THE EMERGENCE OF CHINA AS AN INTERNATIONAL COMPETITOR TO GERMAN MACHINERY MANUFACTURERS

MACHINE TOOLS & MANUFACTURING SYSTEMS, PRECISION TOOLS

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Zu dieser Studie

China ist derzeit der am stärksten expandierende Absatzmarkt für Maschinen und Anlagen weltweit. Mit Zuwachsraten von durchschnittlich 30% in den letzten Jahren ist die VR China inzwischen der drittgrößte Exportmarkt des deutschen Maschinenbaus. Für Werkzeugmaschinen ist China schon heute der größte Absatzmarkt der Welt.

Über dieser China-Euphorie darf aber nicht übersehen werden, dass China selbst heute schon weltweit der viertgrößte Maschinenproduzent ist und intensive Anstrengungen unternimmt, um seine Position auch auf den internationalen Märkten weiter auszubauen. Vor diesem Hintergrund ist es für den deutschen Maschinen- und Anlagenbau außerordentlich wichtig, immer wieder aktuelle Informationen über den derzeitigen Leistungsstand und die weiteren Entwicklungslinien der potenziellen chinesischen Wettbewerber zu erhalten.

Deshalb hat die IMPULS-Stiftung des VDMA Droege & Comp. Singapore Pte Ltd. beauftragt, absehbare Entwicklungen in einzelnen chinesischen Maschinenbaubranchen und deren Kundensortimente zu analysieren sowie die Leistungspotenziale und Strategien der wichtigsten Wettbewerber zu erforschen. Um noch mehr Informationen über die technischen Entwicklungspotenziale zu erhalten, wurde das Institut für Produktionsmanagement, Technologie und Werkzeugmaschinen (PTW) der TU Darmstadt in die Untersuchung einbezogen. PTW hat Universitäten, staatliche und private Forschungs- und Ausbildungseinrichtungen besucht und somit wichtige Hinweise für die weiteren Innovationspotenziale erhalten.

Um mit dieser Studie hinreichend tief in die Märkte einsteigen zu können, sollen die einzelnen Teilbranchen des Maschinenbaus getrennt analysiert und die Ergebnisse dann modular zu einem Ganzen zusammengefügt werden. Begonnnen wurde mit Werkzeugmaschinen, denen bei der Entwicklung des chinesischen Maschinenbaus eine Schlüsselfunktion zukommt, und den damit eng verbundenen Präzisionswerkzeugen. Dazu wurden 27 chinesische Hersteller von Werkzeugmaschinen und 16 Hersteller von Präzisionswerkzeugen vor Ort besucht und zu ihren Aktivitäten befragt. Begleitet wurde die Studie von einem Steering Committee aus Vertretern der untersuchten Maschinenbaubranchen, die Fragen formuliert und die Plausibilität der Berichte über Entwicklungen und Strategien ihrer chinesischen Wettbewerber diskutiert haben. Im Steering Committee wurden auch mögliche Konsequenzen für den deutschen Maschinenbau erörtert.

Der vorliegende Bericht ist eine der detailliertesten Untersuchungen über die Leistungsfähigkeit und Marktstrategien chinesischer Wettbewerber im Bereich der Werkzeugmaschinen- und Präzisionswerkzeugindustrie. Er gibt den Unternehmen des Maschinen- und Anlagenbaus eine wichtige Orientierungshilfe beim Treffen von strategischen und praktischen Entscheidungen.

Unser Dank gilt den Mitarbeitern von Droege & Comp., des PTW und den Mitgliedern des Steering Committees, den Herren Peter Feil (Gühring oHG), Gerhard Hein (VDMA FV Werkzeugmaschinen und Fertigungssysteme), Michael Heim (Gebr. Heller Maschinenfabrik), Dr. Wolfgang Sengebusch (VDMA FV Präzisionswerkzeuge), Ekrem R. Sirman (A. Waldrich Coburg), Hans Vonier (Hermle AG) und Oliver Wack (VDMA Außenwirtschaft).

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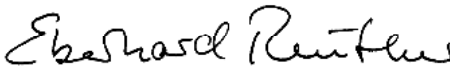

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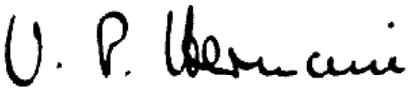

Dipl.-Volkswirt Ulrich P. Hermani
Geschäftsführender Vorstand
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µm	Micrometer [unit]
a	Acceleration
AAME	American Association of Manufacturing Engineers
approx.	Approximately
ASEAN	Association of South-East Asia Nations
bn	Billion
CAD	Computer Aided Design
CAE	Chinese Academy of Engineering
CAM	Computer Aided Manufacturing
CAS	Chinese Academy of Science
CBN	Cubic Boron Nitrite
CD Rom	Compact Disc read-only memory
CDMA	Chinese Die and Mould Industry Association
CEO	Chief Executive Officer
CIMS	Computer Integrated Manufacturing Systems
CIVoTE	Central Research Institute for Vocational and Technical Education
CMES	Chinese Mechanical Engineers Society
CMTBA	China Machine Tools & Tools Builders Association
CNC	Computerized Numerical Control
Corp.	Corporation
CTRI	Chengdu Tool Research Institute
Dept.	Department
DHE	Department of Higher Education
DMG	Deckel Maho Gildemeister [Corp.]
Dr.	Doctor
dwt	Dead Weight Tonnage
e.g.	exempli gratia = for example
EDM	Electric Discharge Machine
EU	European Union
FDI	Foreign Direct Investments
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GE	General Electric
GNP	Gross National Product
H	Height
h	Hours [unit]
HR	Human Resources
HSC	High Speed Cutting
HSS	High Speed Steel
HUST	Huazhong University of Science & Technology
i.e.	id est = that is
IC	Integrated Circuit
ILO	International Labor Organization
ISO	International Standardization Organization
JV	Joint Venture
kW	Kilowatt [unit]

l	Liter
LCD	Liquid Crystal Display
Ltd.	Limited
m	Meter [unit]
M&A	Mergers & Acquisitions
M.Sc.	Master of Science
ME	Mechanical Engineering
min.	Minute [unit]
mio.	Million
mm.	Millimeter [unit]
MOE	Chinese Ministry of Education
MOLSS	Chinese Ministry of Labor and Social Services
MOST	Chinese Ministry of Science and Technology
N	Newton [unit]
NC	Numerically Controlled
nm	Nanometer [unit]
Nm	Newtonmeter [unit]
No.	Number
OEM	Original Equipment Manufacturer
PC	Personal Computer
PCD	Poly Crystalline Diamond
Ph.D.	Doctor of Philosophy
Prof.	Professor
PTW	Institut für Produktionsmanagement, Technologie und Werkzeugmaschinen; TU Darmstadt
R&D	Research and Development
resp.	Respectively
RMB	Renminbi (Chinese Currency) [unit]
RPM	Revolutions per Minute [unit]
SME	Small/Medium Enterprises
SMSE	School of Mechanical Science & Engineering in Wuhan
SMTCL	Shenyang Machine Tool Corp. Ltd.
SOE	State Owned Enterprise
t	tons (1.000kg) [unit]
TEUs	Twenty (Foot Container) Equivalent Units
TU	Technische Universität
UK	United Kingdom
US	United States
US$	US Dollar [unit]
USA	United States of America
USD	United States Dollar
VAT	Value Added Tax
VDMA	Verband Deutscher Maschinen- und Anlagenbau e.V.
VDW	Verein Deutscher Werkzeugmaschinenfabriken
VET	Vocational Education and Training
W	Watt [unit]
W	Width
WFOE	Wholly Foreign Owned Enterprise
WTO	World Trade Organization

Chapter 1: Introduction

1 Introduction

The Chinese economy grew 8% per annum on average over the last 20 years. During that period China attracted more than US$ 900 billion of Foreign Direct Investments (FDI) and is the world's largest recipient of FDI today. Foreign investors flock to China because of the anticipated twin benefits of investing in a large domestic economy with 1.3 billion consumers and using its cheap labour force as a basis for manufacturing and global exports. Foreign Invested Enterprises (FIE) have meanwhile become the main driving force of China's 438 US$ billion exports in 2003. Up to 50% of these exports, however, consist of imported components so that import substitution will very soon become a major issue.

As a result, the machinery industry in China has grown tremendously over the last 3 years and domestic machine tool production has now reached a volume of US$ 2.9 billion. The production volume combined with imports of US$ 3.2 billion have made China the world's largest consumer of machine tools. This trend is expected to intensify with China's accession to the WTO in 2006.

These emerging trends prompted the IMPULS Foundation to investigate if and when the first Chinese machinery manufacturers would appear on the global stage as competitors to Western machinery manufacturers, and how they would enter the market. The Foundation entrusted Droege & Comp. in collaboration with the Institute of Production Management, Technology and Machine Tools (PTW) of the Technical University Darmstadt to examine the current status of the machinery industry in China and to assess the future impact of the Chinese machinery industry as an emerging competitor for German machinery manufacturers on the International stage. The first two specialist groups chosen from within the VDMA were the machine tools and the precision tools group.

For both groups, we conducted extensive research, but found out fairly quickly that the available data were not coherent, not reliable, outdated or in most cases simply not publicly available. We therefore decided to visit the largest enterprises in China, meet with senior management, explain our mission and ask them to share with us the information we required. Occasionally we managed to inspect the factories and speak to middle management as well.

Our visits took place during 3 months in 2003/2004. Our findings put to rest the traditional view that state-owned enterprises in China cannot change and will always remain backwaters of international technical development. We did not encounter firms with low-paid labour forces employed under dismal conditions, driven by the desire to fulfil the state quota and to contribute towards the development of their nation. Instead we observed signs of a paradigm shift. Privatization is shifting priorities in firms and in families alike. *Getting rich* is glorious, not to fulfill the quota. "To make money" has become the new mantra and "it does not matter whether the cat is white or black, as long as it catches mice." (Deng Xiaoping).

Privatization is taking the country by storm, private property is now protected by law and private entrepreneurs can become members of the Communist Party. This major shift is reflected directly in the company managers' attitudes and in the country's changing infrastructure.

Whereas Chinese companies in the past were very careful not to disclose any information at all for fear of being accused of having released confidential information to outsiders, the same managers now provided us with professionally-made catalogues and CD ROMs and requested that these be freely circulated in Germany, but not to be disclosed to their domestic competitors.

This document is the result of our investigations carried out through our offices in Singapore, Beijing and Shanghai on the industry sectors of the Chinese machine tool and precision tool manufacturers. Most of the researched data were only available in Chinese or English. To minimize losses due to translation we decided to prepare this report in English.

We believe that the changes we observed are irreversible and that China will soon again assume her prominent position in the league of countries which she had dominated for centuries in the past. Some of this belief is reflected in the changed attitude of many Chinese managers. They radiate confidence. They are financially strong and ready to take over German companies. They are flexible in their approach and adapt different world views. They are now ready for true, global partnerships.

In our survey we confined our investigation to domestic Chinese enterprises. We did not consider joint ventures or cooperations with foreign companies as foreign influence would have distorted the picture and the true state-of-affairs of the home-grown Chinese industries.

We believe we conclusively demonstrate with this report that there are many opportunities for German machine tool manufacturers and precision tool manufacturers to form true partnerships with the emerging Chinese giants as long as this offer is still appreciated by the Chinese. But the message is clear. Wait for too long and the Chinese will take the initiative. *They* will then select their partners and dictate the terms of the deal.

We firmly believe that in commissioning the report the IMPULS foundation made a timely decision. It provides, for the first time, the current status of the industry in China one year before WTO. China today is not the "Middle Kingdom" of old where "Opening to the West" meant opening the Chinese doors to let the foreigners come in. Now, for the first time since the Ming Dynasty, Chinese entrepreneurs are preparing themselves to enter the global markets and let their products compete with Western products in Western countries in Western cultures with Western methods. We firmly believe that the Chinese will master this challenge despite many threats that still exist and may have to be addressed.

2 Executive Summary

Der zukünftige Auftritt Chinas als globaler Wettbewerber des deutschen Maschinenbaus

2.1 Management Zusammenfassung

Mit einem durchschnittlichen Wachstum von 8% in den letzten 20 Jahren ist China der dynamischste Markt der Welt. Der Spitzenwert von 9,1% im vergangenen Jahr löste bereits bei manchen Analysten Warnungen vor einer Überhitzung der Konjunktur aus.

Auch im Jahr 2003 hielt der Zustrom ausländischer Direktinvestitionen an. US$53,5 Milliarden wurden gemeldet, und man erwartet, dass die US$80 Milliarden-Grenze in wenigen Jahren überschritten wird. Die meisten ausländischen Unternehmen wollen durch ihr China-Engagement die Vorteile des vermeintlich riesigen Binnenmarktes nutzen und gleichzeitig eine Produktionsbasis für preiswerte Exportprodukte in die Region aufbauen.

China ist mittlerweile auch zum größten Werkzeugmaschinenmarkt der Welt herangewachsen. Mit US$7,2 Milliarden hat China die traditionellen Spitzenreiter Japan und Deutschland verdrängt. Mehr als die Hälfte des gesamten Marktvolumens besteht aus Importen. Unter den weltweiten Werkzeugmaschinenproduzenten liegt China mit US$3,4 Milliarden auf Platz 4. Die Werkzeugmaschinenbranche ist weltweit tätig und man würde vermuten, dass die Chinesen auch hier bereits eine signifikante Rolle spielen. Zur Zeit werden jedoch nur 10% der lokal produzierten Werkzeugmaschinen exportiert. Einer weltweiten Expansion der chinesischen Maschinenbauer stehen noch grundlegende strukturelle Mängel wie z.B. Verfügbarkeit qualifizierter Arbeitskräfte und ineffiziente Organisationsstrukturen entgegen. Darüber hinaus sind die Chinesen mit dem westlich strukturierten globalen Geschäftsumfeld nur wenig vertraut, und ihre Managementstrukturen weisen gravierende Mängel auf.

Wir glauben allerdings, dass die chinesischen Werkzeugmaschinenbauer zunehmend in den Export gehen werden, weil sie so der erdrückenden einheimischen Konkurrenz entgehen und sich gleichzeitig die Devisen für weitere Expansion beschaffen können.

Während die ausländischen Unternehmen in China bereits die Potentiale billiger Arbeitskräfte nutzen und somit ihre weltweite Wettbewerbsfähigkeit steigern, haben die chinesischen Unternehmen diesen Vorteil noch nicht in massive Exporte umgesetzt. Bei der Umtriebigkeit der neuen chinesischen Manager wird es allerdings nicht mehr lange dauern, bis die ersten einheimischen Firmen diesen Wettbewerbsvorteil zu ihrem eigenen Vorteil nutzen.

Zugang zu technischem Fachwissen ist nicht das dringendste Problem. Die chinesischen Maschinenbauer sehen genug Potential in den weltweiten

Niedrigpreismärkten und wollen zunächst diese Vorteile ausnutzen. Sie wissen mittlerweile auch, wie schwierig es ist, die Grenzbereiche der bestehenden Werkzeugmaschinentechnologie zu verbessern und haben weder die Forschungs-Infrastruktur noch die Absicht, ihre Gelder in diesen Bereichen zu binden. Falls in der einen oder anderen Nische tatsächlich Bedarf nach höherwertigen Komponenten besteht, wollen die Chinesen sich diese auf den Weltmärkten kaufen – im Einzelfall kann das sogar die Übernahme des Komponentenherstellers bedeuten. Hier werden wir in Zukunft nicht mehr die armen chinesischen Technologiebittsteller oder –kopierer sehen, sondern selbstbewusste chinesische Unternehmer, die ihre Kooperationsangebote zur Not auch mit dem Geldbeutel unterstützen. Dieser optimistische Ausblick der Chinesen liegt in vielen Fällen noch in einer Selbstüberschätzung der eigenen Möglichkeiten und in der Unkenntnis der Anforderungen westlicher Märkte begründet. Sobald die Chinesen in den internationalen Märkten auftauchen, werden sie ihre Erwartungen schnell anpassen müssen.

Um die oben geschilderten erwarteten Entwicklungen näher zu untersuchen, beauftragte die IMPULS Stiftung des VDMA die Unternehmerberatung Droege & Comp. Asia mit der Untersuchung des heutigen und zukünftigen technologischen Niveaus des chinesischen Maschinenbaus. In einer ersten Phase wurden hierzu für die Fachverbände Werkzeugmaschinen und Präzisionswerkzeuge entsprechende Detailstudien der chinesischen Geschäftsumfelder durchgeführt. Kapitel 6 enthält die Untersuchung für den FV Werkzeugmaschinen und Kapitel 7 gibt die Situation der Präzisionswerkzeuge und Messmaschinen wieder. In Kooperation mit der Technischen Universität Darmstadt wurde gleichzeitig das heutige Niveau der technischen Ausbildung in China analysiert, um daraus die Qualifikation der zukünftigen chinesischen Werksmanager ableiten zu können (siehe Kapitel 8).

Wir besuchten die größten chinesischen Werkzeugmaschinenhersteller und griffen vielfältige Daten bei den Interviews mit den Top-Managern ab. Ein Fragebogen wurde zum Schluss der jeweiligen Gespräche übergeben, aber hier gab es nur wenige Rückläufer, die komplett ausgefüllt waren. Die in den Interviews gewonnenen Informationen wurden durch Produktkataloge ergänzt. Ausgewählte Maschinen und Spezifikationen, die unserer Meinung nach den aktuellen Stand der Technik widerspiegeln, sind sowohl im Textteil der Studie als auch im Anhang und in der beigefügten detaillierten Datenbasis aufgeführt. Bezüglich der Kataloge und weiterer Informationen wurde ein deutlicher qualitativer Unterschied zwischen den Werkzeugmaschinenherstellern und den Präzisionswerkzeugherstellern festgestellt. Während die Maschinenhersteller bereits über sehr gute Kataloge, meist mit beigelegter CD-ROM, verfügen, war es schwierig, Produktdetails der Präzisionswerkzeughersteller zu erhalten. Hier wird Information noch als etwas Vertrauliches behandelt, welches nur in kleinen Dosen und nach vorheriger Absprache mit höheren Instanzen an Ausländer weitergegeben wird. Die Werkzeugmaschinenhersteller hingegen gaben uns ihre Kataloge und baten, diese in Deutschland zu verteilen, aber sie nicht an ihre eigenen chinesischen Konkurrenten weiterzugeben.

Chapter 2: Executive Summary

Details des chinesischen Entwicklungsstandes in der Werkzeugmaschinen- und Präzisionswerkzeugindustrie sowie Vorhersagen über zukünftige Entwicklungsszenarien sind in den zwei Detailberichten der Studie enthalten.

1. **Strategische Alternativen deutscher Hersteller**
   Auf Grund unserer Gespräche und Besichtigungen Vorort sind wir zu der Überzeugung gelangt, dass es mehrere Alternativen für deutsche Werkzeugmaschinenhersteller gibt, der zukünftigen chinesischen Herausforderung auf den Weltmärkten zu begegnen. Der „richtige" Weg hängt dabei immer von den speziellen Gegebenheiten des einzelnen Maschinenbauers ab. Wir glauben aber, dass die Entwicklung innerhalb der folgenden Rahmenszenarios stattfinden wird:

2. **Ignorieren, das chinesische Strohfeuer ist bald vorbei**
   Einige Analysten äußern Bedenken, dass die chinesische Wirtschaft sich überhitzt. Die notwendigen Korrekturen werden zu einer starken und plötzlichen Kontraktion der Wirtschaft führen. Detaillierter Aussagen zu Herausforderungen und Risiken diesbezüglich finden Sie im Anhang 11.1.

3. **Chinesen mit ihren eigenen Waffen schlagen: Deutsche Billiganbieter**
   Deutsche Werkzeugmaschinenhersteller können die Kapazitätsauslastung und Produktivität ihrer Fertigungsstandorte in Europa verbessern und möglicherweise ihre Wettbewerbsfähigkeit durch Verlagerung von lohnintensiven Fertigungsschritten in die neuen EU Mitgliedsstaaten erhöhen. Verbesserte Fabrikauslastung verbunden mit billigen Zulieferungen aus Osteuropa ermöglicht es deutschen Werkzeugmaschinenherstellern, auf dem Weltmarkt relativ kostengünstige Maschinen anzubieten, die dennoch das Qualitätsmerkmal „Made in Germany" tragen.

4. **Wiederbelebung deutsch-chinesischer Kooperationen**
   In den 80er und frühen 90er Jahren wurde eine Reihe von Partnerschaften (Joint Ventures) zwischen deutschen und chinesischen Unternehmen gegründet. Obwohl diese Abkommen anfangs als nicht sonderlich erfolgreich eingeschätzt wurden, räumen viele chinesische Firmen heute ein, dass sie von diesen Kooperation profitiert haben. Die Vorteile lagen ihrer Ansicht nach nicht nur im Wissenstransfer, sondern auch in der damit verbundenen umfassenden Ausbildung und Dokumentation. Chinesische Jungunternehmer schätzen diese Form der Kooperation und streben eine Fortsetzung an, wenn auch in einer veränderten Form von Partnerschaft.

5. **Weltweite Partnerschaft**
   Viele Chinesen sind davon überzeugt, dass der Weg zum langfristigen Erfolg in der Kombination von deutscher Technik mit chinesischen Niedriglöhnen liegt. In solch einer Partnerschaft könnte zum Beispiel die untere Produktpalette eines deutschen Werkzeugmaschinenherstellers von OEM-Maschinen und -Werkzeugen aus China abgedeckt werden, während der deutsche Partner den oberen Bereich bedient. Im Zwischensegment könnte eine Kombination von deutschen Herzstücken mit chinesischen Standardkomponenten die internationale Wettbewerbsfähigkeit erhöhen. Der chinesische Partner könnte auch den Vertrieb und die Wartung der Kooperationsmaschinen in China übernehmen. Vereinzelt werden bereits Vorstöße von chinesischen Firmen unternommen, Mehrheitsanteile an deutschen Maschinenbauern zu übernehmen, um sich damit die Zuneigung des deutschen Partners zu erkaufen.

6. **Der japanische Weg**
   Hersteller von Systemkomponenten entwerfen ihre Produkte so, dass sie mit einer Vielzahl von Maschinensystemanbietern kompatibel sind. Im Gegensatz dazu bevorzugen Systemanbieter den Verkauf integrierter Werkzeugmaschinensysteme. Einige japanische Hi-Tech Hersteller haben damit begonnen, Standardkomponenten für ihre Produkte von japanischen Zulieferern zu kaufen und diese dann an die speziellen Erfordernisse ihrer Werkzeugmaschine anzupassen. Damit können die Komponenten und die Software nur noch vom Systemhersteller gewartet werden. Das gesamte technische Wissen und alle Modifikationen bleiben das Geheimnis des Herstellers und es wird für Nachahmer sehr schwierig, Prozesse und Komponenten zu kopieren.

7. **Auf eigene Findigkeit vertrauen, Erfolg durch Innovation**
   Viele deutsche Werkzeugmaschinenhersteller haben in ihrer speziellen Marktnische eine starke Position in den Weltmärkten. Sie vertrauen auf ihre eigene Findigkeit und die Fähigkeit, jederzeit sowohl filigrane Detailverbesserungen als auch technologische Quantensprünge erreichen zu können. Die andauernde Fähigkeit der deutschen Hersteller, aus vielen verschiedenen Industriezweigen, Prozessen und Technologien völlig neuartige Anwendungen und Maschinen zu entwickeln, stellt auch in Zukunft sicher, dass der deutsche technologische Vorsprung vor den chinesischen Produkten auf absehbare Zeit nicht abnimmt.

Schlussfolgerung

Die chinesischen Werkzeugmaschinenhersteller durchlaufen einen grundlegenden Wandel ihres Geschäftsmodells, der zu intensivem Wettbewerb innerhalb Chinas führen

wird. Die Firmen, die diesen Wandel überstehen, werden sehr schlank und wettbewerbsorientiert sein und sich daher auch nicht mehr mit der bloßen Rolle der „Fabrik der Welt“ zufrieden geben. Sie werden die Gelegenheit ergreifen, ihre Wettbewerbsfähigkeit zu verbessern, indem sie das mittlerweile vorhandene Qualitätsmerkmal „Made in China“ mit den aus niedrigen Löhnen resultierenden Kostenvorteilen verbinden. Dies wird zunächst mit Exporten in Schwellenländer beginnen, kann aber auch beispielsweise im Gefolge eines Großauftrages eines chinesischen Automobilherstellers erfolgen. Die Chinesen werden die notwendigen Lernkurven bei Reparatur, Anwenderunterstützung und Management relativ schnell durchlaufen und sich als selbstbewusster Lieferant im unteren Bereich der Standardmaschinen auf den Weltmärkten etablieren. Auch als OEM Lieferanten werden die Chinesen wichtiger, wobei sie da von den Erfahrungen der chinesischen Konsumgüterhersteller profitieren. Wenn im OEM-Geschäft die Marktkenntnis erworben ist, wird man zum Vertrieb eigener Marken übergehen. Aber diese neuen Marken stellen zunächst keine Gefahr für die deutschen Werkzeugmaschinenhersteller dar, da die Chinesen ihren Schwerpunkt auf die Billigmärkte der Welt legen und nicht auf schwer zugängliche Marktnischen modernster Werkzeugmaschinentechnik. Die Chinesen wissen, dass sie mehr Erfahrung mit dem westlichen Wirtschaftssystem sammeln müssen, bevor sie sich dem internationalen Wettbewerb stellen können.

2.2 Management Summary

China is the most dynamic market in the world. For the past 20 years the country grew on average by 8% p.a. and topped that by adding 9.1% growth in 2003, seemingly unaffected by 9/11, SARS, bird flu epidemics and global volatility.

Foreign Direct Investment (FDI) continues to pour into the country at a rate in excess of US$ 53.5 billion p.a. Most foreign invested enterprises (FIE) come to China because of the double benefits of a large domestic market with 1.3 billion consumers and the use of China with its cheap labour force as a global export base for their products.

For instance, China now ranks number 4 among the global machine tools manufacturers with a total production worth almost US$ 3.4 billion. Of these only 10% are currently exported. But there are powerful incentives for China's manufacturers to go abroad, above all the paradigm shift in the structure of the Chinese machinery industry, domestic competition and the attraction of better margins overseas. Presently the expansion drive of Chinese enterprises is still limited by the need to restructure their internal organizations, by the general lack of qualified staff, and by their inexperience with Western markets and management methods.

The Chinese firmly believe they can more than make up for these weaknesses and that, in time, they will be able to master these challenges and dominate the global markets. Most of the existing FIEs use low Chinese labour costs to improve their global competitiveness. The Chinese entrepreneurs are convinced that they can use the same low labour cost advantage for their own export products, and probably make better use of it than the FIEs. Access to Know-How is no immediate problem. Chinese machine manufacturers see enough potential in the global low- and medium-technology markets to keep them busy for years. If special components or technologies are needed, Chinese companies, awash with cash, might just buy what is required. This optimistic view is not clouded by much global experience yet and will have to be adjusted substantially once Chinese managers begin their "Journey to the West".

The IMPULS Foundation of the VDMA commissioned Droege & Comp. Asia to examine the present and future technological level of the Chinese machinery industry as well as the general business situation in the machine tool industry (refer to chapter 6) and the precision tool industry (refer to chapter 7) in China. In collaboration with the Technical University of Darmstadt, Droege & Comp. also examined the level of technical education prevailing in present China in order to predict the qualifications of future Chinese technical managers and machine operators (please refer to chapter 8).

At the end of our interviews we asked all interviewees to complete our standard questionnaire and we received some feedback on these. However there was a marked difference between the machine tool manufacturers and the tooling manufacturers. Whereas the standard catalogues of the machine tool manufacturers have now reached almost Western standard with glossy pictures, good quality printing and accompanying CD ROM data, the tooling manufacturers were hesitant even to let us have standard

catalogues of their products for fear of releasing too much information to outsiders. Also, among the machine tool manufacturers we were encouraged several times to distribute their brochures in Germany, but we were always asked not to let the Chinese competitors have any of that information.

1 Alternative strategies for German manufacturers

Based on the results of our discussions and inspections, we believe that there may be more than one "correct way" to get prepared for the emergence of China as a global competitor to the German machine tool industry. We anticipate several approaches:

2 Ignore the development, Chinese success will be short-lived

Some analysts are getting worried that the Chinese economy is overheating and that the combination of economic and political developments will eventually trigger a sharp contraction of the Chinese economy. For more on the risks and challenges, we refer to Annex 11.1.

3 Beat the Chinese at their own game: manufacture and export low-cost machines

German machine tool manufacturers are able to increase the utilization and efficiency of their manufacturing plants in Europe and may be able to improve their competitiveness by shifting more labour-intensive work to the new EU member states. Increased utilization rates coupled with cheap suppliers from Eastern Europe would enable the German machine tool manufacturer to offer relatively low cost machine tools in the world market which still bear the label "Made in Germany".

4 Revive the Sino-German co-operation

During the 80's and 90's, a number of joint ventures between German and Chinese companies were concluded and although most of these ventures were not very successful, many Chinese companies today acknowledge the benefits that came from these co-operations. They have come to respect the German way of transferring not only know-how, but also ensuring that it was accompanied by extensive training and documentation. The Chinese entrepreneurs feel comfortable with this kind of cooperation and would like to continue, albeit at a different level of partnership.

5 Global partnership

The Chinese believe that the winning formula is combining German technology with Chinese low-cost labour. In such a partnership, Chinese-made OEM machine tools could form the lower end of the product range of a German

machine tool manufacturer with obvious advantages: the Chinese partner would ensure a proper marketing of the German machine tool partner's products in China and would take care of the manufacturing of the lower end of machine tools. The German partner would be in charge of technology, design, and prototype manufacturing of the top tier machine tools.

6 The "Japanese Way"

Manufacturers of machine tool components design their products in such a way that they are compatible with a large number of system manufacturers. System manufacturers, however, prefer to sell one integrated machine tool system rather than just components. Some Japanese hi-tech manufacturers purchase standard components for their machinery from Japanese suppliers, but re-program or modify these components to suit the requirements of their complete machinery system. They also take over the after-sales-service functions for the modified components, so that only the Japanese system manufacturer is able to sell, install and maintain his system on site. All knowledge regarding design and adaptations stay within the company and copying of processes or components becomes extremely difficult.

7 Trust in one's own ingenuity and prosper through innovation

Many German machine tool manufacturers occupy a global product niche where they have only few competitors. They trust their own ingenuity and ability to not only design incremental improvements of existing machine systems, but also to achieve quantum leaps in innovation. The ability of the German machine tool manufacturer to meld various industries, processes, technologies and market trends into new machine tools for new applications in new industries will ensure that the technology gap between the German and Chinese products will not narrow for quite some time.

Conclusion

The Chinese machine tool manufacturers are going through a paradigm shift that will lead to intense domestic competition. Those who survive the shake-out will be lean and fit organizations that are no longer content with being "the extended workbench of the world". They will grasp the opportunity to improve their competitiveness by combining solid "Made in China" quality with domestic low labour cost advantages. This will result in Chinese manufacturers selling standard machine tools for mass production to the developing world. However, these companies will go through a steep learning curve as far as after-sales services and technical applications are concerned. At the same time, the Chinese will communicate their multi-industry OEM experience and quickly develop strategies on how to establish their own brands. These brands will not constitute an immediate threat to German machine tool manufacturers because the Chinese see their priorities in the low-cost markets of the world and not in the hard-to-reach niches of

state-of-the-art machine tools. The Chinese realize that they must gain more experience with the western market economy before they can compete at that level.

3 Present situation and goal of the project

While the world economy is characterized by a phase of high volatility and slow growth, China continues to power ahead at an average GDP growth rate of more than 8% p.a. (9.1% in 2003)[1]. The machinery industry shows an even stronger growth rate with an average increase of 15% p.a. It is estimated to reach an annual volume of US$ 405 billion by the end of 2005.[2]

China is the largest recipient of Foreign Direct Investments (FDI) worldwide exceeding even that of the United States[3]. The machinery industry as one of the major beneficiaries of this development experienced several cycles of rapid development between 1990 and 2000. During this period, FDI related projects with a contractual value in excess of US$ 900 billion were launched. These foreign invested enterprises meanwhile account for 55% of China's total exports and 80% of all high-tech exports.[4]

With China's accession to the World Trade Organization (WTO) the confidence of foreign investors in the Chinese market is expected to increase. Correspondingly, FDI is also expected to rise from US$ 53.5 billion in 2003 to US$ 80 to 100 billion in 2010. Most foreign investors expect a dual benefit from their investment: to gain access to allegedly 1.3 billion consumers, and to manufacture high-quality goods for world-wide exports at lowest possible costs. Investors are also prepared to commit themselves to long-term plans as many do not expect the general market conditions in China to deteriorate. It is a widely held belief that an estimated 800 million workers in the countryside will continue to supply cheap labour for many years to come.

As a result, Chinese-made products increasingly find their way to Western markets as illustrated by China's US$ 124 billion trade surplus with the US.

As Chinese machinery manufacturers become more market-oriented they gain experience of Western markets as OEM suppliers to Western firms. They also see the foreigners flocking to China to reap the benefits of manufacturing competitive products at low labour costs for export to global markets. Chinese managers are increasingly coming round to the idea that they can also reap these benefits. They want to export their products to global markets, too. Thus, it is the foreign firms themselves that provide strong incentives to the Chinese to move towards global exports.

For many years China was seen by many Westerners as a monolithic, state-run economy where the Communist Party controlled the economy and allocated resources across industries. State-owned enterprises in the machinery industry had to fulfil certain tasks and functions. There was no competition as it was considered a duplication of effort and a waste of state money. Now, with the privatization of state-owned enterprises they no longer command a 100% market share in their respective markets. Instead they have to compete against other private companies that are transgressing into their home turf in search of new business opportunities.

Chapter 3: Present situation and goal of the project

The combination of China's WTO accession, the continued influx of FDI and the domestic machinery boom increase the danger of an overheating economy. Some analysts warned that this may be only a few months away. In the light of this threat many Chinese enterprises accelerate their restructuring programs and utilize the proceeds from sales of old land and assets to invest in new property and new manufacturing facilities. These developments will result in a rapid increase in machinery manufacturing capacity and eventually lead to a large over-capacity in the machinery sector. This over-capacity in turn will lead to intense domestic competition within China.

The inevitable shake-out will eventually produce lean Chinese manufacturers who run their manufacturing enterprises according to professional Western methods and manufacturing processes. This will help to drive costs down even further, but it will also increase the manufacturing quality. As a result new specialist groups for certain aspects of the machinery industry will emerge.

China's tenth Five Year Plan (2001-2005) aims to improve the machinery industry's structure to accelerate the development of products and to strengthen the competitiveness of Chinese machinery manufacturers.

The focus of this study is the examination of the technical development that is presently taking place in China. As mentioned above, investments flow into China that enable the old and traditional machinery industry to upgrade and renew themselves. Decisive for the success of an enterprise in this industry are its ability, competence and level of technological sophistication. In this study we analyze these technical capabilities in order to infer if and when Chinese manufacturers will be able to reach world-class level and become competitors on international markets. We examine the effects on international and German manufacturers arising from possible moves of the Chinese machinery industry, make recommendations how to prepare for such an encounter, and explore alternative avenues on how to cope with these challenges.

4 Methodology

At the initial stage of the study we conducted extensive desk-top research in both English and Chinese libraries to obtain general data. These provided us with an overview of the Chinese economy in general and the machinery industry in particular, but they were insufficient to serve as a clear and accurate foundation for a projection of the future development. This is to some extent due to the limited availability of detailed statistics, particularly for such a specialized field, but also because of the low reliability of Chinese sources which are quite often inconsistent with other sources. There are several ranking lists all placing emphasis on different parameters like customs statistics, provincial statistics, CMTBA ranking, investors, group turnover, etc. In addition, a large part of the relevant information is not publicly available and regarded as confidential by many Chinese manufactures.

We thus mobilised our network of Chinese advisors, who are experts in various specialized fields. This collaboration opened many doors and provided us with some of the background information we were seeking.

To overcome the problems and limitations of desk-top research the main part was done through field research in China. We visited more than 40 of the major manufacturers and players to gain inside knowledge about current developments in the Chinese machinery industry. A visit typically included a structured interview that provided data and information which we fed into a detailed database. The database was used later for statistical analysis and to corroborate our findings. We also relied on support from relevant business associations. Interviews with leading representatives proved insightful for our study and helped in tracking trends and transformations of the industry.

Although the main task of our project was to examine the Chinese machinery industry, we also felt that it was necessary to analyze the present level of technical education at Chinese universities, research institutes and large enterprises. German machinery is usually complex and may seem difficult to operate to the uninitiated, but in the hands of a well-trained operator it can really show its potential and demonstrate impressively that a well-maintained piece of equipment in the hands of a skilled operator can achieve process quality, product reliability and manufacturing speed that is second to none. We therefore collaborated with the Institute for Production Management Technology and Machine Tools (PTW) of the Technical University Darmstadt, to answer the following questions:

- What is the level of practical research and technical development at Chinese universities? Also, what is the level of sophistication of present university curricula and what qualification do university graduates in China have today? What will it be like in the future?

- What is the present level of R&D work in traditional research institutes and what kind of technical education and training are these institutes providing?

- What is the level of corporate training? What programs are being offered, what is the qualification of the graduates, and which positions are graduates moving into?

Similar to our own approach, the PTW of the TU Darmstadt visited the main universities and research institutes in China and spoke to the relevant professors, lecturers and managers directly. Their findings are reflected in a separate part of this report and provide the link to the future machinery manufacturing part in the People's Republic of China.

5 Development of the Chinese machinery industry

The machinery industry represents the largest single industry in China. It comprises the following major sectors: Machine tools, automotive, apparatus and meters, electrical engineering and electrical appliances, engineering machinery, mining machinery and agricultural machinery.

Due to the increasing impact of the various reform initiatives, changes and the overall opening of China, the Chinese machinery industry has recently experienced rapid growth (32% from 2002 to 2003)[5]. Conservative estimates predict an annual consumption volume of about US$ 405 billion by the end of 2005 which represents an average annual growth rate of 15% since 1998. China is now the world's largest consumer of machine tools, followed by Germany, Japan and the USA.[6]

China's foreign trade volume of machinery products jumped 50% from US$ 103.8 billion in 2002 to US$ 155.9 billion in 2003.

The export of machines reached US$ 58.3 billion in 2003, a rise of 48.9% compared to 2002. China exports mainly labour-intensive and low-tech mechanical installations as Chinese companies have competitive advantages in these fields.

In 2003, China's machinery product imports reached US$ 97.6 billion, a rise of 51% against 2002.

In the same year, the industry saw a foreign trade deficit in the machinery sector of US$ 39.3 billion which can be attributed partly to an increase in imports of advanced technology and equipment from industrialized countries.

Japan has remained China's largest machine trade partner for eleven straight years, followed by the USA and the EU. China has also shown larger growth in machine trade with other regions, such as ASEAN.[7]

With the signing of the WTO accession treaty in 2001 China committed herself to conforming to the international rules of foreign trade, eliminating trade barriers and opening her markets for foreign investors. Hence there is a need for Chinese enterprises to adapt to these standards and achieve international competitiveness. Furthermore, for the Chinese machinery industry it is vital to acquire new technologies and management skills in order to succeed in this as yet unfamiliar competitive environment. Under the WTO agreement the Chinese machinery industry has reduced the average tariff for industrial products to 11.6% and for mechanical products to 9.6% in 2002. Quotas will remain in place for a few imported mechanical products such as automobile products, until 2005.[8]

Until 1978, output of the machinery industry was dominated by large state-owned enterprises (SOEs) which were founded between 1950 and 1980 in a planned

economy. Many factories still face a number of issues that need to be resolved as they were not addressed at the time:

- Obsolete manufacturing equipment, product and production technologies lead to lower productivity and lower quality.

- Business management: Companies were not reorganised after China opened its economy to Western markets in the 1980s. Their organizational structures and management processes do not meet the requirements of a market economy yet.

- Low R&D activities along with relatively low efficiency: Most of the sophisticated manufacturing equipment and product technologies are imported from highly developed industrialized countries (Japan, Germany, USA, etc.).

However, during the 1980s the structure of China's secondary industry changed fundamentally. Since then, much of the output growth in manufacturing came increasingly from private entrepreneurs or foreign investors, either in wholly foreign owned enterprises or joint ventures with Chinese interests. Many shortcomings arising from the past were addressed in the “Tenth Five Year Plan” (2001-2005): The major task is restructuring the industry, enhancing the level of management and administration, and promoting industry reform. Meanwhile, many of these developments are either implemented or underway, changes are already visible and as a result the technology of Chinese machinery industry is reaching new heights.

Within the last few years, great progress in the field of high tech and high value-added products can be noticed. The Chinese machinery industry increasingly applies imported core technology and complements this development by intensifying R&D activities.

Vigorous demand for automobiles has become one of the driving forces for the industry's rapid growth. Statistics show that China produced 4.4 million vehicles in 2003, up 35.2% from the previous year. Of the whole machinery industry, the automobile sector now accounts for 37% of sales volume and 48% of profits.

Such intense growth has prompted some economists to worry about overcapacity in some sectors. During recent years, the Chinese market has been flooded with investments from all major producers in the world. Concerning the market for cars, for instance, China is likely to reach overcapacity within two years.

6 Machine tool industry

Der zukünftige Auftritt Chinas als globaler Wettbewerber des deutschen Maschinenbaus

6.1 Zusammenfassung Werkzeugmaschinenbau

Die chinesische Werkzeugmaschinenindustrie befindet sich im Umbruch. Der Wandlungsprozess wurde ausgelöst von dem Bestreben der chinesischen Regierung, die Staatsbetriebe auf breiter Front zu privatisieren, und wird sich in Zukunft eher noch beschleunigen als abschwächen. Der Beitritt Chinas zur Welthandelsorganisation (WTO) zwingt die chinesischen Betriebe, sich auf das Erscheinen internationaler Konkurrenten im chinesischen Heimatmarkt vorzubereiten.

Ziel der Studie war es, den gegenwärtigen Stand der chinesischen Werkzeugmaschinentechnologie zu ermitteln, um daraus Rückschlüsse auf das zukünftige Verhalten chinesischer Werkzeugmaschinenhersteller im Binnenmarkt und auf Exportmärkten ziehen zu können.

Wir haben unsere Untersuchungen begonnen mit einer Sichtung des vorhandenen Statistikmaterials der China Machine Tools & Tools Builders Association (CMTBA). Diese Zahlen dienten uns dann als Ausgangsbasis für nachfolgende Interviews, und diese wurden dann entsprechend aktualisiert. Das CMTBA Jahrbuch aus dem Jahre 2003 gibt den Stand der chinesischen Werkzeugmaschinenindustrie im Jahre 2001/2002 wieder, und spiegelt daher die dramatischen Veränderungen der letzten drei Jahre nur unvollständig wider. Um den wirklichen Status der Werkzeugmaschinenindustrie zu ermitteln, haben wir 27 Werkzeugmaschinenhersteller besucht und mit den jeweiligen Führungskräften persönliche Gespräche geführt. Es war schwierig, konkrete und detaillierte Informationen hinsichtlich der Firmenentwicklung zu erhalten, da die meisten Führungskräfte nur zögerlich Auskunft gaben oder einfach die Daten nicht parat hatten. Überreste der alten Einstellung, wonach Firmeninformation nicht an Ausländer gegeben werden dürfen, sind immer noch feststellbar. Dort, wo das Top-Management durch jüngere Experten ersetzt wurde, besteht die Zurückhaltung nicht mehr.

Privatisierung von Staatsbetrieben
Traditionell waren alle staatlichen chinesischen Werkzeugmaschinenhersteller von strategischer Bedeutung und in der Regel eng mit dem Militär verbunden. Marketing war nicht gefragt, denn der Staat hatte dem Hersteller eine Nische zugewiesen mit genauer Angabe der zu fertigenden Produkte. Damit hielten manche Hersteller einen automatischen Marktanteil von 100% für bestimmte Maschinen. Diese Staatsbetriebe erwiesen sich jedoch langfristig als teuer, ineffizient und wenig innovativ. Im Zuge der WHO-Verpflichtungen muss China auch seine 120.000 Staatsbetriebe neu

organisieren, und wir schätzen, dass mittlerweile mehr als die Hälfte entweder bereits privatisiert ist oder gerade dabei ist, privatisiert zu werden. Jeder der von uns besuchten Werkzeugmaschinenhersteller hatte den Privatisierungsprozess entweder bereits abgeschlossen oder war gerade kurz davor. Der Staat hat in den meisten Fällen seinen Aktienanteil auf weniger als 50% reduziert. Die verbleibenden Aktien waren entweder von der Stadtverwaltung, individuellen Investoren, Arbeitnehmern oder Vermögens-auffanggesellschaften (asset management companies) übernommen worden.

Ein besonders interessanter Aspekt des Privatisierungsprozesses der Werkzeugmaschinenindustrie ist, dass die privatisierten Staatsbetriebe im ersten Schritt von ihren vielfältigen finanziellen Schachtelverbindlichkeiten zu Banken, Lieferanten, Institutionen und Kunden befreit werden, was ihnen einen frischen Start ermöglicht. Im zweiten Schritt hilft die Regierung den Staatsbetrieben, die Anzahl der überschüssigen Mitarbeiter zu reduzieren, indem sie diese teilweise in den Staatsdienst übernehmen. Die privatisierten Staatsbetriebe können ihre überschüssigen Arbeitnehmer auch mit einem Jahresvertrag an andere Staatsbetriebe abgeben. Sobald dieser Jahresvertrag jedoch abgelaufen ist, sind die Arbeitnehmer auf sich selbst angewiesen.

Änderung des Geschäftsmodells: Von Produktionsquote zu Rentabilität
Bisher war eines der Hauptprobleme chinesischer Staatsbetriebe die fehlende Flexibilität des Managements. Ein Fabrikmanager im alten China war nur für die Erfüllung der vorgegebenen Produktionsquote verantwortlich. Seine Aufgabe bestand darin, die Lieferungen von Rohmaterialien anderer Staatsbetriebe zu überwachen, vorgeschriebene Produkte herzustellen und die fertigen Maschinen einzulagern, bis sie von anderen Staatsbetrieben abgeholt wurden. Er konnte wenig entscheiden, und der zuständige Parteisekretär war ihm übergeordnet. Im Zuge der Reformen werden diese Manager nach und nach durch junge Experten ersetzt, die Auslandserfahrung haben, englisch sprechen und das System der Marktwirtschaft kennen.

Weil die großen chinesischen Werkzeugmaschinenhersteller früher von strategischer Bedeutung waren, liegen die Betriebsstätten meist in Innenstadtnähe. Aufgrund des derzeitigen Immobilienbooms in China sind diese großen Landflächen sehr attraktiv für Baugesellschaften, die dort Wohnanlagen für Chinesen errichten wollen. Manche Stadtverwaltungen unterstützen ausdrücklich die Verlagerung der Maschinenbauer in die Randbezirke der Stadt. So können die Betriebe ihr Land teuer verkaufen und mit den Erlösen die Neuansiedlung am Stadtrand bezahlen. Neue Grundstücke, neue Gebäude und neue Infrastruktur sind im Paket mit eingeschlossen. Teilweise ist sogar genug Kapital vorhanden, sich von einem ausländischen Kooperationspartner bei der Restrukturierung unterstützen zu lassen. Ein gutes Bespiel hierfür ist Beijing No. 1 Machine Tool Works, die ihr 500.000 qm großes Grundstück in der Changan Avenue im Zentrum von Beijing verkauft und in den Industriepark im Süden umzogen sind. Zusammen mit Okuma ist Beijing No. 1 Machine Tool Works derzeit dabei, eine neue Produktionsstätte aufzubauen, die größer und moderner ist als viele westliche Fabriken.

Ausländische Investitionen
Ausländische Direktinvestitionen in China werden Schätzungen zufolge bis zum Jahr 2010 auf US$ 80 bis 100 Milliarden jährlich steigen. Der Hauptgrund hierfür liegt in der Attraktivität Chinas als Absatzmarkt einerseits und als Produktionsstandort für den weltweiten Export andererseits. China kann billige Maschinen für den Export produzieren, weil die Löhne in China weit unter denen in westlichen Industrieländern liegen. Die Chinesen sind jedoch zusehends weniger gewillt, die Kostenvorteile, die sich aus lokaler Produktion, weltweitem Export und entsprechenden Gewinnen ergeben, den ausländischen Firmen zu überlassen.

Chinesische Firmen haben inzwischen als OEM Zulieferer Erfahrung im Ausland gesammelt und festgestellt, wie gut sich chinesische Produkte verkaufen. Nun haben sich die ersten chinesischen Firmen dazu entschlossen, die niedrigen Löhne zum eigenen Vorteil zu nutzen, indem sie ihre eigenen Marken im Ausland vertreiben. Das gegenwärtig einzige Problem hierbei ist, dass „Made in China“ noch mit Billigprodukten und schlechter Qualität assoziiert wird.

Wandel der Infrastruktur
Während der Kulturrevolution waren viele Schulen und Universitäten geschlossen, und diese Lücke ist noch bis heute spürbar. Mittlerweile haben die Firmenchefs das Pensionsalter erreicht und die nachrückende Generation von Top-Managern ist wesentlich jünger als dies normalerweise der Fall wäre. Viele der neuen Manager sprechen passables Englisch, haben Reisen in westliche Länder unternommen, und sind sich sehr wohl des globalen Wettbewerbs bewusst, dem sie sich künftig stellen müssen.

Sie sind sich auch im Klaren darüber, das China nicht nur Technologie, sondern vor allem dringend eine Vielzahl qualifizierter Manager benötigt.

Je chaotischer das Geschäftsumfeld, desto besser für die Chinesen und ihre Geschäftsmethoden. Je organisierter, strukturierter, regulierter, desto vorteilhafter für westliche Firmen. Die neuen Manager werden zum ersten Mal seit der Ming Dynastie wieder eine „Reise in den Westen“ unternehmen. Selbst unter Deng Xiao Ping, als China sich „dem Westen öffnete“, bedeutete dies, die Türen zu öffnen und die Ausländer herein kommen zu lassen. Ausser durch einige Hotel- oder Immobilienbeteiligungen waren Chinesen nicht im Westen vertreten. Jetzt liegen die Dinge anders.

Qualitätsverbesserungen
Die Qualität von Werkzeugmaschinen aus chinesischer Produktion hat sich deutlich verbessert. Viele chinesische Werkzeugmaschinenhersteller hatten in den 80er Jahren Kooperationsabkommen mit deutschen Firmen abgeschlossen. Gewöhnlich verkauften

die Deutschen ihre Technik nach China und die Chinesen versuchten, den damit verbundenen Wissenszuwachs in ihre eigene Produktion einfließen zu lassen.

Das war nicht einfach, da die Deutschen gewöhnlich darauf bestanden, die Herzstücke aus Deutschland zu schicken. Für die Chinesen hatte das zwei Nachteile: erstens war es ihnen nicht möglich, das mit den wichtigsten Komponenten verbundene Wissen zu erwerben, und zweitens waren die in China hergestellten Maschinenwerkzeuge nicht wettbewerbsfähig: chinesische Kunden, die billige Maschinenwerkzeuge wollten, kauften Ausrüstung aus chinesischer Produktion. Die Firmen, die dagegen allerbeste Fertigungsqualität benötigten, zogen es vor, ihre Maschinenwerkzeuge komplett aus Deutschland zu beziehen. Werkzeugmaschinen aus Joint-Venture Produktion waren nicht wettbewerbsfähig, da sie weder im Preis mit chinesischen Produkten, noch in der Qualität mit importierten Produkten konkurrieren konnten. Daher waren viele Joint Ventures kommerziell nicht erfolgreich und wurden von Wholly Foreign Owned Enterprises abgelöst. Dennoch blieb diese Phase bei den Chinesen in guter Erinnerung, da diese Kooperationen ihnen halfen, den technischen Standard im Lande zu verbessern.

Ein anderer Grund für den wirtschaftlichen Misserfolg waren die unterschiedlichen Erwartungen beider Seiten. Die Chinesen erwarteten von den Deutschen, dass diese ihnen ihre technischen Zeichnungen überlassen würden. Die Deutschen dagegen erwarteten, dass die Chinesen ihnen Zugang zu einem Absatzmarkt von 1,3 Milliarden Verbrauchern verschaffen würden.

Der oben beschriebene Wandel hat heute dazu geführt, dass viele Werkzeugmaschinenhersteller gemessen an westlichem Standard noch relativ viele Angestellte haben, aber das Problem scheint unter Kontrolle zu sein. Bestehende Fabriken werden modernisiert und sind niedrigen westlichen Standards vergleichbar. Angegliederte Dienstleistungsbetriebe wie Hotels, Kindergärten, Restaurants, Kindertagesstätten, Betriebskrankenhäuser, usw. werden ausgegliedert, ohne Rücksicht darauf, ob diese Betriebe wirtschaftlich überlebensfähig sind oder nicht.

Jüngere Manager verzichten oft auf traditionelle Vergünstigungen wie Firmenwagen, vertragliche Zusatzleistungen, usw. Sie sind viel eher an Gewinnbeteiligung interessiert, da sie selbst mittlerweile Aktionäre der eigenen Firma geworden sind. Diese Firmen sind oft dabei, das Spektrum ihrer Produktpalette zu erweitern. Diese Erweiterung erfolgt gewöhnlich auf zwei Gebieten:

(a) Organisatorischer Wandel
Zu Zeiten kommunistischer Planwirtschaft wurden die Werkzeugmaschinenhersteller vom Staat bestimmten Industrien und Produktklassen zugeordnet. Innerhalb dieser Struktur waren sie geschützt. Durch den wirtschaftlichen Wandel der letzten Jahre ist dieser Schutz innerhalb der Nischen aufgehoben. Allerdings steht denselben Firmen nun die Expansion in Industriezweige offen, die ihnen bisher verschlossen waren. Wir rechnen daher fest damit, dass die chinesischen Werkzeugmaschinenhersteller ihre Produktpaletten stark erweitern und in Bereiche expandieren werden, die lukrative

Gewinne versprechen. Nach wie vor wird es gerade in China staatliche Kontrollen geben, aber diese werden nicht mehr eine so wichtige Rolle wie bisher spielen.

Bei unseren Besichtigungen vieler Fertigungsstandorte wurde deutlich, dass die existierende Infrastruktur Überkapazitäten zur Werkzeugmaschinenherstellung aufweist. Daher haben viele Unternehmen damit begonnen, diese Überkapazitäten anderweitig mit der Produktion für lokale und ausländische Zulieferer auszulasten. Beispielsweise stellt Shanghai Machine Tool Company No. 1 sowohl Gussteile für namhafte deutsche Firmen als auch Spindeln für General Electric (USA) her.

(b) Überkapazitäten

Die chinesische Werkzeugmaschinenindustrie wächst momentan viel schneller als das Bruttoinlandprodukt Chinas. In unseren Gesprächen äußerten die meisten Werkzeugmaschinenhersteller, dass sie in den letzten 3 Jahren zwischen 40% und 100% jährlich expandiert seien.

Diese Zahlen stimmen nicht mit der offiziellen Wachstumsrate des chinesischen Werkzeugmaschinenverbrauchs überein, der angeblich bei 27% pro Jahr liegt.

Als Folge dieser hohen Wachstumsraten erwarten wir die ersten Überkapazitäten ab 2005. Diese Überproduktion muss umgeleitet werden und wir glauben, dass sich der Binnenwettbewerb noch verschärfen wird. Viele chinesische Hersteller, von staatlichen Vorschriften befreit, werden in andere Industriezweige expandieren, um sich zusätzliche Marktanteile zu sichern.

Außerdem werden die Überkapazitäten bei den Unternehmen diese in einen Preiskampf zwingen, der zunächst zu hartem Wettbewerb und dann bald darauf zu einer Marktbereinigung führen wird, denn staatliche Subventionen wird es nicht mehr geben. Die dann noch im chinesischen Markt bestehenden Firmen werden mit anspruchsvollen Produkten und konkurrenzlosen Preisen als höchst wettbewerbsfähige Hersteller und Zulieferer auf dem Weltmarkt erscheinen.

Die künftige Struktur

Die chinesischen Werkzeugmaschinenhersteller, mit denen wir Gespräche geführt haben, sehen künftig eine Aufteilung des Marktes für Werkzeugmaschinen in China in drei Segmente:

1. Das Top Segment

Das Top Segment in China wird den ausländischen Import-Firmen vorbehalten sein, und hier insbesondere den deutschen Firmen. Allerdings stellt dieses Top Segment in den Augen der Chinesen nur eine relativ kleine Nische dar im Vergleich zu dem gewaltigen, vermuteten Potential des Weltmarkts im Segment der Standard- und Niedrigtechnologiemaschinen. Daher haben chinesische

Werkzeugmaschinenhersteller zur Zeit nicht die Absicht, in diesem Marktsegment aktiv zu werden und in weltweite Konkurrenz zu den Deutschen zu treten, zumal sie die Deutschen eher als Ergänzung und zukünftige Partner denn als Konkurrenten sehen.

Chinesische Werkzeugmaschinenhersteller, die wirklich Funktionalität benötigen, die das Können der eigenen Produktion übersteigt, wenden sich gewöhnlich an Hersteller von Komponenten. Diese liefern dann beispielsweise eine Hochgeschwindigkeitsspindel oder eine 5-Achsen CNC Steuerung. Da Zulieferer von Komponenten an den internationalen Markt liefern und sich viele Werkzeughersteller auf die Verfügbarkeit zusätzlicher Produkte verlassen, müssen die Zulieferer für die Kompatibilität eben dieser Produkte mit den installierten Systemen sorgen, egal ob diese aus chinesischer oder westlicher Produktion stammen. Der einzige Grund, warum nicht mehr chinesische Werkzeugmaschinenhersteller in das Outsourcing von Spezialmodulen expandieren, liegt in der Tatsache begründet, dass mit diesen Erweiterungsmodulen auch Wartungsaufwand verbunden ist. Die Chinesen mögen vielleicht mittelfristig das mit der Integration von zugekauften Spindeln oder Kontrollsystemen verbundene Know-how erwerben. Aber das kombinierte System derart aufeinander abzustimmen, um Weltklasse-Ergebnisse zu erzielen, liegt zur Zeit noch ausserhalb der Möglichkeiten und Fähigkeiten chinesischer F&E Abteilungen.

2. Mittleres Segment

Die meisten jener chinesischen Werkzeugmaschinenhersteller, die in irgendeiner Form von früheren Kooperationen mit westlichen Partnern profitiert haben, werden sich in diesem Segment positionieren. Diese Hersteller haben mittlerweile die von den westlichen Firmen erworbenen Technologien in ihre eigenen Produkte integriert. Einige dieser Technologien kommen möglicherweise in Fertigungsstandorten von Joint Venture Firmen in China zum Einsatz.

Auch auf dem Automobilsektor bildet sich eine enorme Überkapazität heran, und die in China produzierenden Automobilbauer müssen einen erheblichen Teil ihrer Produktion künftig exportieren. Autos, die sich auf den Weltmärkten erfolgreich verkaufen lassen sollen, müssen allerdings von Weltmarktqualität sein, und da genügen die reduzierten Standards des chinesischen Binnenmarktes nicht mehr. Daher glauben wir, dass deutsche Werkzeugmaschinen in China auch in den nächsten Jahren stark gefragt sein werden.

3. Unteres Segment

Hier wird es eine große Anzahl von Herstellern einfacher Werkzeugmaschinen im Binnenmarkt geben, die sich untereinander bekämpfen. Weil sie sich technisch nicht unterscheiden, konkurrieren sie im Preis. Für den Export wollen

> die Chinesen den Preisvorteil ihrer billigeren Arbeitskräfte nutzen, wesentlich günstigere Werkzeugmaschinen als der Rest der Welt zu liefern. Die Technik dieser Maschinen ist zwar auf dem Stand vor 10 bis 15 Jahren, sie haben aber den Vorteil, dass der After-Sales Service dadurch problemlos machbar ist.

Die Chinesen sind davon überzeugt, dass die Zeit reif ist, an die Kooperationen der 80er Jahre anzuknüpfen bzw. neue Kooperationsmodelle und technische Partnerschaften einzugehen. Ausländische Automobilhersteller müssen sich zukünftig auf dem chinesischen Binnenmarkt mit einer starken Konkurrenz auseinandersetzen. Prognosen zufolge wird es im Jahr 2010 ein Fahrzeugüberschuss von 5.2 Millionen geben, da der chinesische Markt selbst nur ca. 4.8 Millionen Fahrzeuge abnehmen kann. Auch wenn sich diese Prognose nicht bewahrheiten sollte, wird die Konkurrenz zwischen den ausländischen Automobilherstellern in China dennoch in jedem Fall ansteigen. Dies wird dazu führen, dass die Qualität der Systemlieferanten auf Weltklasseniveau sein muss, da viele der in China produzierten Fahrzeuge in internationale Märkte exportiert werden, die diesen Standard voraussetzen.

Um sich im Wettkampf am Markt behaupten zu können, muss die verwendete Herstellungstechnologie auf dem neuesten Stand sein. Automobilhersteller bestehen darauf, dass ihre Systemlieferanten die neuesten Maschinen in die Fabriken stellen, egal ob das Werk in China oder Deutschland steht. Das heißt, dass deutsche Lieferanten nicht mehr die kompletten F&E Tätigkeiten in Deutschland angesiedelt haben, sondern dass angewandte Forschung dort stattfindet, wo die neuen Maschinen stehen. Wartungs- und Bedienungspersonal vor Ort muss die Ergebnisse über eine entsprechende Technologie-Pipeline an den Hauptsitz ihres Unternehmens weiterleiten. Deutsche Ingenieure im Ausland werden auf Dauer zu teuer, und die Chinesen halten es für unabdingbar, dass chinesische Ingenieure von deutschen Fachkräften geschult werden, was sie in die Lage versetzt, Maschinen in chinesischen Produktionsstätten selbst zu reparieren und zu warten.

Die Chinesen unternehmen derzeit große Anstrengungen, ihre technischen Trainingsprogramme zu verbessern. Sie haben erkannt, dass zur Produktion von qualitativ hochwertigen Produkten Weltklassemaschinen erforderlich sind, die von gut ausgebildeten Mitarbeitern bedient werden. Diese Entwicklung kommt deutschen Maschinenwerkzeugherstellern sehr entgegen, da ein gut ausgebildeter und erfahrener Maschinenbediener die technischen Vorteile von deutschen Maschinen besser würdigen und ausnutzen kann.

Aufgrund der positiven Entwicklung in China sind die Chinesen fest davon überzeugt, dass sie zukünftig in der Lage sein werden, erfolgreiche Partnerschaften mit deutschen Unternehmen einzugehen. Die Deutschen haben ihrer Meinung nach ein Interesse daran, gut ausgebildetes Bedienungspersonal und erfahrene Techniker vor Ort zu haben, und die Chinesen glauben, dass sie diese Leute stellen können. Außerdem meinen die Chinesen, dass eine Partnerschaft mit den Deutschen sowohl wegen des großen Potentials des chinesischen Binnenmarktes als auch wegen der niedrigen

Lohnkosten für beide Seiten vorteilhaft ist, da man so gemeinsam eine preisgünstige Marke am globalen Markt platzieren kann.

Bezüglich des Technologietransfers ist in China ebenfalls eine drastischer Wandel zu beobachten. Beijing No. 1 versuchte bereits erfolglos, die Aktienmehrheit eines großen deutschen Maschinenbauers zu erwerben. Sie werden es nochmals versuchen, und es ist davon auszugehen, dass früher oder später ein chinesischer Maschinenwerkzeughersteller Erfolg haben und ein deutsches Unternehmen übernehmen wird. Die radikalste chinesische Strategie besteht darin, einen deutschen Maschinenwerkzeughersteller zu kaufen und danach die Produktion unter Anleitung deutscher Experten komplett nach China zu verlagern. Die Werkzeugmaschinen aus dieser Produktion sollen dann weltweit unter dem deutschen Markennamen verkauft werden. Die Chinesen wollen lediglich die Forschung und Entwicklung zur Produktion von Prototypen in Deutschland belassen, um auch zukünftig auf dem neuesten Stand der Technik zu bleiben.

6.2 Executive summary machine tool industry

The Chinese Machine Tool Industry has undergone dramatic changes during the last three years and these changes are expected to continue for the foreseeable future. The main reason for the paradigm shifts in the Chinese machine tool industry concerns the privatization efforts by the Chinese government and the preparations for Chinese accession to the WTO Agreement.

We started our investigation by using the available statistical data from the China Machine Tools & Tools Builders Association (CMTBA) and adjusting and updating the figures as we went. The CMTBA Yearbook of 2002 was actually reflecting the status of the Chinese machine tool industry of 2000/2001 and even the 2003 issue only takes the statistics of 2002 into consideration. As the most dramatic changes in the machine tool industry happened in the last 3-4 years these statistics are not very relevant any more. In order to shed some light on the real status of the machine tool industry today, we visited 27 machine tool manufacturers and spoke to the leading managers directly. Still it was difficult to obtain concrete detailed information on the companies' performance because there is still the hesitation in China that these bits of information may be considered classified by some government officials and the informant may experience difficulties afterwards. Only at those enterprises where top management had been replaced by young specialist we found no hesitation to disclose information if it was available.

Privatization of State-owned Enterprises

Traditionally all Chinese machine tool manufacturers were regarded by the state as having strategic importance and military implications. Therefore the machine tool industry was usually closely related to the military and there was no need to do any marketing because the State had allocated certain industry sectors to certain machine tool manufacturers, thus providing them with an automatic market share of 100% by definition in the respective manufacturing industry.

Out of the 120,000 state-owned enterprises of the overall industry, more than half have meanwhile been privatized and every single machine tool manufacturer we visited had either gone through the privatization program already or was preparing to do so. In all cases the state had reduced its shareholding to less than 50% whilst the other shares were either held by municipalities, individual investors, staff members or asset management companies.

The emerging pattern of the privatization in the machine tool industry is such that in the first step, the machine tool companies are relieved of their triangular-debt obligations to other state-owned enterprises, so that the financial controller can start with a clean sheet. In the second step the government assists the state-owned enterprises in reducing the number of surplus workers and staff, by taking these workers out of the state-owned enterprises and back into government services. These surplus workers are

then employed in small jobs like traffic wardens, community coordinators, etc. with their salary being paid by the government. There is a strong incentive for these surplus workers to look for other jobs because government pay is only slightly above the poverty line in many cases.

Business system is changing from production quota to profitability

State-owned enterprises can also hive off surplus workers by shifting them to affiliated companies which are not directly related to the main enterprises, and by providing them with a one-year contract. Once this contract runs out the surplus staff is on their own. Traditionally the main problem in the state-owned enterprises has been the inflexibility of the management. A manufacturing manager in China is only responsible for fulfilling the quota. His job is to process the raw materials another state-owned enterprise has delivered to his doorstep into finished goods and to store these finished goods until another state-owned enterprise collects them. He has no influence on financing, marketing, production, quality, human resource, etc and in doubtful cases, he is always responsible to report to the Party Secretary dedicated to this enterprise. Most of these managers are now in their late 50s or early 60s and are gradually being retired. If need be, they will be provided with an advisor contract to secure their retirement financing.

State-owned enterprises in the machine tool industry were strategic companies and were established very early in the post-war history of the People's Republic of China. This means that most of these enterprises are today located in strategic locations very close to the city centre and because of the present property boom in China, the large piece of land is very attractive for property developers who acquire the land, change the usage rights, and build apartment blocks for Chinese citizens.

The Chinese state-owned enterprises are even encouraged by the relevant municipality governments to sell their land and move to the outskirts of the city because the manufacturing of machine tools does no longer comply with the general usage of city centre property. Therefore we saw many companies presently negotiating with Chinese asset-management companies to sell their city centre land and from these sales they apparently made so much money that they can easily afford to move the whole operation to the outskirts of the city, build completely new manufacturing infrastructure and even have enough money to engage a foreign co-operation partner to assist them in the reconstruction. Beijing No. 1 Machine Tool Works is a good example. They sold their 500,000 sq metre piece of land at Changan Avenue in the centre of Beijing and moved to the industrial park in the south. Together with Okuma of Japan, they are presently constructing new facilities which are larger and more modern than many installations in Western countries.

Foreign Investments

Foreign direct investment into China is continually expected to increase to around US$ 80 to 100 billion per annum in 2010 and the main reason for the foreign investors to come to China concerns the attraction of the huge domestic market and use China as a

basis for their exports. China can produce cheap machines for export because labour cost in China is way below Western standards. The Chinese however are gradually coming round to grasping the idea and they see no reason to let foreign companies reap the benefits of Chinese labour by manufacturing their products in China, exporting them to global markets and pocketing the resulting profits. Chinese companies have ventured abroad as OEM suppliers and saw how well Chinese-made products are selling. Now the first Chinese companies have decided to utilize the cheap-labour factor for their own purposes and have begun to export under their own label. The only problem for the time being is that “Made in China” machine tools still have the image of being cheap and of relatively low quality.

Changes in Infrastructure

For almost 15 years during the Cultural Revolution, there was no university education, school education, etc so that the retired company officials are leaving behind an age gap of up to 15 years. This in turn means that the new top management in the machine tool industry are all in their 40s and this is probably the reason for the main change in attitude. The new managers usually speak passable English, have visited the West and have a much better idea of the global competition that they will have to face in the future. The managers realize that it is not only technology that China needs, but much more urgently, management capacity. The more chaotic the business environment is, the more favourable this is to the Chinese way of doing business. The more organized and regulated the business environments are, the more advantageous this level-playing field becomes for Western companies. The new Chinese managers realized that China now, for the first time since the Ming Dynasty 500 years ago, is really embarking on a journey to the West. Even under Deng Xiao Ping, when China was “opening to the West”, the country opened the door to let the Westerners come in, but very few companies actually ventured abroad with the exception of hotels and natural resource companies. Now it is a different game.

Quality improvements

Concerning the quality of Chinese-made machine tools, there has been a marked improvement. During the 80’s, many Chinese machine tool manufacturers had entered into co-operation agreements with German companies. The Germans usually sold their current technology to China and the Chinese tried to absorb the know-how into their own production.

This was not easy because the Germans usually insisted that the core components of the Chinese-made machine tool should be provided from Germany and this resulted in two disadvantages for the Chinese. Firstly, they were unable to acquire the know-how for the manufacturing of the core technology and secondly, the Chinese-made machine tools were not competitive. Any Chinese client who was looking for a cheap machine tool bought Chinese-made equipment. Those enterprises that had to manufacture world-class quality prefer to import the complete machine tool from Germany. The Joint Venture machine tool built in China with German key components was not competitive

because it was neither as cheap as the Chinese wanted it, nor did it provide the quality of the imported machine tool. Therefore, almost all of the Joint Ventures in the 80's have faded away and the know-how transfer has stopped. Still the Chinese have good memories of these co-operations because the know-how they acquired helped them to upgrade their own domestic technology. Another reason for the ending of the Joint Ventures in the 80's was that both sides had different expectations. The Chinese expected the Germans to open all their cardboards and transfer their technical drawings whereas the Germans expected that the Chinese would deliver on the potential of 1.3 billion domestic customers.

The changes mentioned above result in machine tool companies which still have a large amount of staff by Western standards, but the problem seems to be manageable now. Existing factory buildings are being modernized and are getting close to low-end Western standards, auxiliary operations like hotels, kindergartens, restaurants, day-care centres, corporate clinics, etc. are being hived off with no consideration whether these units are able to survive. Younger management does not insist on the usual perks (company car, fringe benefits, etc), but are more attracted to invest any profits into the further development of the company, because they have meanwhile become shareholders in these enterprises. These companies are also now looking to diversify their products portfolio and this diversification happens in two main areas:

Organisational Changes

Originally machine tool companies were allocated certain industries and product ranges by the state and within this niche they were protected. Now however the protection is gone, but also the other industry fields are now open for expansion. Therefore we are confident that these Chinese machine tool companies will in future expand their product range considerably and will move quickly into those areas where real profits can be made. This being China, there will always be the element of state-control although this will not be so prominent in the future any more.

We have seen many manufacturing facilities and because the existing infrastructure is still too large for the manufacturing of machine tools only, many enterprises have now begun to do contract manufacturing for domestic and foreign suppliers. For instance, Shanghai Machine Tool Company No. 1 is supplying the machine beds for a European manufacturer and they are also manufacturing spindles for GE of America.

Emerging Overcapacity

The Chinese machine tool industry is presently expanding at a rate far above the GDP growth of China. Most of the machine tool manufacturers we visited stated that they were experiencing growth rates of between 40% and 100% over the last 3 years. This growth rate does not tally with the official growth rate of the Chinese machine tool consumption of 27% per annum, but we were told that the official statistics were not very reliable.

As a result of these high growth rates we expect the first over-capacities to emerge in 2005 and these over-capacities have to be diverted. First, we foresee intense domestic competition to build up because many Chinese machine tool manufacturers who are now freed from the shackles of state-planning guidance are trying to expand into different industries and they will try to build up market share. Secondly, the emerging of over-capacity will force Chinese machine tool manufacturers to reduce their domestic price levels and this will lead to intense competition, which should result in a shake-out fairly quickly. The machine tool manufacturers are no longer supported by the state and therefore cannot hope to receive subsidies for loss-making products or industries. The anticipated shake-out will be completed in 2007 and those machine tool manufacturers who survived the domestic elimination fight will emerge on the world stage as highly competitive manufacturers and suppliers of sophisticated machine tools at unbeatable prices.

Future Structure

The Chinese machine tool manufacturers we spoke to see the future machine tool market in China to be divided into 3 tiers:

1. Top Tier

The top tier in the machine tool world in China belongs to importers, particularly to the Germans. However, compared to the real potential of the world market for low- and medium-tech machine tools, this top tier is a relatively small niche and Chinese machine tool manufacturers have no intentions yet to develop into this area and become a global competitor for the Germans. Chinese machine tool manufacturers who really need a feature which is more sophisticated than they can supply from their own production, will usually turn towards component manufacturers to obtain a high-speed spindle for instance or a 5-axes CNC control system. These component suppliers provide their components to the international market and because many machine tool manufacturers worldwide rely on these components like CNC machine controls, the component manufacturers must ensure that their components work in harmony with the main body of any machine tool, be it Western-made or Chinese-made. The only reason why not more Chinese machine tool manufacturers have moved into the outsourcing of attachments lies in the fact that the auxiliary equipment pieces also have to be maintained and serviced. The Chinese may gradually develop the ability to integrate outsourced spindles or machine controls, but to develop the whole package further in order to achieve real world-class performance parameters, is still beyond the capability of the Chinese researchers.

2. Middle Tier

This is where most of those Chinese machine tool manufacturers will gather, who have benefited in one way or another from previous cooperation agreements with

Western companies. They have meanwhile absorbed the technology which they bought in the West and continued to develop their own products, so that some of them are meanwhile being used in the manufacturing plants of the foreign-invested companies. In the automotive industry, we can see that Chinese presses are being used to provide auto parts for the Chinese domestic production. However, with the looming over-capacity in the automotive industry in China, auto makers will be forced to export as well and the exported products can no longer have the image and the quality of the "Chinese-made foreign car" but must have world-class quality and world-class image. This kind of quality however, cannot be achieved by using Chinese-made machine tools and we therefore see no immediate threat to the import of German machine tools into China for the next two to three years.

3. Bottom Tier

At the bottom will be a large number of suppliers of simple machine tools for standard applications. Within these machine tools the Chinese will want to bring their price advantage into play whilst at the same time providing technology of 10-15 years ago. Because of the low level of sophistication, after-sales service is not a real problem and therefore we will see the first of these cheap Chinese-made machine tools appearing in the developing markets of the Third World countries soon.

The Chinese however believe that time is on their side, as they see that the co-operation model of the 80's now gives way to a completely new model for technical partnership. Foreign auto manufacturers in China, for instance, now face increasing domestic competition, and there are predictions that by 2010, the passenger car market for China will produce around 8 million vehicles p.a., with imports of approximately 2 million. The Chinese market itself is predicted to be able to absorb 4.8 million cars, so that there would be an over-capacity of 5.2 million cars by 2010. This will probably not happen, but there will be increasing competition among the foreign auto-makers in China and these will result in increased pressure onto the system suppliers to provide components of world-class standards and world-class quality, because many of the cars manufactured in China will not stay in China, but will be exported to emerging market countries where world standards do apply.

The need to have the absolutely latest manufacturing technology installed in the most competitive markets will prompt auto-makers to insist that their system suppliers also use their latest products in the manufacturing process, no matter whether this factory is located in China or in Germany. This means that the German suppliers will no longer have all of their R&D works done in one location at the head office in Germany, but that applied R&D will now happen in various places in the world and they have to ensure that the technology pipelines from their outposts are functioning properly in order to channel the applied research results back to their head office so that at head office in Germany they can continue to develop state-of-art latest machining technology. If on the other hand applied R&D takes place more safely in China then it is also the

obligation of the German machine tool supplier to have trained personnel onsite. Usually however they cannot afford to place German engineers in all manufacturing locations at all times. Therefore the Chinese believe it is in the vital interest of the Germans to train Chinese engineers to be able to repair and localize machine tools that are at the production facilities in China.

The Chinese are also making great efforts at present to upgrade their technical training programs because they realize that world-class products require world-class machines which require world-class trained operators. This is also beneficial for German machine tool manufacturers because the more experienced and trained an operator is, the more likely he will be able to make full use of all the technical advantages of German machine tool equipment.

All these lead the Chinese to believe that they will be able to form a true global partnership in the future with the Germans because the Germans have a vital interest to have well-trained operators and technicians on site to run and maintain the most sophisticated German machine tools, and the Chinese believe that they will be able to contribute to the partnership the size and potential of the Chinese domestic market, but also the cheap labour factors to form partnerships with the Germans to launch global low cost brands and thus benefit jointly from each other.

Concerning technology transfer, we can also see the beginnings of a more drastic process: Beijing No. 1 already tried to acquire the majority shares of a Major German Machinery, but failed this time. They will try again and sooner or later the first Chinese machine tool manufacturer will succeed. The most radical thinking of the Chinese concerning the acquisition of German machine tool manufacturers goes like this: Chinese will buy the German company, transfer the production to China where they will manufacture German machine tools under the guidance of German manufacturing experts. These machine tools will be sold worldwide under the German brand name and the Chinese will only leave the R&D facilities and proto-type manufacturing in Germany, thus ensuring a technology flow for some time to come.

The Chinese machine tool industry has undergone dramatic changes during the last 3 years and these changes are expected to continue for at least another 2 years. The main reason for the paradigm shifts in the Chinese machine tool industry concerns the privatization efforts by the Chinese government and the preparations for Chinese accession to the WTO agreement.

6.3 Overview

China's role in the global machine tool industry

The machine tool industry holds a key position in the technology and manufacturing chain and as such plays a pivotal role in economies with a large manufacturing base such as China, Germany, Japan or the US.[9] In 2003 the value of the worldwide production of machine tools of the top 30 countries was estimated to be US$ 36.3

billion, 13% higher than in 2002.[10] Japan had the highest output with a value of US$ 7.9 billion, followed by Germany (7.5), Italy (4.2), China (2.9) and the USA (2.2), respectively. Especially the Asian countries like Japan, China, Taiwan, South Korea and India showed above average output growth in 2003.

The following graph shows the production, consumption and trade volumes of the Chinese machine tool industry.

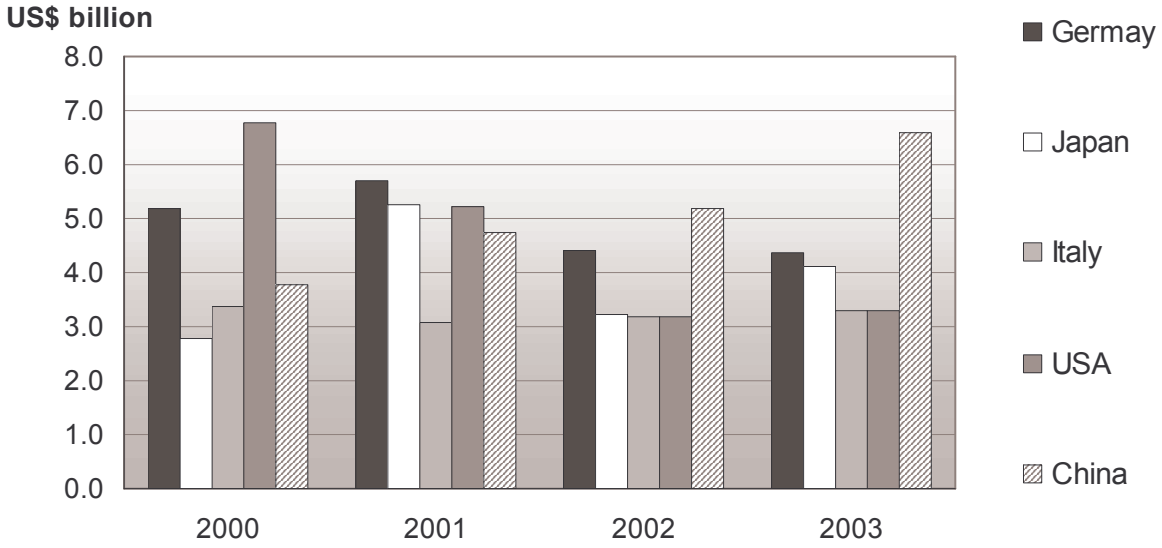
Table 1: Machine Tool Development in China[11]

In Million US$	1998	Growth 97-98	1999	Growth 98-99	2000	Growth99-00	2001	Growth 00-01	2002	Growth 01-02	2003	Growth 02-03
Production	1,893	11%	1,839	-3%	2,197	19%	2,624	19%	2,350	-10%	2,910	24%
- cutting machines	1,458	28%	1,287	-12%	1,516	18%	1,889	25%	1,786	-5%	2,241	25%
- forming machines	435	-22%	552	27%	681	23%	735	8%	564	-23%	661	17%
Export	250	-24%	221	-12%	299	35%	290	-3%	310	7%	370	19%
Domestic sales	1,643	20%	1,618	-2%	1,898	17%	2,334	23%	2,711	16%	2,540	-6%
Import	1,391	-10%	1,445	4%	1,890	31%	2,406	27%	3,150	31%	4,040	28%
Domestic consumption	3,034	4%	3,063	1%	3,788	24%	4,740	25%	5,190	9%	6,580	27%

Consumption of the Chinese machine tool industry

In 2002, the People's Republic of China overtook Germany as the world's top machine tool market. China's total consumption grew from US$ 5.2 billion in 2002 to US$ 6.6 billion in 2003, a year-on-year growth of 16%. By 2005, machine tool consumption in China is estimated to reach US$ 7.0 billion by sales value.[12]

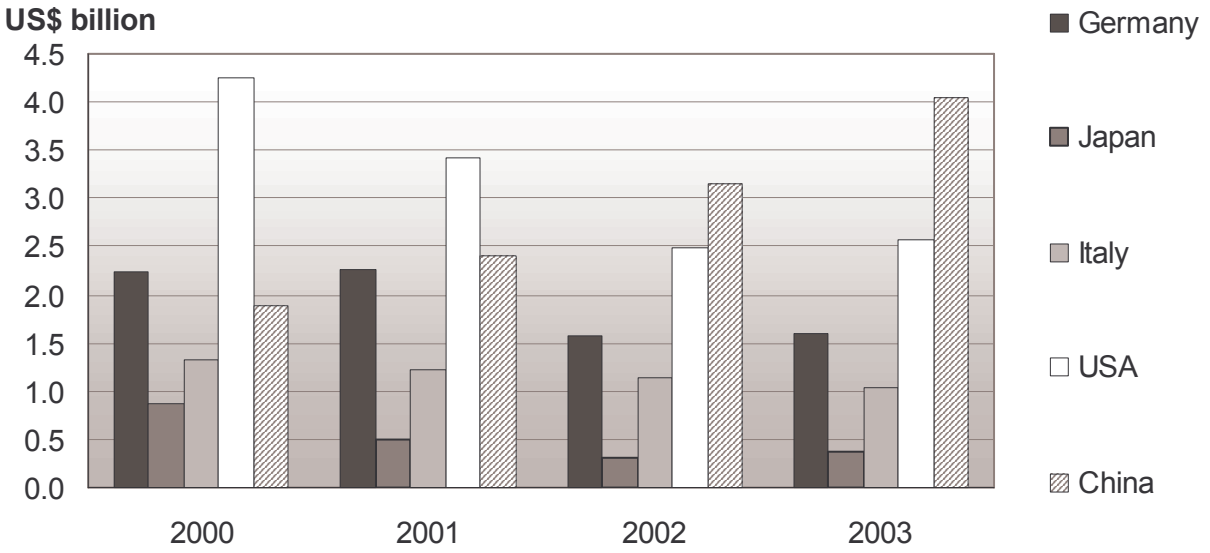
Figure 1: Consumption of the Machine Tool Industry[13]



Imports

With its high demand of machine tools, especially forming machine tools, China is by far the biggest consumer and importer of machine tools. An increasing demand for high-tech metal-forming machine tools combined with an insufficient supply of locally made machine tools lead to high import rates, representing approximately 50% of demand[14], particularly of NC and CNC machines but also high tech forming machine tools like mechanical and hydraulic presses and shears. China's imports of machine tools are expected to reach US$ 4.0 billion in 2005.

Figure 2: Imports of the Machine Tool Industry[15]

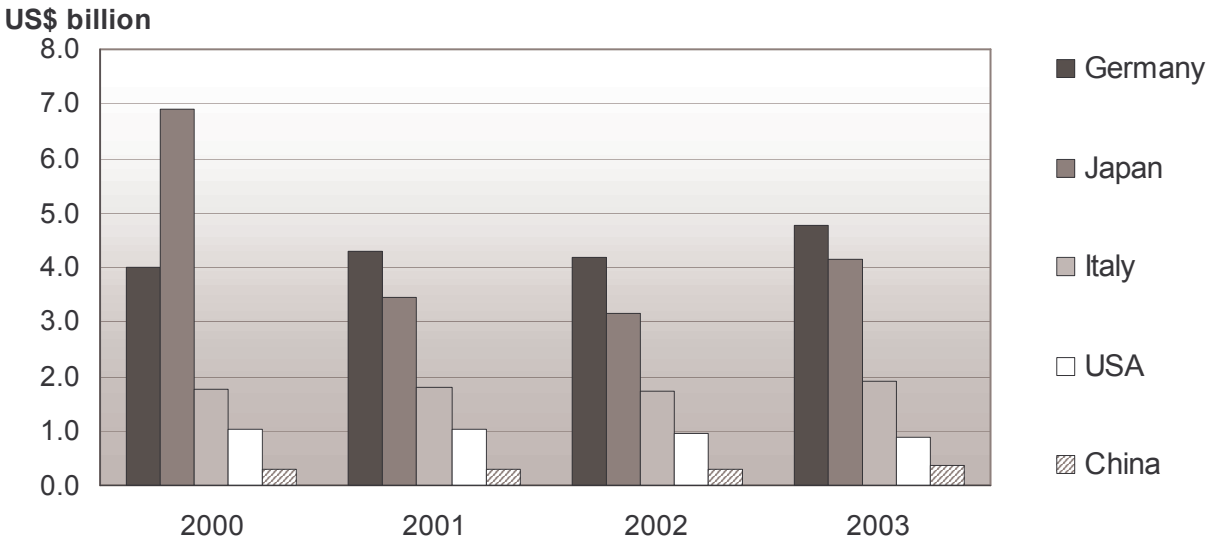


Exports

China's machine tool exports were US$ 310 million in 2002, which represents about 10% of the import value of the same year. Exports are rising and are expected to reach US$ 1.0 billion in 2005.

Major export markets include the US, Hong Kong, Germany, Canada, the UK and Southeast Asia. Most exports are low-end NC machines to developing countries and Southeast Asia.[16]

Figure 3: Exports of the Machine Tool Industry[17]



Traditional weaknesses of the Chinese machine tool industry[18]

The main companies of the Chinese machine tool industry went through major changes from an insufficient and outdated industry to one of advanced technology. The majority of small companies, which do not benefit from foreign investments and privatization perks, still suffer under the following problems:

- Insufficient investment in technology and innovations: Small companies do not invest enough in their technology and their R&D activities. On average only 2% of their turnover is invested into new technologies and innovations. In high developed countries like Germany companies invest on average 5% to 10% of their turnover in R&D activities. In the last few years only the leading companies started to intensify their R&D activities. The machine tool industry tries harder than ever to cooperate with universities and institutions to improve their R&D efficiency. Foreign investors also start working collectively with the leading research institutions and universities in China, which will increase the pressure on the local industry.

- Low share of numerical control (NC) machines: NC equipment makes up only 3% of installed capacity compared to virtually 100% in Japan. Most of the equipment of small Chinese machine tool companies is comparable with that from Germany in the 1970's. The small Chinese machine tool makers operate at very

low productivity output levels of US$ 1.62 per worker and hour, compared to the general machinery industry's figure of US$ 3.59.

China's traditional labour-intensive machine tool industry still enjoys a competitive advantage due to low labour costs. However, the country's technology-intensive high-end machine tools which are just in the initial stage are not ready for the international competition yet. Imports of foreign capital along with technology transfer are of great importance. There is an obvious technology gap between domestic and imported NC machine tools, with imported machine tools being generally more advanced in terms of quality, precision, speed, reliability and ease of maintenance. Prices reflect this technological gap, with imported NC machine tools costing roughly four times the average price of domestic machines in 2001 (US$ 80,000 versus US$ 21,000).[19]

Compared to the previously emphasized problems of the small Chinese enterprises the top Chinese machine tool manufacturers enjoy a higher competitiveness. This shift is due to high FDI inflows, R&D co-operations as well as the continuing process of privatization. Especially Western ventures deliver technology and R&D capability into the Chinese machine tool industry.

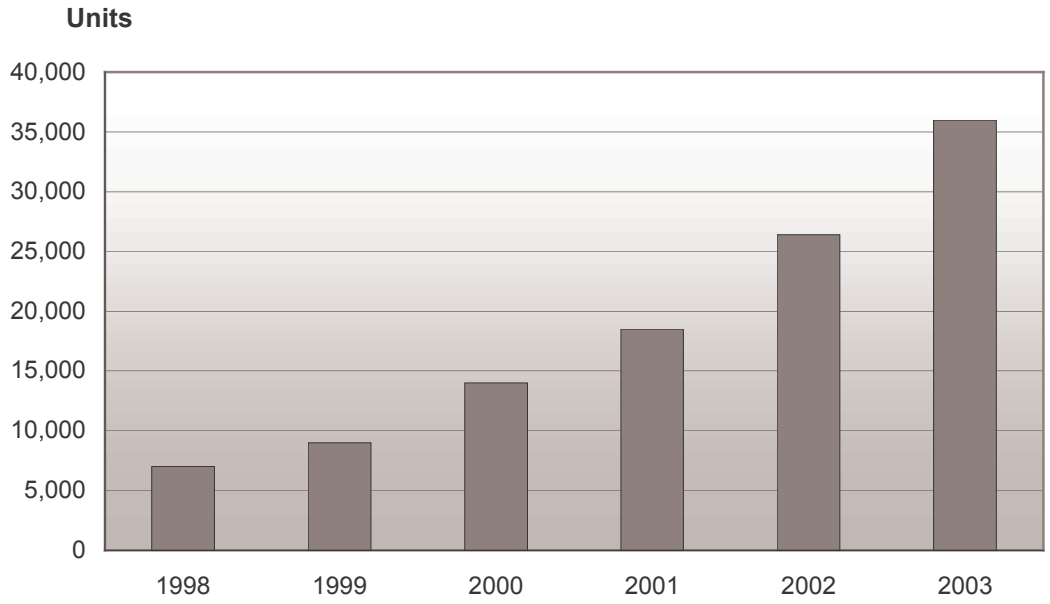
This group of leading machine tool manufacturers is already able to make a variety of key machine tool components, but they still depend on foreign imports for more advanced technologies. Examples for this development are the following companies: Qingdao Brown & Sharpe; Beijing Agie; Suzhou Sodick-Sanguang; Wuxi Guangyang; Ningxia Little Giant.

These companies stand for the future development of the Chinese machine tool industry and are characterised by an increased

- Adaptation of the new market demands
- Technology level as well as product variety
- More flexible and efficient organisation
- R&D activities and R&D capability
- Technology co-operations with Western companies
- Import of modern techniques and equipment

The production progress of NC machine tools is indicative for the development of the Chinese machine tool industry as a whole.[20]

Figure 4: Production of NC machine tools in China, 1998 - 2003



Impact of China's accession to the WTO for the machine tool industry[21]

Since China's accession to the WTO, the technology transfer and the number of business co-operations between Chinese and Western companies increased rapidly. The import of foreign technologies and capital significantly enhanced the competitive position of some companies.[22]

China's signing of the accession treaty to WTO in 2001 resulted in a substantial cut in tariff on imported machine tools. The new average import tariff has been lowered to 9.6% in 2002 (compared to 36% in 1996). Among the machine tools the new average tariff is 10.14%, compared to 14.45% before adjustment. However, there are 20 items, mostly NC machine tools, remaining unchanged at the 9.7% tariff level.[23] Import protection will be reduced, and eventually cancelled in 2006. The complicated examination and approval system will be changed to create a fair competition atmosphere for WTO members.

Table 2: Tariffs before and after China's accession to the WTO[24]

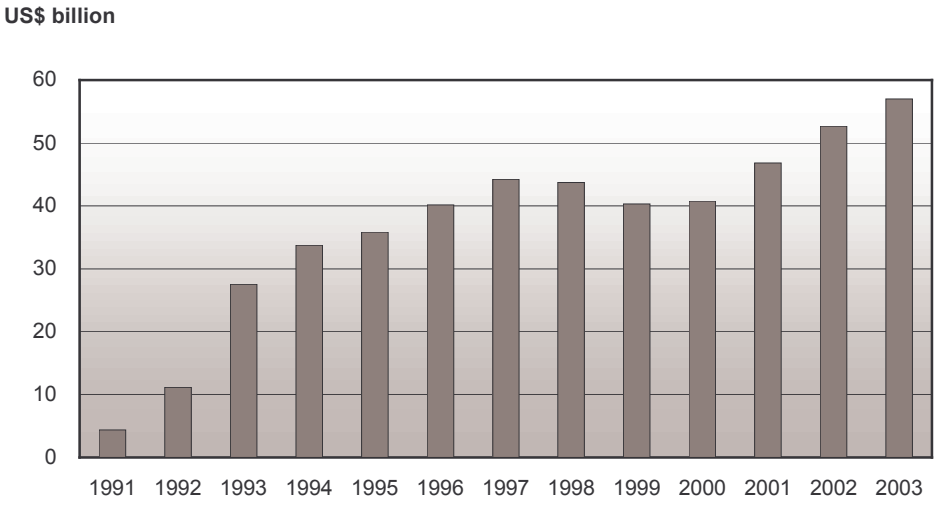
	Before WTO	2003 - 2006
Metal cutting machines	9.7% - 20%	5% - 12%
Metal forming machines	9.7% - 18%	9.7% - 12%

Competition is more intensive, especially for NC machine tools. Chinese NC machines face big challenges, especially from Taiwan and Korea. The superiority of foreign

companies in terms of quality and price increases the pressure on the relatively weak Chinese NC machines industry.

With China opening its markets, multi-national companies are attracted to invest in the Chinese markets. Many machine tool companies have established joint ventures, partnerships or wholly owned enterprises in China since 2001. This trend is forced by a liberalized investment policy, which is in line with China's WTO commitments of 2001. This investment flow to China is reflected in the high amount of foreign committed direct investments of US$ 53.5 billion in 2003.

Figure 5: China's FDI Inflows 1991-2003



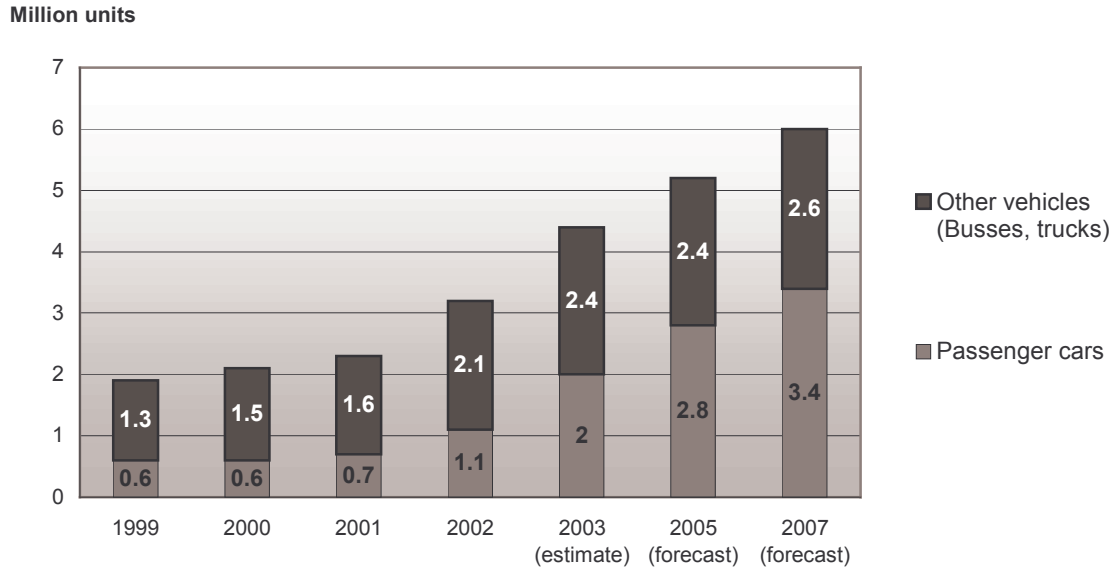
6.4 Industry sectors of the Chinese machine tool industry

Since the People's Republic of China opened its economy more than 20 years ago, its markets have grown at an average growth rate of 8% p.a. This steady growth is closely linked to a continually increasing demand for machine tools in various sectors. Manufacturing companies, especially from the automotive and aerospace sectors, are the main purchasers of machine tools.

6.4.1 Automotive/automotive components

The automobile industry, representing more than half of the demand for machine tools sold in China, is its most important customer. In 2002 it contributed about 40% to the total revenue of the national machinery industry output.[25] The total domestic production of vehicles increased from 3.2 million units in 2002 to 4.4 million units in 2003 with an output value of US$ 53.9 billion.

Figure 6: Annual sales of vehicles in China, 1998 - 2007[26]



Reasons for the rise in the automobile industry

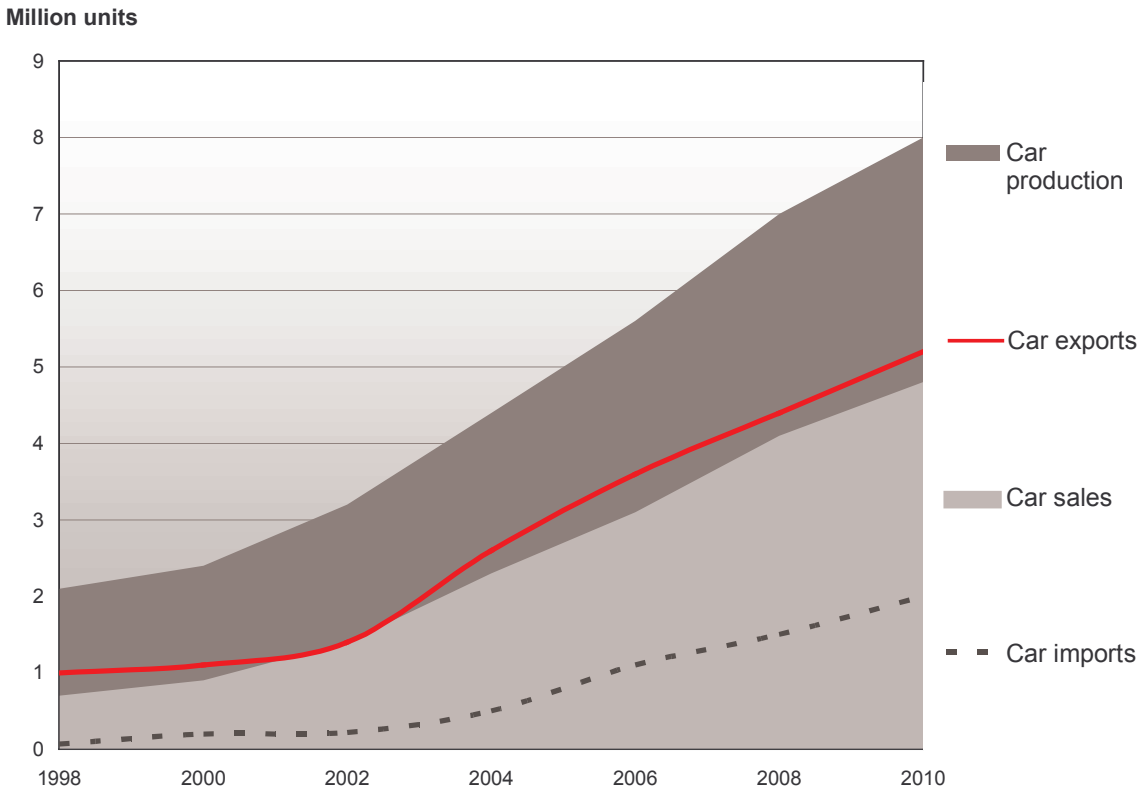
- With a population of 1.3 billion, China represents a large market. Due to a major increase of the Chinese living standard over the last few years, more people are able to afford their own car.

- Due to plummeting customs duties, the average price level of imported vehicles has been lowered by about 15% in general. For example, the import tax of passenger cars below 3-liter capacity has dropped from 70% in 2001 to 43.8% in 2002. Import duties for vehicles of capacity of 3-liter and above declined from 80% to 50.7%.

As part of the Tenth Five Year Plan, the Chinese government supports the automotive industry with investments amounting to US$ 7.5 billion to strengthen the domestic car manufacturers in the face of international competition. These investments are used to advance the technology as well as to modernize existing production tools.

Most equipment used will be NC machines and PLC controlled composite systems and automated production lines. Body parts assembly will be gradually turned into rigid & flexible combination formed by high-speed machining centres.[27]

Figure 7: Development of the Chinese automotive industry



When taking all the announced investment- and expansion plans of foreign auto makers into consideration, total installed capacity for passenger cars in China will reach almost 8 million units by 2010. At this time, the Chinese market will at best be able to absorb about 4.8 million units. Including imports of approx. 2.0 million units this would mean theoretically that China would export about 5.2 million passenger cars by 2010. We do not believe that these projections will actually materialize.

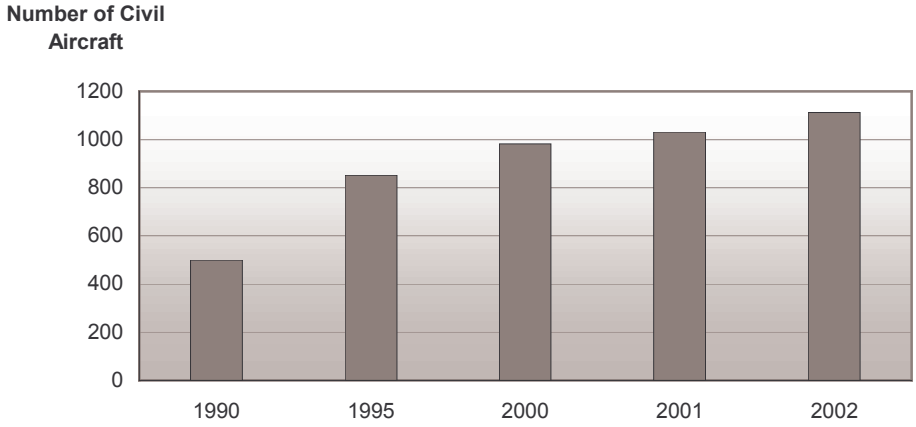
However, over-capacity will almost certainly lead to:

- price reductions and domestic competition
- reduced imports and/or increased exports
- enhanced quality to meet world standards
- even more pressure on system partners to shift best machines/processes to China

6.4.2 Aviation and Aerospace

Due to increasing demand for air travel, China's aviation and aerospace sector continues to develop at a rate that is higher than the international average of currently 2% to 3% p.a.

Figure 8: Number of Civil Aircraft in China[28]



Preliminary estimates show that total air-transport turnover will grow by and average 8% to 10% in the next year.[29] This expansion will result in remarkable profits for the machine tool industry as it will require large-scale, high-speed, multi-axes and high-precision machines.[30] For example, Chengdu Aircraft Company and Xian Aircraft Company built production lines for manufacturing spare parts for Airbus and Boeing, that require a large number of three-axes and five-axes high-speed high-precision CNC milling machines, machining centres and special purpose machine tools.[31]

6.4.3 Shipbuilding

For nine years in a row, since 1994, China has remained the world's third largest shipbuilder. Statistics show that in 2003 China's shipbuilding industry delivered a total of 6 million dead weight tonnage (dwt) of vessels, representing a global market share of 10%. This development indicates that China's shipbuilding industry is becoming internationally competitive in terms of quality and performance.[32] Meanwhile, the country continues to import advanced foreign technology and key equipment, develop its domestic shipbuilding capabilities and encourage the use of advanced domestic equipment, hereby supporting the domestic machine tool industry.

6.4.4 Engineering and construction

China is trying to provide enough stimuli to the economy to ensure that the 30 million job seekers entering the labour market each year can be employed. Although the economy is already overheating, the Government continues to pump US$ 30 to 50 billion into infrastructure projects each year. The best known of these are the Three Gorges Dam, the 20,000 km railway electrification, the 60,000 km highway projects and the US$ 28 billion investments in preparation for the Olympic Games in 2008. As a

result of this infrastructure spending, China is now running an annual budget deficit of about 4% of GDP, roughly in line with industrialized countries.

To meet WTO requirements, China is gradually revamping its legislation on engineering and construction. In the past, engineering was always considered to be linked to construction and as a result, engineering firms could not establish wholly-owned foreign enterprise in China because of stiff regulations regarding the establishment of construction companies in China. There are several multiple-stage licensing schemes all involving vast amounts of capital and all requiring various categories of licenses. Plant engineering firms will probably begin to flock to China once the new legislation is in place and once it is possible for foreign engineering companies to employ local Chinese subcontractors to do auxiliary work and supply components to the engineering plants. As soon as this happens, we foresee an enormous increase of engineering activities by foreign companies in China and with it an increasing influx of foreign-made machine tools.

Due to the development projects across China in general, and in the North-Western regions in particular, high power rigid machine tools that perform heavy-duty cutting jobs are in demand. Especially the four infrastructure projects South-to-North Water Supply Project, West-to-East Natural Gas Supply Project, West-to-East Power Supply Project and Qinghai-Tibet Railway Project are of great importance to the engineering and construction sector.[33]

6.4.5 Moulds and dies

China's moulds and dies industry has been developing rapidly. Between 1996 and 2001, the output value grew at an average annual rate of approx. 14%, reaching US$ 3.95 billion in 2001. It is expected that this growth rate will be maintained at 12% to 15% during the Tenth Five-Year Plan period (2001-2005). The main market for moulds and dies is needed in the industries of automobiles and motorcycles, household appliances, electronic and telecommunication products, building materials, plastic products, instruments and meters.

Although locally produced machine tools can satisfy the production of ordinary moulds and dies, they apparently do not meet precision requirements when it comes to sophisticated products such as packaging for electronic parts or various car components. Imported machine tools by the Chinese moulds and dies industry in 2002 amounted to about US$ 734 million, which is equivalent to approximately 25% of all machine tools imported. The machines in highest demand include 5-axes plano mills, high-speed mills, machining centres, precision EDM machines and various types of precision grinders.[34]

6.5 Future developments of the Chinese machine tool industry

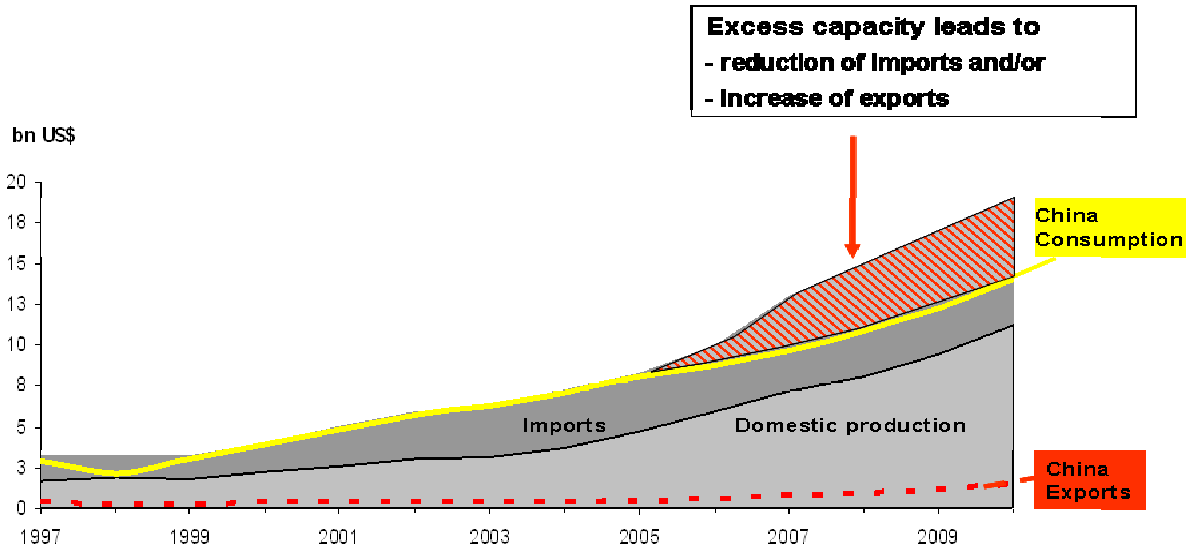
We firmly believe that the privatization of the Chinese machine tool industry will continue and it will probably accelerate even more rather than abate in the near future. At present the Chinese government is very positive about the general economy and subsidises the SOE's in their transition to private enterprises. Government grant

schemes relieve the privatized companies from most of their financial and employment related burden. Triangular debts are being forgiven or reduced, surplus staff is either taken over by the government or transferred to none core subsidiaries, which later will be divested. Infrastructure related burdens like daycare centres, hospitals, hotels and restaurants etc. are being hived of, and – most importantly – the property boom is expected to continue for at least another four years (until the Beijing Olympics) so that there is a strong incentive for Chinese machine tools manufactures to sell their considerable inner-city land to potential developers and use the revenues as a once-in-a-lifetime opportunity to rectify all the mistakes of the past and establish a solid foundation, which hopefully enables the Chinese machine tools manufacture to meet the future challenges.

Many of the Chinese we spoke to, share our uneasiness vis-à-vis the projected smoothness of the further development of the Chinese economy and they would rather complete the privatization as quickly as possible, in order to eliminate the imponderables of the future development to the Chinese economy in general in the future.

With the past sorted out and their economic development put on a new footing, most of the Chinese machine tool manufactures have a very optimistic view of their future. Most managers we spoke to explained that they had experienced growth rates between 40 % and 70 % p.a. for each of the past three years and they expected this development to continue. They are also confident to weather the storms of the overcapacity in China, because they feel, with their new foundation and new structure, to be competitive enough to be one of the few survivors of the future shake out.

However the machine tools manufactures also realize that the domestic pressure generated in the Chinese market will probably force them sooner or later to look for new avenues of revenue and they all see their future in exports to the global markets.



If China continues to increase its imports as well as the domestic production, it will not be able to absorb the existing machine tools anymore from 2005 on. This excess capacity, could either lead to an unavoidable decrease of imports or increasing exports.

Generally the Chinese see a three tier structure for their domestic machine tool structure in China and for exports in the future.

Bottom Tier: Sell existing technology and export what you have

- Direct sales of Chinese-made machine tools in China: At this tier, the Chinese machine tool manufacturer enjoyed enormous growth rates in the past three years and they all hope that the good times continue. However, most realize that there is an overcapacity crunch coming, but they hope to be able to escape. The recent reforms and the growth of the past years instilled a sense of “Can Do” in the main players of the industry so that they feel they are well equipped to survive the shakeout.

- Export of standard machine tools: At this level of manufacturing, the Chinese feel confident that their reasonable quality-low price machine tools of current production can be sold not only in the Chinese domestic market, but also abroad. These low cost-machines would also provide the Chinese with a good learning example of how to enter the rich Western markets and – most importantly – allow them to build up an after sales service infrastructure and to learn how to solve problems like global spare parts delivery, foreign marketing & sales, and to find their place among the international competition. The Chinese machine tool manufactures realize that this may not be a very glamorous way to enter the international markets, but they feel confident that they could handle the technical challenge of this kind of expansion. In this phase of the export strategy of the Chinese, it is much more important for them to learn the tricks of the Western trade rather to optimize their profits. The machine tools manufactures also feel confident that this is relatively risk free way, because many other Chinese companies have already treaded this path of international expansion.

- Enter International markets through OEM: Another low risk way for the Chinese machine tool manufactures to expand into international markets concerns lies in the opportunity provided as an OEM manufacturer to one of the leading global machine tool manufacturers. At present we do not know of any Chinese machine tool manufacturer whose low cost reasonable quality machine tools appear as the low end market entry product in the catalogue of a major German machine tool manufacture. However, Dalian Machine Tool Group Company is already manufacturing low end lathes for the U.K. Company “600”. These machines are manufactured in China and a “600” label goes on the machines before shipment. Another example concerns Jinan First Machine Tool Group, whose products are now listed in the catalogue of the German company “Knuth”. The “Master Turn 400” is a CNC lathe which Jinan sells under the “Knuth” label and they are also

selling two small CNC machine tools “Starship 460” and “Starship 320”. They also have a vertical drilling machine “T5035” which they export to Germany through another German company.

Trough this channel, the Chinese have the opportunity to learn about the Western ways, learn about Western quality and Western understanding of service, reliability, accuracy, precision etc. and they also learn through their OEM partner the essential skills for marketing, sales, promotion etc. This OEM way is impressively being demonstrated by the Chinese consumer good industry and here in particular in the manufacturing of toys. The present 124 US$ billion trade surplus between China and the US is largely caused by this OEM approach of the Chinese.

Usually the Chinese go along with their OEM partner for a couple of years until they know everything there is to be known. As soon as they feel confident enough, they terminate the OEM Agreement, continue to sell the same machines, but under the Chinese brand name to the same international customers and build up there own presence and brand internationally.

Middle Tier: Benefits from previous co-operations and know-how transfers

The second tier concerns those machine tools where the Chinese manufactures have benefited from know-how transfer in the 80’s and where there are now able to manufacture machine tools which are close to international standard. The optimism of the Chinese machine tool manufactures in this category concerning future expansion to the world market stems in part form their ability to win approval from Foreign Invested companies (particularly in the automotive industry) to supply their machines to the foreign automotive manufacturing plants in China. This approval exists for presses and standard machine tools, which are required in great quantities, but it does not go for the complicated or highly demanding special machine tools yet. The Chinese manufactures in this category maintain that they have absorbed the know-how which the bought in the 80’s and early 90’s and that they now understand the trickiness of the machine tool manufacturing process. They feel that all they need is a small final push from the Western technology bearers to achieve world market standards. The Chinese machine tool manufactures are also buoyed by their tremendous success over the last three years and feel that they can handle almost any technical challenge that is being thrown at them.

Another international development seems to play into the hands of the Chinese manufactures as well: Increasingly, the manufacturing of machine tools is being segmented into different areas. There are now specialists for the CNC machine controls; there are specialists for the supply of spindles, specialist for the supply of linear drives, suppliers for machine beds etc. All of these system component suppliers have a vital interest to ensure that the interfaces of their components are following international standards to that they can work in harmony with as many client manufactures as possible. This development is of course not always in the interest of an integrated machine tool manufacturer, but seems to be prevailing more and more. The

Chinese machine tools manufactures in the second tier structure hope to benefit from this development by leapfrogging the German competition.

Whereas the Germans have gone through the long and tedious way of continued development and continued perfection of every single mechanical part that constitutes a sophisticated machine tool, the Chinese hope to be able to benefit from the future modularisation and hope to benefit from future quantum leaps in digitization, which may eventually be able to compensate for shortcomings in the mechanical precision of their own present machine tools. Thus the Chinese machine tools manufacturers in this category hope to be able to expand their product range to meet international requirements by substituting their own inferior domestically made components with the international equivalent. Servicing these components is than the responsibility of the system component supplier.

Top Tier: The Big International Players

The third tier of machine tool technology in China is still the domain of the Germans and Japanese. Wherever there is requirement to meld different technologies, industries and different processes into one particular technical solution, the Germans and Japanese are expected to continue to excel in the future. The integration of a laser welding beam into a six-axes robot for the manufacturing of car bodies in an automotive manufacturing plant is something which is way beyond the present capability of any Chinese manufacturer.

The Chinese realize this very clearly and are not aiming to expand their production into these areas. Besides the Chinese feels that there are enough “low hanging fruits” in the two other tiers below this level, so that for many years to come the Chinese and German machine tool manufactures will be able to exist in harmony without interfering with each other or transgressing in each others turf.

The Chinese machine tool manufacturers do not want to have a confrontation with the Germans. They are grateful for the past development aid provided by the German companies and would prefer to revive the corporation agreements rather than fighting the Germans on the international markets. There is, however, a change in the status of the cooperation as anticipated by the Chinese: In future co-operations the Chinese do not see themselves as a junior partner anymore, because they know that the future will play into their hands and that they would dictate the rules of the game sooner than rather later.

The Chinese would want the Germans to approach them now for a fresh round of discussion, which would eventually bring the benefits both parties were hoping for, when they started the first round of cooperation in the 80’s.

There are also a few of the large Chinese machine tool manufactures who are already thinking about a more drastic way of expanding both technology and markets at the same time:

Some Chinese manufactures have familiarized themselves with German know-how during the cooperation phase in the 80's and believe that it is their vital interest now to continue the next phase of corporation. Now, however the Chinese are no longer the poor cousin they once were, but they are confident, self-assured and cash rich. They have the money to force the old cooperation partner into a new relationship. If negations cannot succeed or if the German partner is not willing to open a new chapter in the cooperation than the Chinese counterpart might just decide to buy the whole German company, lock-stock-and barrel. There were already some attempts, but they failed because of the inexperience of the Chinese negotiators. However we found during our interviews a number of Chinese companies are eying their previous technical mentor in Germany and are contemplating strategies to buy into that company or acquire all the shares at once.

At present, the scenario the Chinese are painting is just that they want to have access to the know-how of their German partner and "entice" the German partner to cooperate with them. However, it can easily be imagined that the Chinese partner, once in control, may decide to shift part or all of the production facilities to China in order to utilize the advantages of Chinese cheap labour and German quality. Machine tools would than be manufactured in China and sold worldwide under the label of the German cooperation partner. Germany would be left with the long term R&D, the design of the machine tools and perhaps with the manufacturing of prototypes.

With this kind of development, the Chinese machine tool manufactures would develop into an international competitor very quickly and their expansion approach would not be immediately noticeable as Chinese driven, because it would be mainly the German company which would be seen as increasing their sales worldwide. When the time is right, the Chinese might decide to assemble all foreign acquired labels under one umbrella brand, but they are in no hurry. For them it is much more important to explore the markets and make money, rather than being visible as a Chinese brand in the machine tool market.

Export controls

Import Limitations

Many of the Chinese machine tool manufactures we spoke to appreciate the level of sophistication of the German imported machine tools. Undisputedly the German machine tool manufactures presently have a higher reputation than even their colleagues from Japan. However, there are two main factors which diminish the high reputation of German machine tools:

Price

As Chinese machine tool manufactures are beginning to purchase machine tool components abroad (spindles, CNC controls etc.), they are increasingly becoming aware of the price level of these components. Therefore they find it difficult to understand why the complete machine tool system imported from Germany still commands such a high price. The machine tool beds are manufactured in China so that the Chinese manufacturers and their clients are well aware of the prices of the main components. The Chinese feel that more Germans should relocate their assembly plants to China if the labour factor is really such a problem. We were told that Japanese companies usually apply the following rule: If the labour factor in any finished product is more than 5 % to 10 % of the value of the total product it is worthwhile to shift the manufacturing to China.

Delivery times

The Chinese machine tool customers have come to accept that the Western world installed some filtering mechanism to ensure that sensitive technology (spindles speed, 5-axes, positioning accuracy etc.) does not find its way into China. Whilst the Chinese vehemently oppose the restrictions imposed on them by the Western world since the events of 1989, most of the machine tool customers we spoke to, maintained that the Western world applies these restriction with various standards. Among the Europeans the Germans are the most bureaucratic and it takes sometimes up to 8 to 12 months after an order has been placed, until the machine tool is actually shipped. This delay almost ruins the chances of German machine tool manufactures to act flexibly to a fast rising demand in China.

Also, the machine tool clients complained that the Germans do not understand the basic business philosophy in China. A Chinese entrepreneur does not plan years ahead, but waits until he receives an order to deliver a certain number of components to a certain client, and only than does he start looking for a machine tool to do the job. Those foreign companies who have a local production in China can act flexibly and satisfy the needs of a Chinese entrepreneur within one or two weeks. However, if it takes the Germans almost one year to approve the deal, another six weeks to manufacture the machine tool and on top of that another four to five weeks to ship it to the final

destination, the Chinese entrepreneur considers other alternatives even if they are more expensive. The deciding factor is the availability of the machine tool.

German Export Restrictions

Several Chinese machine tool customers mentioned that they had noted that the Japanese machine tool manufactures basically applied the same restrictive filtering rules to Japanese exports to China as the rest of the world, but once a decision had been made, the approval of the deal was much faster than for instance from the German authorities. The Chinese also mentioned that the flow of sophisticated machine tools from Japan into China had increased dramatically over the past one year; roughly in line with the decision of most of the Japanese entrepreneurs to shift their standard majority manufactures facilities out of Japan into China.

The Chinese machine tool manufacturers interviewed also doubted whether the restrictions imposed on imports into China actually worked, because meanwhile they had developed their own technologies and their own access channels to foreign technology. They mentioned for instance that is was no problem to obtain 5-axes CNC machine controls, high-speed spindles and sophisticated high precision components.

We found that the main criteria of export limitation (Spindle speed > 10,000 rpm, > 4 axes, Positioning accuracy < 6µ) are routinely being breached by Chinese machine tool manufacturers.

As an example to demonstrate this, we used the parameter of “Axes number”. 4-axes machines are meanwhile standard everywhere and we found more than 200 machine tools in publicly available catalogues. From our collection of catalogues we also extracted almost 50 machine tools with printed specifications of five or more axes (including four 6-axes machines). Only those machine tools were included where a written specification was publicly available in a catalogue. We also asked the Chinese machine tool manufactures whether they had any more 5-aches machines under development and were told that the number of published machine tools was roughly half of the total number of complex machine tools they were working on.

Many Chinese machine tool manufactures in the past were unable to provide their domestic markets with sophisticated machine tools, but meanwhile they are able to obtain the main components of complex machine tools on the international markets and the export controls have meanwhile become an unavoidable nuisance rather than a real limitation.

7 Precision tools industry

Der Aufstieg Chinas zu einem globalen Wettbewerber zum deutschen Maschinenbau

7.1 Zusammenfassung Präzisionswerkzeuge

Die Privatisierungswelle, die gravierende strukturelle Veränderungen in der Werkzeugmaschinenindustrie bewirkt, hat die Präzisionswerkzeughersteller noch nicht erreicht. Traditionell rangierte die Präzisionswerkzeugindustrie immer hinter dem Maschinenbau, der von strategischer Bedeutung für die Entwicklung der Grundlagenindustrien in China war. Die Werkzeugindustrie hatte auch eine enge Verbindung zum Militär, weil dort die meisten Werkzeuge eingesetzt wurden, aber auch weil die meisten zweckgebundenen Forschungsgelder aus dieser Quelle kamen. Die chinesische Werkzeugindustrie, einschließlich der Messgeräteindustrie, hinkt heute ca. 15 bis 20 Jahren hinter dem Weltstandard Deutschland her.

Die meisten Präzisionswerkzeuge- und Messgerätehersteller bewegen sich immer noch im traditionellen Raum der Staatsbetriebe und sehen Ihre Hauptaufgabe darin, die spezifischen Bedürfnisse von vorgegebenen Industrien im zivilen und militärischen Bereich zu befriedigen. Es bestehen kaum Anreize, extensive Grundlagenforschung oder anwendungsorientierte Forschungsprojekte in Angriff zu nehmen, weil es den entsprechenden Staatsauftrag dazu nicht gibt und dadurch auch die erforderlichen Mittel nicht zugeteilt werden.

Dazu kommt die Geldknappheit bei den meisten Werkzeugherstellern, die in dem staatlichen System der gegenseitigen Abhängigkeiten begründet liegt. Die Kunden der Werkzeughersteller sind meist wiederum Staatsbetriebe oder unterstehen dem Militär, so dass die Werkzeughersteller diese Kunden auch dann beliefern müssen, wenn sie wenig Aussicht haben, für ihre Werkzeuge auch bezahlt zu werden. Andererseits sind die Werkzeughersteller wiederum den Rohstofflieferanten verpflichtet, so dass sich ein über lange Jahre gewachsenes gegenseitiges Schuldenverhältnis aufgebaut hat, welches den Werkzeugherstellern keinen finanziellen Spielraum für eigenständige Forschung lässt.

Wegen der Rückständigkeit der chinesischen Werkzeugindustrie verwenden selbst chinesische Werkzeugmaschinenhersteller in ihren Erstausrüstungen importierte Werkzeuge, denn die Maschinen gehen häufig zu Joint Venture Betrieben und diese bevorzugen für die Herstellung von hochwertigen Produkten entweder importierte oder ebenfalls aus Joint Ventures mit ausländischen Firmen gefertigte Werkzeuge.

Die gleiche Überlegung gilt übrigens auch für ausländische Werkzeugmaschinen die nach China importiert werden. Bei diesen Maschinen geschieht die Erstausrüstung bereits im Herstellerland, und die chinesischen Kunden gehen meist nicht das Risiko

ein, die technischen Maschinenspezifikationen durch die Verwendung von einheimischen Werkzeugen zu gefährden.

Bei unseren Besuchen konnten wir fast immer die Ausstellungsräume von chinesischen Herstellern sehen, aber wir bekamen nicht die Gelegenheit, die Produktionsbetriebe oder Herstellungsprozesse zu besichtigen. Standardkataloge sind frei verfügbar, aber über eventuelle Weiterentwicklungen hüllten sich unsere Gesprächspartner in Schweigen. Die Kataloge enthalten hunderte von Werkzeugen und Messwerkzeugen, diese sind jedoch fast ausschließlich für den chinesischen Binnenmarkt bestimmt, und nur wenige werden exportiert. 20% des gesamten Werkzeugbedarfs in China wird importiert, und fast alle importierten Werkzeugmaschinen verwenden importierte Präzisionswerkzeuge oder solche auch Joint Ventures.

Es gab in der Vergangenheit bereits Kooperation mit deutschen Präzisionswerkzeugherstellern wie Widia oder Walter. Diese haben jedoch nicht zu einer nachhaltigen Verbesserung der technischen Leistungsfähigkeit der chinesischen Präzisionswerkzeugindustrie geführt. Es bestehen nur sporadische Kontakte zu deutschen Konkurrenten. Die Chinesen konzentrieren sich auf den Binnenmarkt. Trotz der bekannt minderen Qualität chinesischer Präzisionswerkzeuge sind doch ausländische Besucher immer überrascht, wenn sie die chinesischen Preise sehen. Die anfängliche Freude der Ausländer über den vermeintlich großen Markt weicht schnell der Ernüchterung, wenn sie das chinesische Preisniveau und die große Zahl chinesischer Anbieter sehen.

Das Management von chinesischen Präzisionswerkzeugherstellern ist immer noch sehr traditionell. Die meisten Fabrikmanager der von uns besuchten Unternehmen glauben weiterhin, dass ihre Hauptaufgabe darin besteht, das vorgegebene Staatsziel zu erreichen. Sie wissen, dass die WTO-Mitgliedschaft kommt, sehen darin aber wegen des niedrigen Preisniveaus keine Bedrohung. Andererseits haben sie aber auch keine Illusionen hinsichtlich der Verbesserung ihrer Leistungsfähigkeit und wissen, dass ihnen der Zugang zum lukrativen Erstausrüstungsgeschäft oder zum After-sales Geschäft noch einige Zeit verwehrt sein wird.

Für die Bereiche der Messwerkzeuge gilt im Prinzip Ähnliches, weil viele Firmen, die Schneidwerkzeuge herstellen, auch Messwerkzeuge produzieren. Dabei handelt es sich normalerweise um preiswerte Schiebelehren, Greifzirkel und Messgeräte, die für die durchschnittliche Anwendung in China ausreichend sind, aber keine Chance haben, in der Qualität mit importierten Produkten zu konkurrieren. Je komplizierter die Anwendung wird, desto größer sind die Chancen für importierte Messvorrichtungen.

Für die Messmaschinen gelten die oben angeführten rückständigen Umstände nicht. Chinesische Firmen, die Messmaschinen herstellen, entsprechen in ihrer Einstellung mehr den Werkzeugmaschinenbauern als den Werkzeugherstellern.

Während der 80er Jahre gab es einige fruchtbare Kooperationen, bei der auch Technologien transferiert wurden, und die chinesischen Messmaschinenhersteller wurden so in die Lage versetzt, diese Technologien stufenweise zu übernehmen und in

kleinen Schritten weiterzuentwickeln. Daraus hat sich ergeben, dass manche chinesische Messmaschinen jetzt bereits ein Niveau erreicht haben, bei dem sie im unteren Qualitätsbereich der Automobilproduktion eingesetzt werden. Damit gewinnen sie Zugang zu Devisen, ausländischer Technologie und Exportmöglichkeiten. Die ersten Messmaschinen aus chinesischer Produktion werden bereits nach Asien exportiert, aber die Absatzmengen sind im Vergleich zur Grösse des Marktes noch recht gering.

Schlussfolgerung

Wir sehen daher auf den Gebieten der Schneidwerkzeuge und Messwerkzeuge in absehbarer Zeit keine chinesischen Wettbewerber auf den Weltmärkten als Konkurrenz zu deutscher Technologie und Qualität.

Bei den Messmaschinen hat eine ähnliche Bewegung begonnen, wie wir sie auch bei den Werkzeugmaschinen beobachten konnten, so dass wir annehmen, dass die ersten Hersteller von chinesischen Messmaschinen bald in Asien auftauchen werden. Die Maschinen werden von solider Qualität sein und von unschlagbarem Preis. Probleme wird es mit dem After-Sales geben und mit dem Aufbau von Netzwerken. In einigen Nischen werden allerdings chinesische Messmaschinenhersteller schnell von Misserfolgen lernen und diese korrigieren. Die Kombination von billigen Arbeitskräften und brauchbarer Qualität wird den Chinesen auf dem Gebiet der Standardprodukte langfristig erhebliche Wettbewerbsvorteile verschaffen.

7.2 Executive Summary Precision Tools industry

In contrast to the Machine Tool Industry in China, the precision tooling industry and the measuring instruments industry do still not enjoy all the benefits of reforms.

Traditionally the Tooling industry took second place to the Machine Tool Industry, which was of strategic importance. However, the tooling manufacturers were always closely associated to the Military because most of the tungsten carbide tools were used there. The Chinese tooling industry is 15 - 20 years behind the most sophisticated manufacturing plants in the West and in contrast to the machine tool companies, most of the tooling companies are still very much involved in the traditional corporate identity of a State-owned enterprise. Many of the tooling manufacturers have a triangular-debt problem because they have an obligation to deliver their products to the Military or State-owned companies, but their clients do not see the obligation to pay the tool manufacturers. This means that most tooling companies do not have the necessary funds to go for reforms or for upgrades of their tool manufacturing facilities.

Besides, most of the R&D financing comes from the Military and the funds are usually allocated to specific tasks. This project-allocated funding does not allow the tool manufacturers to develop capacities to serve the sophisticated Chinese market or to serve the after-market for imported machine tools.

Because of the backwardness of the Chinese tooling industry, most Chinese machine tool manufacturers who supply their machines to Foreign-invested enterprises will not use Chinese-made cutting tools for their machine tools, but prefer to use those which come from Sino-foreign Joint Ventures (Leitz, Sandvik and others), or to import straight from abroad.

Our investigations also showed that foreign-invested companies who imported machine tools from abroad are not inclined to use Chinese-made cutting tools for their machines, because they are not up to the highest standard.

As a result, most of the Chinese precision tool manufacturers continue to work in out-dated facilities, under traditional State-owned enterprise management and without the necessary funds to upgrade. Their product catalogues usually contain hundreds of tools, but these are meant for the Chinese domestic market and only very few are being exported. Almost 20% of the total tool consumption in China is being imported and virtually all the imported machine tools are using imported precision tools.

There have been some co-operations in the past, also with German tooling manufacturers (Widia, Walter), but these have not resulted in a dramatic upgrade of the technical capabilities of the Chinese precision tools industry. There also do not seem to be many regular contacts with foreign competitors and the marketing view of the Chinese tooling manufacturers does not extend beyond the People’s Republic of China. Most Chinese precision tool manufacturers are happy to receive foreign visitors, but

their happiness is short-lived, when the foreigners find out the domestic price level in China on cutting tools and the murderous competition among the Chinese companies.

Management of Chinese tool manufacturers still adheres to the old standards and most of the factory managers we visited believe that their main aim is to fulfil the State quota and to be of service to the Military. They know that WTO is coming, but do not see that as a competition or a threat, because their own price level for Chinese tools is so low that they do not fear foreign competition. On the other hand, they have no illusions about their own upgrading capability and will leave the after-market for imported machine tools and for high-end tooling applications to foreign suppliers.

Standard catalogues are available, but we are not allowed to inspect a single manufacturing plant for precision tools, mainly with reference to some sensitive applications that were tried out on the premises.

For the measuring industry, pretty much the same goes as mentioned above. Many companies who are manufacturing cutting tools are also in the business of measuring devices. These are usually low-cost, low quality callipers which may be sufficient for the average application in China, but have no chance to compete with imported products. The more complicated the application gets, the higher the chances of imported measuring devices.

For measuring machines, our findings are more positive and more akin to the developments in the machine tool industry. During the 80's, there have been a number of fruitful co-operations, where technology was transferred and the Chinese measuring machine manufacturers were able to gradually absorb this technology and develop it further in incremental steps. As a result, some Chinese made callipers (especially 3-dimensional callipers) have now reached a level where they can be used in the automotive industry and these callipers are finding a ready export market.

Cutting- and Measuring tools

In most Chinese tooling companies we visited, Cutting tools and measuring tools were also being manufactured. Measuring tools however suffer from the same restrictions as the cutting tools. Triangular debts pose the biggest problem. Their clients are usually the large Chinese conglomerates and for them, a measuring tool is a relatively unimportant product, hence the tendency to pay late – if ever. The resulting lack of capital prevents the Chinese measuring tool manufacturer to invest into new facilities or in R&D, because he has to use what little money he receives for the purchase of raw materials. Many Chinese measuring tool manufacturers suffer from an image problem, are unable to attract sufficiently trained personnel and are generally not seen to be of strategic importance. The majority of these companies are still State-owned, because the Government has to ensure the smooth transition of the behemoths first, before distributing what subsidy is left among the other companies.

Management is relatively old, interviews usually end in general statements on the future long-term potential of the Chinese precision tool industry in general and the measuring

tool industry in particular, but precise information is very hard to come by. We were unable to visit even a single manufacturing plant for precision tools or measuring tools, although we were able to inspect the samples in the show rooms and we were able to look at the finished products prior to shipping to clients. The catalogues we received from the precision tool manufacturers and the measuring tool manufacturers are standard run-off-the-mill and all Chinese manufacturers we visited are quick to acknowledge that their products are only being used in Chinese companies who work for domestic applications. Every reputable Chinese machine tool manufacturer recommends foreign tools and any customer with critical applications is not prepared to run the risk of using Chinese tools.

Measuring Machines

We were only able to visit a few measuring machine manufacturers. However, in every factory we visited, there was a marked contrast to the visits to their brothers at the measuring tool manufactures. The measuring machine tool manufacturers were much more forthcoming, were playing an active part in their forthcoming privatization, had co-operations in the 80's and were confident that they were on the right track to become an international competitor. Harbin No. 1 Tool Corporation for instance is actively looking for cooperation partners in seven key projects and has already entered into cooperation with an American company for the manufacturing of precision complex cutters. It also has a cooperation in the area of screw cutters with a French company.

Harbin Measuring Cutting Tools is another company, exemplifying the change in attitude. They had a cooperation in the 80's with Hommel and were also cooperating with Klingelnberg. Meanwhile they believe that they have absorbed the technology and they would be interested in continuing the cooperation with their previous partners. Whilst Harbin agrees that the present Hommel technology is much more advanced than the old cooperation machine, they feel that they have now advanced sufficiently enough to understand the technical background of the functions of the measuring machine and would like to offer their engineers and technicians to repair both the presently imported Hommel measuring machines and the ones which resulted from the previous cooperation.

Harbin's other previous cooperation was with Klingelnberg in the area of gear measuring tools. Meanwhile Harbin has continued with the development and we were shown a 2m diameter measuring machine, which according to the Chinese are only obtainable from the US, Germany and now from China. The Chinese now realize the difficulties in manufacturing such complex measuring machines and would like to share the load of future development with German companies.

Chinese manufacturers of measuring machines also are now beginning to export some of their products, and with increasing success their confidence also increases. For instance Shanghai Measuring and Cutting Tool Works was originally supplying 3-point-measuring tools to the domestic automotive industry, but were able to export to Europe through their good contacts and growing reputation. They realize the potential for

exports in measuring machines, but are also quick to acknowledge that they do not have the management capabilities to enter the Western markets alone. Besides they feel that at the lower end of measuring machines there is still much potential for Chinese made measuring machines so that they do not see themselves as direct competitors to measuring machines from German origin.

Throughout the remainder of this report we shall refer to the Chinese Precision Tool Industry and this is meant to include precision tools, measuring tools and measuring machines, as the conditions apply to all three industry groups likewise.

7.3 Overview

For the purpose of this study, precision tools are understood to encompass the manufacture of machining tools, chucking and clamping devises, press tools, jigs and fixtures, moulds and patterns, as well as dimensional measuring instruments and machines[35].

The precision tool industry plays a vital role in the manufacturing cycle, as almost every manufacturing process would require the use of precision tools. As in the case of the machine tool industry, the precision tool industry shoulders a large economic responsibility of industrialized nations such as Germany, Japan and especially, the "factory of the World', China.

Contrary to the practice of the Chinese Machine Tool Industry, the Chinese Precision Tool Industry is still very traditional in its approach concerning the engagement with foreign competitors and the release of information other than what is printed in their companies' brochures and catalogues. In addition, the scale of operations of precision tool industry in China is small compared to the machine tool industry and the overall industrial outputs; resulting in limited emphasis and research being conducted in the performance of the precision tool industry. Hence, the information concerning the Chinese precision tool industry is relatively limited, in comparison with the information on machine tools.

There are a number of other issues and weaknesses still hindering the development of the industry. Insufficient investment in technology and innovation, incompatibility of products with the needs of customers, quality and durability issues, shortage of qualified personnel, poor OEM penetration as well as weak company structure, are some of the areas which are examined more in detail in their respective subsection below.

Key players like Jiangsu and Shanghai understand that there is still a 10 – 15 year gap between Chinese and foreign precision tools manufacturers and they have taken the first step to adopt a more proactive approach towards technological development and innovations. In fact, over the last 2 years, even though the technological difference between Chinese and foreign producers are still big, there have been some significant improvement and development within the Chinese Precision Tool Industry[36].

The development of Chinese Precision Tool Industry, in particular the metal cutting tools, have also taken on a new focus over the last few years. Cemented carbide tools are replacing HSS based cutting tools and enjoy a growth rate of more than 40% year-on-year[37].

Further, the Chinese precision tool manufacturers have just started to comprehend the notion that while precision tools represent only 2.5% to 4% of total manufacturing cost, it directly affects 20% of machine tools running costs and 38% of labour cost. In fact, the industry is urging its members to adopt strategies used by industrialized nations that capitalized on such notions, whereby every 15% to 20% increase in the speed of feeding and cutting would reduce the overall manufacturing cost by 10% to 15%, even if the price of precision tools increased[38].

7.3.1 Development

China's industrial output had been increasing at double digits in response to its economic growth (2000 +11%; 2001 +10%; 2002 +12.6%; and 2003 +16%)[39]. The surge in Chinese industrial output over the last few years created a strong demand for machine tools and the corresponding precision tools.

The automotive industry, which accounts for almost 40% of gross consumption of precision tools in China, is experiencing a hyper-growth phase which grew by 38.5% and 36.7% in 2002 and 2003, respectively[40]. It is forecast that the automotive industry would continue to be the single most important market for both the Machine and Precision Tool Industries for the next 3 to 5 years[41].

Other than the automotive industry, the energy industry and the die and mould industry are the other 2 key industries that generate the surged in demand for the Chinese precision tools. The capacity of the energy industry grew by 74.88% in 2003 to 37 million KW, accounting for more than 50% of the 10th Five-Year Plan's total planned capacity of 70 million KW[42]. Industry experts had predicted that by 2005, China's energy capacity would well exceed the 70 million KW target. The die and mould industry, on the other hand, experienced a continuous and high growth rate of 14% per annum[43]. The market demand still exceeds the supply of the industry, especially the demand for precise, large, sophisticated and durable products. It is forecast that this industry would grow by an average of more than 13% per annum over the next few years[44].

Other industries that influence the demand for precision tools include the aerospace industry, the electronics industry, the machinery industry and the ship building industry. The aerospace industry, which encompasses the defence industry, is also experiencing high growth since 2000. The aerospace industry is currently undergoing a major reorganization and restructuring not seen in more than 20 years[45].

The Chinese Government regards both the Machine Tool and Precision Tool Industry as strategically important to China's long-term economic development. Therefore these industries are included in the Government's 5-year plans. In essence, the 10th Five-year plan for Machine Tool and Tooling Industry calls for:

The optimization, upgrade and expedite the progress of the industry's technological capability, development and innovations as well as product design;

The condensation and transfer of surplus productivity;

The establishment of manufacturing processes that is responsive to market changes;

The need to intensify training; and

The need to enhance the competitiveness of the industry.

The Plan envisaged the formation of 10 to 15 core/key precision tool manufacturers as pillars for the Precision Tool Industry, while other companies within the industry would be small and light-duty specialists with the ability and agility to quickly respond and adapt to market changes.

The specialist structure would enable these companies to direct their resources and investments for the development, testing, production, packaging, branding, product solutions and quality control of a few products that would form their core competency; thereby becoming a specialist of those products in the true sense.

7.3.2 Weaknesses

The Chinese Precision Tool Industry stands in the shadow of the big brother, the machine tool industry. The Chinese Government's priority focuses on the modernisation of the machine tool industry and all subsidies go there. The precision tool industry may be next in line, but no one is certain.

For the time being, the precision tool industry is stuck in the tradition of the State-Owned Enterprises (SOE) with no funds to modernise and no Government support to begin the transition to private enterprise status. Thus they continue to produce mass-market products of sub-industrial standard at incredibly cheap prices.

- **Quality and durability**[46]

  Quality and durability are issues identified by customers to be the most critical to the Chinese Precision Tool Industry. Most Chinese precision tool manufacturers have outdated testing facilities and much of the "testing" is done when customers are actually using the products for production purposes. Hence, most of these manufacturers lack the ability to ensure quality or uniformity of their products.

- **Products are not compatible with the needs of customers**[47]

  New product development must be based on the requirements of the end customers. However, most Chinese precision tool manufacturers have yet to fully comprehend the specific requirements of each cluster of customers for its products. This is due to the lack of close consultations with the end users as well as insufficient research into the needs and requirements of the customers.

To gain a better understanding and insight into the need and requirements of the customers, the industry had forged closer ties and cooperation with the Machine Tool Industry as well as with key clusters of end users to enhance the practicality and functionality of their R&D activities and product development.

- **Shortage of qualified personnel**[48]

There is a severe shortage of qualified technicians, engineers, management and sales personnel as well as machine operators, which are vital to the development of the Precision Tool Industry. These personnel would need at least 3 to 5 years of intensified training. Both the Machine Tool and Precision Tool Industries felt that the technical schools, in China, have not provided adequate and quality training for their students who would join both industries upon their graduation. Further, the precision tool manufacturers are unwilling to invest the time and resources to train their personnel due to time constraints as well as the fear that these personnel would not stay with the company over time.

This problem was intensified when foreign producers, in their efforts to expand their sales networks and to establish manufacturing facilities in China, poached such personnel from the industry. Hence, the industry lacks qualified technicians and engineers for their product and manufacturing process developments as well as lacks qualified sales personnel with an intimate knowledge of their products and functionalities.

- **Poor OEM penetration**[49]

Traditionally, there is little emphasis by the Chinese Precision Tool Industry to tap into the OEM market and sell the initial set of toolings together with a new machine tool. Many within the industry failed to realize that the machine tools manufacturers can help the Precision Tool Industry gain a better understanding of the future directions of precision tool developments as well as the customers' requirements. Chinese manufacturers of sophisticated machine tools prefer to equip their machines with imported tools in order to improve the general performance of their machine.

This development was aggravated further by the increased competition in the customer markets, where for instance the automotive industry demanded quality and durability parameters commensurate with Western standards, but the Chinese were unable to comply.

This has an adverse effect on the product development of the Chinese precision tool manufacturers and had forced them to look at the replacement market, where they may have gained some short-term success with their attractive prices, but invariably ruined the established price structure without being able to convert their first approach into long-term success.

As a result, the Chinese precision tool market is only growing by ca 20% per annum, whereas imports from Western companies like Sandvik enjoy growth rates of 50% over the past 3 years.

- **Limited by existing company structure**[50]

The level of technology, production capability, size of investments, scale of operations, productivity as well as market share of the Chinese precision tool manufacturers are relatively small in comparison to modern foreign precision tool manufacturers. The majority of the more than 330 companies are still State-owned enterprises with all the disadvantages of the State Planning System:

Obsolete manufacturing equipment and processes, product and production technologies as well as design capability

Organizational structure and management processes that do not effectively address the requirements of a market-driven economy. Party interference on all levels.

Low efficiency and little R&D activities. Many of the State owned enterprises had not progress beyond the strategy of copying. There is no incentive to do anything other that fulfilling the State Plan.

Diversion of talents and resources: Many precision tool companies have their roots in the military organizations. Up until today, the military contributes a substantial part of the funding, and in turn they get priority treatment in production matters, procurement matters and in the allocation of resources.

- **Handicap in exports**

The competitive position of the Chinese precision tool industry vis-à-vis foreign imports is further exacerbated by regulatory obstacles. After a partial liberalisation in the 80's foreign producers enjoyed the same benefits as the Chinese manufacturers and were subject to an import duty of 8%, whereas the Chinese manufacturers had to pay a Value Added Tax (VAT) of 17% (which was later offset against an export rebate of 16%)[51].

To capitalize on the surge in demand for precision tools and for customer service purposes, foreign precision tools producers have, over the years, established extensive sales networks, with many setting up manufacturing facilities within China[52]. These joint operations are not part of our report, because the inclusion of this group would provide us with an impression of the overall industry status, but not that of the Chinese precision tool manufacturers. Besides the technological edge over the Chinese, foreign producers' resources and after-sales services are also much stronger than their Chinese counterparts.

- **Domestic overcapacity and price wars**

  Chinese precision tools lack a brand name and do not have the added value of good quality, durability etc. As they cannot compete on these parameters with imported products, they must compete on price. Subsequently, a price war is presently going on in China, where all are competing for a larger share of the market.

  The influx of imported precision tools into China resulted in a larger variety of precision tools being available to the customer and at competitive prices. Because of the ruinous price attacks of Chinese manufacturers, prices of imported precision tools are about half to two-thirds compared to a decade ago. The situation is further aggravated by Taiwanese producers, who also adopt a low pricing strategy[53].

- **Insufficient investment in technology and innovation**[54]

  The Chinese manufacturers, traditionally, have minimal or no investment allocated to upgrade their technology and for their R&D activities. In addition, the level of technological theories, research functionalities and practicality as well as testing facilities and methodology of the Chinese research institutions and schools, with regards to precision tools, lags behind those of the advanced industrial nations; hence the lack of technology support and push to enhance the technology developments and innovation.

7.3.3 Strength

The key strength of the Chinese precision tool manufacturers lies in their ability to mass produce general purpose precision tools of reasonable quality at an extremely low cost compared to industrial nations' standards. Such ability comes from the abundance of cheap and skilled labours in China, and the availability of the required raw materials. As these precision tools cannot match the standards of industrial nations, they do not pose a direct threat to the German producers, except for general purposes. Presently the focus of Chinese exports is on Africa, Latin America and South East Asia.

However, the Chinese precision tool manufacturers understood that they cannot solely rely on the price factor to sustain their growth or survivability, especially with the impending onslaught into their home base by the foreign precision tool manufacturers. Hence, the Chinese are beefing up their capabilities in terms of product and technology development, multi-functions/purpose tools as well as quality and durability.

7.4 Industry sectors of the Chinese precision tools industry

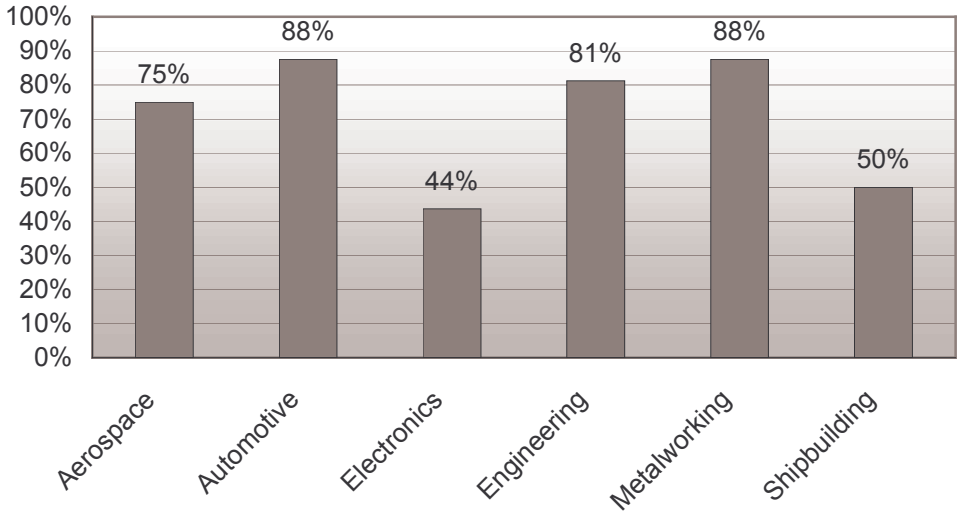
The surge in Chinese industrial output over the last few years created a strong demand for machine tools and the corresponding precision tools.

Chapter 7: Precision tools industry

Since China opened its economy in the 1980's, its economy had sustained an average growth rate of almost 8% per annum. In 2003 the economy grew by 9.1% and this speed is expected to continue over the next few years. Additionally, the ever increasing FDI will no doubt spur further growth and ensure greater demand for both machine tools and precision tools.

Of the16 largest Chinese Precision Tool Companies in China that we interviewed, most of them supplied precision tools to the automotive and the metal working industries, whilst less than 50% of them supplied to the electronics industries.

Figure 9: Breakdown of industries supplied by the Top 16 precision tools companies



The growth and development of the following industries would continue to fuel the demand for precision tools:

7.4.1 Automotive

The automotive industry experienced double digit growth for each of the last 5 years. In both 2002 and 2003, exceptional high growth was experienced as the industry grew by 38.5% and 36.7%, respectively[55]. China is now the fourth largest automotive producing country in the World, producing 4.4 million automotives (including 2 million cars) in 2003[56]. Industry experts predicted that by 2010, China would be the 2nd largest automotive producing nation after USA[57].

Table 3: Import volume and value of the Chinese automotive industry[58]

	Output Volume	Output Value (in billion US$)
2003	4,444,000	53.9
2002	3,477,000	42.2
2001	2,242,000	28.4
2000	2,070,000	23.2
1999	1,832,000	19.7

Out of US$130 billion fixed assets investments that poured into the industrial sectors between January and October 2003, US$107 billion was absorbed by the automotive, energy, metal working and machinery industries[59]. Further, the majority of 53.5 US$ billion Foreign Direct Investment in 2003 was focused on the automotive, communication and energy sectors. In addition, the automotive industry, which is experiencing a hyper-growth phase, is undergoing constant restructuring and reorganization as well as constant upgrading and expanding its facilities to cater to the rapidly growing demand due to the surge in the Chinese standard of living and industrial needs. This had resulted in a surge, not only in the demand for machine tools and the resultant precision tools for OEM, but also for precision tools within the replacement market.

The automotive industry forecasted that it would produce about 5.6 million automotives, including 2.6 million cars, in 2004, which would be an additional stimulant for both the Machine Tool and the Precision Tool Industries. It is forecasted that the automotive industry would continue to be the single most important market for both the Machine and Precision Tool Industries for the next 3 to 5 years[60]. From historical data, the automotive industry accounts for almost 40% of gross consumption of precision tools in China.

While the hyper-growth of the automotive industry provides a surge in demand for precision tools, imported precision tools account for more than 90% of the automotive industry's high-end precision tools requirements[61]. This is due to the vast difference in the technological and product development between Chinese and foreign precision tool manufacturers. An example cited to demonstrate this point was the fact that the automotive industry purchased a few production lines of the 1990s technology, but the Chinese precision tools account for only 20% of the precision tools needed for those lines[62]. This trend of importing high-end products will continue well into the foreseeable future, as long as the Chinese precision tools are unable to meet the technical specifications of high-end products required by the automotive industry.

Although the automotive industry's current procurement policy with regards to precision tools is relatively liberal, it is however, under immense pressure to reduce cost[63]. This would present the Chinese precision tool manufacturers and foreigners with

manufacturing facilities in China, especially the Japanese, who has an opportunity to capture a bigger slice of the market share.

7.4.2 Electronics

Since China opened its economy in the 1980's, there has been a massive growth in the consumer goods market. Rapid economic expansion has brought with it a continuous and rapid increase in average household incomes in China, leading to improved standards of living and stronger household purchasing incomes. The new wealth generated under the current economic climate fuelled the rapid growth in the demand for electronic goods[64].

The market has now reached a stage where households ownership of TV sets are universal, the vast majority of which are colour sets, with a sizeable proportion of households owning more than one set. Ownership of video and audio equipment is equally universal, if not more so; hence, the market has reached a high level of maturity, making it increasingly competitive.

The consumer electronics goods market is, by Chinese standards, very mature, and has reached a point where the emphasis of those involved in the market has shifted from trying to reach every home in China with a first sale, to improving purchasing levels per household and selling to consumers wishing to upgrade their consumer electronic goods.

This does not mean that the market is stagnant. One of the key features of the electrical and electronics industry, at present, is that it is highly competitive. This means that companies would have to work harder to find a niche market for new products and win over an increasingly well-informed consumer constituency that is looking to buy better quality, more advanced and better priced goods. Therefore with price competition becoming a key factor in recent years, manufacturers are being forced to become even smarter in their product design, distribution, marketing and costing.

7.4.3 Machinery

Though it was considered a sunset industry in the past, the Chinese Machinery Industry has witnessed a hyper-growth rate over the past 5 years, with 2003 recording a growth rate of about 32%. The surge in China's economic development over the last few years had created a huge demand for machinery and equipment, which spur the rapid growth of the industry. The Machinery Industry is forecast to grow at an average annual rate of 15% over the next few years, which is in response to the demand generated from China's continual economic development[65].

7.4.4 Dies and Moulds

The die and mould industry experienced an average annual growth rate of 14% over the last few years and is one of the vital industries that propelled China's economic and industrial growth. The market demand still exceeds supply, especially in the demand for precise, large, sophisticated and durable products. However, the majority of such

products are being imported into China. Over the last 5 years, China imported more than US$800 million worth of dies and moulds[66]. Key consumers in this industry are mainly the household appliances, electronics and telecommunication construction, aerospace and the automotive industry (the single most important user of die and mould products). Therefore it would further generate greater demands for the dye and mould industry.

The 10th Five-Year plan forecasted that this industry would grow by an average of more than 13% per annum. Currently, the market size of the Chinese die and mould industry is more than US$6.2 billion and is still growing. Fixed Asset investments in this industry are forecasted to average about US$ 620 million per annum over the next few years, of which 80% (about US$500 million), would be used for the purchase of metal-cutting machine tools and precision tools every year[67].

7.4.5 Shipbuilding

For nine years in a row, China has remained the world's third largest shipbuilder since 1994. In 2003, China's shipbuilding industry delivered a total of 6 million dead weight tonnage (dwt) of vessels, reaching a share of 10% in the global markets, indicating that China's shipbuilding industry is becoming internationally competitive in quality and performance[68]. Meanwhile, the nation continues to import advanced foreign technology and key equipment, develop its domestic shipbuilding capabilities and encourage the use of advanced domestic equipment, thereby supporting the domestic machine tool and precision tool industries.

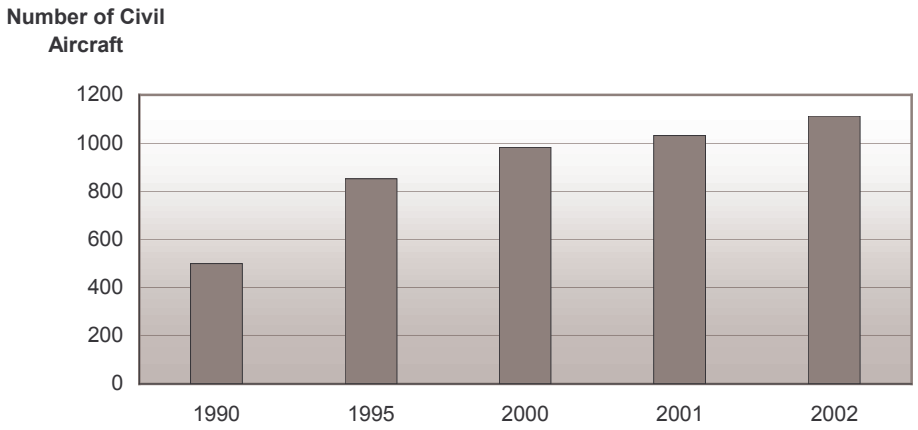
In addition, among the top 50 busiest ports in the world, 10 of them can be found in China. In fact Shanghai had displaced Busan (South Korea) to become the world's third busiest port in 2003, with about 12 million TEUs. These top 10 Chinese ports, combined, handled more than 55 million TEUs in 2003. These ports also handle the repairs and maintenance for ships that called at these ports; hence, generating further demand for machine and precision tools.

7.4.6 Aerospace

The aerospace industry is also experiencing high growth. Since 2000, there has been a continual and rapid surge in the demand for both machine and precision tools in the aerospace industry due to a large number of priority military and aerospace projects, which the Central Government had identified for technological development and renewal purposes. In fact, China has not experienced the reorganization and restructuring of such a magnitude and scale within the defence industry, vis-à-vis the aerospace industry, in more than 20 years[69].

In a continual effort to upgrade and expand, the Chinese civil aviation and aerospace industry has been developing at a rapid pace which far exceeds the international average of 3%. The initial estimates reflect an average annual growth rate of between 8-10% for the aviation industry over the next few years[70]. This would, no doubt, spur further demand for precision tools.

Figure 10: Number of Civil Aircrafts in China[71]



7.5 Future developments of the Chinese precision tools industry

The key players within the Chinese Precision Tool Industry understand that there is a vast difference in terms of technological gap between the Chinese and foreign precision tools manufacturers and that great effort and sacrifices need to be made in order to bridge that gap. Some of these players had taken steps to consolidate their focus and pushed for the industry to adopt a more proactive approach towards technological development and innovations. In fact, over the last 2 years, even though the technological difference between the Chinese and foreign producers are still huge, there have been significant improvements and developments within the Chinese Precision Tool Industry[72].

The development of the Chinese Precision Tool Industry, in particular the metal cutting tools, have taken on a new focus over the last few years. Many Chinese metal cutting tools manufacturers discovered that the growth rate of cemented carbide tools have grown by more than 40% on a year-on-year basis. Therefore more and more manufacturing functions have replaced those of the HSS based cutting tools[73].

Furthermore, the Chinese precision tool manufacturers began to realize that while precision tools represents only 2.5% to 4% of total manufacturing cost, it directly affects 20% of machine tools running costs and 38% of labour cost. In fact, the industry urged its members to adopt strategies used by industrialized nations to capitalize on such notions, where every 15% to 20% increase in the speed of feeding and cutting would reduce the overall manufacturing cost by 10% to 15%, even if the price of precision tools increases[74].

7.5.1 Anticipated Strategies

Generally, the Chinese Precision Tool Industry, besides pushing for closer joint cooperation between the Chinese Machine Tool and Precision Tool Industries, key customers, research institutions and schools[75], has called upon its members to adopt the following strategies in order to rectify its image problem and to bridge the technological gap between Chinese and imported precision tools:

a) Revamp existing company structure[76].

The Chinese Central Government has recognized the fact that the company structure of the State-owned enterprises does not suit the current economic climate. Therefore the Chinese Government had floated the need for the restructuring or privatization of most of these State-owned enterprises in the mid 1990s. This is particularly true in the case of the Chinese Machine Tool and Precision Tool Industries. However, due to the poor performance of both industries from 1996 to 1999, and increasing unemployment rate, etc, such initiatives were not pursued actively by State-owned enterprises in both industries. However these industries had progressed at an extremely slow pace as the State-owned enterprises failed to realize the urgency of these matters.

With the recovery of the industry and the surge in demand for precision tools since 2000 (especially for imported high-end products) as well as its inability to compete against imported/foreign precision tools, made the industry realized the magnitude of the problem. Further, the Central Government had also incorporated the need for restructuring and/or privatization, of these State-owned enterprises, into its 10th Five Year Plan.

The Plan addressed many of the inherent weaknesses of State-owned enterprises and the tooling industry, with the main focus directed at the restructuring of the industry thereby enhancing the level and quality of management and manufacturing processes, as well as promoting industry-wide reforms. Since then, there are a number of visible results and developments within the Chinese Precision Tool Industry, such as the surge in R&D activities; pronounced improvements in innovations, technology developments as well as product quality and design; closer cooperation between members within the industry as well as with members of other industries and research institutions.

Some of the key State-owned enterprises within the Chinese Precision Tool Industry have been working closely with the National Development and Reform Commission on the restructuring issues. Currently, the number of privatization is increasing steadily and can be seen as a genuine attempt to depart from the

traditional and rigid structure which had impaired their competitiveness under the current economic climate.

In fact, the Chinese Precision Tool Industry, besides pushing for the need to retain a small number of large- and medium-sized State-owned enterprises for the purposes of strategic and resource allocation, has also intensified its call for the urgent need to speed up the process of privatizing and restructuring other State-owned precision tool companies. The ultimate aim would be to liquidate those companies that could not adapt and compete effectively, thereby freeing their resources to be allocated to those companies that can. The Chinese Precision Tool Industry also urged its members to institutionalize themselves and cooperate with both domestic and foreign partners to develop their own core competencies.

b) Focus on core competency [77]

The Chinese precision tool manufacturers realized that the scale of their operation is extremely small, compared to any modern foreign precision tool manufacturers and could not create a value chain. Currently, the Chinese precision tool manufacturers' attention is spread over a wide range of products. There have been numerous calls from within the Chinese Precision Tool Industry for members to focus on developing their core competencies and to cultivate a closer cooperation and form alliances with other manufacturers within the Chinese Precision Tool Industry to complement each other's strengths to grow.

This calls for members of the Chinese Precision Tool Industry to develop a few core products and be specialized on those products which are based on the notion that it would enhance the quality and uniformity of their products, reduce the level of in-fighting between members and enable members to speed up their product development, hence bridging the technological gap between Chinese and foreign producers as well as reducing the influence and impact of imported precision tools. Arguments for the adoption of this specialist strategy are centred on the notion that the Chinese precision tool manufacturers, when targeting a much smaller number of products, would be able to direct the majority of resources and investments for the development, testing and production of these products; thereby becoming a specialist of these products in the true sense.

This specialist strategy would also allow the Chinese precision tool manufacturers to be separated from the current low price and costing strategies, that are hurting the Chinese Precision Tool Industry as a whole, and concentrate their resources at enhancing product quality, packaging, branding, product solution and specialization.

c) Human Resources[78]

The Chinese Precision Tool Industry, like Japan of the past, adopted the strategy of copying, but without fully understanding the underlying technologies and processes. There are only handfuls within the industry that fully understand the entire manufacturing process. The Chinese Precision Tool Industry has urged its members to establish alliances with foreign producers and attract foreign talents to upgrade their capabilities, by learning from Germany's Mapal's strategy of engaging specialists from Valenite to upgrade its design and manufacturing capabilities[79].

To resolve the problem of qualified personnel shortage in the long run, the Chinese Precision Tool Industry has adopted a 2-prong strategy. Firstly, the industry seeks closer ties and cooperation with the Chinese Machine Tool Industry, key customers as well as research institutions and schools. The aim, besides developing products and technologies, would better suits customers' needs to enable the research institutions and schools to develop a technical training curriculum that would address the needs of these industries. In addition, efforts have also been intensified to identify more candidates to be enrolled into engineering schools of the technically-advanced industrial nations to learn new technologies and take these newly acquired skills back to China. Secondly, the industry has strongly urged its members to place more emphasis in order to intensify the training at various levels of the organization, from technicians and engineers to sales personnel and machine operators. This would aid the Chinese precision tool manufacturers to project a professional image to their existing and prospective customers.

d) Develop patent technology and other intangibles[80]

The Chinese Precision Tool Industry urged its members to move beyond adopting the strategy of copying to a strategy of innovation. Members were urged to focus on developing their own patent technologies and products; thereby, securing a first move advantage over foreign competitors. Through such technologies and products innovation, the Chinese Precision Tool Industry would then be able to influence the direction of technology development, rather than being led by their foreign counterparts.

To this end, the Chinese Precision Tool Industry has been very proactive in seeking closer ties and cooperation with the Chinese Machine Tool Industry, key customers as well as research institutions and schools to enhance the practicality and functionality of their R&D activities and design capabilities. Further, learning from the experience of the Japanese precision tool manufacturers, such close cooperation with both the Chinese Machine Tool Industry and key customers

would propel the Chinese Precision Tool Industry understanding of the future directions of precision tools, customers' requirements as well as an opportunity to minimize the impact of imported precision tools and to penetrate the OEM markets.

Having learned from the experience of foreign competitors, the Chinese precision tool manufacturers had started to pay more attention to the development of their brand names and professional image. This would assist them in their efforts to recapture a bigger domestic market share in order to penetrate into overseas market. In fact, companies such as Chengdu Chengliang Group, Harbin Measuring & Cutting Tool Works and Wuxi Xigong Tools & Measuring Instruments had put in time and effort on the design of their logos which project a modern image than the traditional Chinese format.

e) Focus on cooperation instead of competition[81]

The influx of imported precision tools into China, in response to the surge in demand, resulted in a larger variety of precision tools being available to customers at competitive prices. Such competition has led to price wars, especially from within the Chinese precision tool manufacturers in their efforts to gain a bigger market share. This price competition is very intense in the medium- and low-end segments. In addition, some of the Chinese precision tool manufacturers base their product development on existing products of established local producers. This resulted in not only the inability to develop new products that would better address customers' requirements, but also create competition between Chinese manufacturers.

With such internal competition and price wars, together with the realization that they are lagging far behind their foreign counterparts, in terms of product design and development, technological development as well as manufacturing process, have led many of the Chinese precision tool manufacturers to understand the urgent need to cooperate rather than compete amongst themselves. Besides, the industry had stressed the need for its members to establish close cooperation to ensure their survivability, especially since their scale of operations are so much smaller than their foreign counterparts.

f) Emphasise on product quality and after-sales service[82]

To capitalize on the surge in demand for precision tools and for customer service purposes, foreign precision tools producers have, over the years, established extensive sales networks, with many setting up manufacturing facilities within China. Besides the technological edge over the Chinese manufacturers, foreign producers' resources and after-sales services are also much stronger than their Chinese counterparts.

Two key competitive advantages that foreign precision tools manufacturers have over the Chinese, that had surface on numerous occasions in the Chinese Precision Tools Industry's publications and forums, are the excellent customer service and their sales intimate knowledge of their products and functionalities. The Chinese precision tool manufacturers, on the other hand, had traditionally failed to focus on both issues.

Although there has been significant improvement in the quality of Chinese precision tools over the last 2 years, such improvements in product quality are incomplete and not standardized. With product quality still an inherent issue faced by Chinese manufacturers, the Chinese Precision Tools Industry urged its members to emphasize on better after-sales service to cushion the impact of product quality issue. Domestic manufacturers were urged to capitalize on their low cost customer service advantage to compete with foreign manufacturers, in terms of quality and speed of customer service, so as to capture a bigger domestic market share and reduce the impact of technological gaps between domestic and foreign manufacturers.

Recommendations by the Chinese Precision Tool Industry include the ability to understand customers' needs, availability of stocks, the consistency of product quality and timely delivery, prompt problem solving, constant feedback to production line, manage corrections or changes, technical specialists or sales staff with technical knowledge to conduct routine visits to customers and to conduct training or retraining on the use of new products, etc.

Learning from the experience of foreign manufacturers, the Chinese precision tool manufacturers are equipping their sales personnel with better knowledge about the functionalities of the products, the company and the industry. Some of the domestic manufacturers, who acted on the calls of the Chinese Precision Tools Industry to enhance the speed and quality of their customer service, had reaped some success, in terms of better sales and lesser complaints.

g) Customize technology and product solutions for each customer[83]

Besides the ability to guarantee the quality, durability and efficiency of their products, key players within the Chinese Precision Tool Industry started to understand the need to customize their products to suit different tooling requirements within each cluster of customers. The ability to customize their products would depend on the domestic manufacturers' ability to establish closer cooperation and communication with each cluster of customers. To this end, the Chinese Precision Tool Industry has made some headway in bridging the relationship between its members and key customers.

In its effort to reduce the 20 years of technological gap between foreign and domestic manufacturers, the Chinese Precision Tool Industry is pushing to speed up the development of precision tools' materials, especially cemented carbide and other hard materials. Precision tools made from these materials have the ability to perform better and are rapidly replacing HSS based precision tools in many manufacturing functions. Furthermore, the industry urged its members to increase the functionalities of their products, vis-à-vis cooperation with research institutions, by developing multi-purpose precision tools which have the ability to serve different/varying needs of the customers. The development of such multi-purpose tools would enable the customers to reduce the frequency of changing tools, reduce the number of tools and storage requirements as well as enhance tooling management; thereby saving manufacturing time and cost.

With the experience gained from foreign manufacturers, the Chinese Precision Tool Industry realized and urged its members to move beyond the selling of products, and value-add to the value-chain by providing technological and product solutions to address customers' tooling needs. Such solutions would include the component of after-sales services, where the domestic manufacturers would be able to capitalize their advantages in quality and speed of customer service to cushion the impact of the technological advantage that foreign producers have over them.

7.5.2 Regional and geographical focus

The general observation that we derived from the interviews with the 16 largest precision tool companies in China, is that there is no systematic export and growth strategies. These companies' philosophy is to grow with their domestic and overseas clients, which seems opportunistic and reactive in nature rather than a concerted strategy in their regional drive. In addition, these companies do not have precise marketing plans and are waiting for the WTO to effect the changes prior to embarking on any counter-strategy.

The Chinese precision tool manufacturers are currently engrossed with their preparation for the WTO's impact on China's precision tool industry; therefore, not much would happen within the immediate future. When the effects of the WTO are in place, the Chinese precision tool manufacturers would then start to test the market and strategies.

Depending on the results of the tests and the domestic market pressure, the Chinese precision tool manufacturers would shape and align their penetration strategies and regional drive. It is likely that the result would yield the need for more intense strategy to go for their home base; hence, would not affect Germany's precision tool manufacturers.

However, with competition heating up in China, these Chinese precision tool companies, over time, would aim to achieve the level of exports which would equate their domestic sales by riding on their competitive advantages of their established brand name and acceptance level in China as well as their low cost yet reasonable quality products to penetrate into the international market and that made-in-China products

would become more acceptable globally. The key regions that these manufacturers are likely to target (and succeed) would be South East Asia, Middle East, Africa and Latin America, where they are much more receptive to Chinese precision tools. This is where the German's precision tool manufacturers would face the most threats from their Chinese counterparts.

8 Research and Vocational Education

Research and Vocational Education Related to the Field of Tool Machines and Precision Tools in China

The emergence of China as an international competitor to German machinery manufacturers

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8.1 Executive Summary – German

Universitäre Forschung im Bereich Werkzeugmaschinen und Präzisionswerkzeuge ist in China noch immer stark theoretisch ausgerichtet. Dem recht soliden und fundierten theoretischen Wissen steht meist ein veralteter Maschinenpark gegenüber, der praktische und anwendungsorientierte Forschung kaum zulässt. Von wenigen Ausnahmen einiger Spitzenuniversitäten abgesehen, sind die Forschungsinhalte daher ohne direkten praktischen Bezug. Ein Wandel zu einer stärkeren Praxisorientierung ist jedoch erkennbar und wird seitens der chinesischen Regierung zunehmend forciert. Derartige Veränderungen sind jedoch, aufgrund des damit verbundenen Investitionsvolumens in Maschinenpark und Personal, aber auch infolge des hierzu erforderlichen Umdenkens seitens der Institutsleitung, nur langfristig zu realisieren. Offensichtliches Ziel der chinesischen Regierung ist es, in den nächsten Dekaden eine eigenständige Forschung im Bereich der Fertigungstechnik aufzubauen. So findet etwa im aktuellen 5-Jahres-Plan die Fertigungstechnologie als Schlüsseltechnologie erstmal direkt Erwähnung. Auch im Bereich der universitären Ausbildung ist ein starkes Bemühen der Regierung erkennbar, den noch immer anhaltenden, jedoch leicht rückläufigen Abfluss der talentiertesten Studenten und Absolventen zu verhindern.

Bis vor etwa 15 Jahren wurde Forschung außerhalb der Universitäten ausschließlich in staatlichen Forschungsinstituten betrieben – die staatlichen Betriebe verfügten über keine eigene Forschung. Im Zuge der wirtschaftlichen Reformen wurden jedoch die meisten bislang staatlichen Forschungsinstitute privatisiert oder durch Kürzungen der Finanzmittel zu eigenständiger Finanzierung gezwungen. Dies hatte zur Folge, dass die Mehrzahl der nicht-universitären Forschungsinstitute entweder von den großen Maschinen-Herstellern übernommen und Teil der konzerneigenen Forschungsabteilung wurden oder eine eigene Produktion aufbauten und sich zu einem rein gewinnorientierten Betrieb ohne technologischen Kompetenzvorsprung wandelten. Da der Import moderner Fertigungstechnologien für diese Institute in der Regel lukrativer ist, als eine eigene Entwicklung und Herstellung, liegt der Produktions-Schwerpunkt auf Standardprodukten. Die Mehrheit der so genannten Forschungsinstitute kämpft viel zu sehr um das eigene Überleben auf dem Markt, als in teure Forschung investieren zu können.

Innovationen im Bereich Werkzeugmaschinen und Präzisionswerkzeuge kommen heutzutage primär aus den Forschungsabteilungen der großen Konzerne bzw. deren angeschlossenen Forschungsinstituten und basieren jedoch meist auf importierten, oder in Kooperationen bzw. Joint Ventures mit ausländischen Unternehmen entwickelten (und ggf. modifizierten) Technologien. Von dem erklärten Ziel einer eigenständigen Forschung Chinas wird auch der Bereich der privaten Forschung profitieren. So plant die Chinesische Regierung den hierfür erforderlichen Modernisierungsprozess in den nächsten Jahren unter anderem mit erheblichen staatlichen Mitteln zu unterstützen.

Die heutige Forschung in China ist, trotz einiger Ausnahmen, vor allem aufgrund der schlechten Ausstattung und des mangelnden Praxisbezugs in Forschung und

Ausbildung, international nicht wettbewerbsfähig und in den untersuchten Forschungsfeldern etwa 1-2 Generationen von europäischen Standards entfernt.

In der chinesischen Tradition wurde Allgemeinwissen dem berufspraktischen Wissen vorgezogen. Dies führte u.a. dazu, dass das Niveau der beruflichen Ausbildung, sehr niedrig ist. Ausbildern mangelt es häufig an Praxisbezug wie auch pädagogischen Fähigkeiten. Facharbeiter verfügen meist weder über praktisches Erfahrungswissen und berufliche Fertigkeiten, noch über Anpassungsfähigkeit oder Flexibilität bei der Problemlösung. Die Produktivität Chinas leidet daher in hohem Maße an einem Mangel an qualifizierten Facharbeitern. Effiziente Ausbildung von Facharbeitern erfolgt heute meist durch Unternehmen mit europäischem Management oder direkt vor Ort durch die Hersteller von Werkzeugmaschinen selber. Aber die chinesische Regierung hat die Schlüsselrolle qualifizierter Facharbeiter für die künftige wirtschaftliche Entwicklung erkannt. Neue Ausbildungsgänge wurden bereits auf den Weg gebracht und in ausgewählten Berufsschulen probeweise eingeführt. Landesweit sollen Berufsschulzentren erweitert werden, um den wachsenden Anforderungen der Industrie gerecht zu werden.

8.2 Executive Summary – English

In China, university research in the field of machine tools and precision tools is still highly theoretical. There is a solid and well founded theoretical knowledge but on the other hand their machinery is mostly outdated which does not allow for any practical and application-oriented research. Except for a few first-rate universities, research therefore is not directly relevant for the practitioner. There is, however, a recognizable change towards a more practical orientation which the Chinese government is aggressively promoting. Still, this kind of change can only be achieved on a fairly long-term basis because of the great amount of investment in machinery and personnel required, but also because of the necessary modification of the managing institute's views. The obvious goal of the Chinese government is establishing independent research in the field of production technology during the coming decades. In the current 5-year-plan, the production technology is directly addressed as a key technology for the first time. Concerning university education, there is also a recognizable effort by the government to prevent the most talented students and graduates from leaving, although this process has decreased more recently.

Until approximately 15 years ago, other than at universities, research was only carried out by state-owned research institutes. State-owned companies did not do any research on their own. In the course of economic reforms, however, most of the former state-owned research institutes were privatized or forced into sourcing their own funding due to cut-backs of state funds. As a result most non-university research institutes were either taken over by the large machine manufacturers and became corporate research departments or they built up own production capabilities and became profit-oriented companies without a lead in technological competence.

Since the import of state-of-the-art production technology is usually more lucrative for these institutes than their own development and production, the main emphasis is put on the manufacturing of standard products. Most of the so called research institutes struggle to survive in the market. They are unable to invest in expensive research.

Nowadays, innovation in the field of machine tools and precision tools comes primarily from research departments of large companies or their affiliated research institutes. They are, however, mainly based on imported technologies or those that were developed (and, if necessary, modified) in joint ventures or cooperative arrangements with foreign companies.

Private research is also going to profit from the apparent goal of establishing national Chinese research. The Chinese government is planning to support the necessary process of modernization with state funds over the coming years.

Nowadays, research is, with only a few exceptions, not competitive on an international level, primarily because of the poor and old machinery and a lack of applied research and education. The research is considered to be one to two generations behind European standards in terms of technology (i.e. accuracy, repeatability, quality).

Chapter 8: Research and Vocational Education

In traditional Chinese education, general knowledge was always favoured while practical experience was considered to be less important. Nowadays, the level of sophistication at vocational schools is rather low, primarily because they are not practice orientated and lack pedagogical and didactical experience. The qualification of skilled workers is insufficient. Workers lack practical knowledge and experience as well as professional skills, e.g. adaptability or flexibility at troubleshooting. Thus, China's productivity in machining companies is seriously suffering from severe lack of skilled workers. Most operators of CNC machines just completed a transfer training. Training of skilled workers is mostly initiated by companies with European management, most efficient training measures are organized by machine tool manufacturers on the spot or abroad and some European middle-class enterprises engage experienced pensioners for education and training. But there are some positive developments recently, because the Chinese government realized that human resources is a key factor for successful future development and plans to establish new vocational training courses have already been developed. New kinds of curricula are already at an experimental stadium and the vocational education and training centres all over the country are to be enlarged to meet the increasing demands of the industry.

9 Alternative Strategies for the German Manufacturers

Based on the result of our investigations, we basically foresee six different avenues for German machinery manufacturers to cope with the future global competition from Chinese manufacturers.

9.1 Ignore the Chinese development, it will eventual blow itself out

China is presently going through an unprecedented phase of rapid growth which has lasted for almost 25 years. The complete Chinese system is buckling under the strain of that much uninterrupted growth and the bottlenecks and shortfalls are visible everywhere. A quarter of the world's shipping capacity is presently tied up with shipments to China and a large quantity of these ships is waiting in the Chinese harbours to be unloaded. There is no easy solution because the Chinese do not have the infrastructure, the ports, the railways to transport the goods, the roads to bring the goods over land, the electricity network to ensure uninterrupted workflow, do not have qualified personnel to handle the onslaught of foreign imports and thousands of rules and regulations need to be changed in order to comply with WTO regulations in 2006.

There is no central authority any more that would coordinate all these activities, but 31 different provinces are promoting their own local champion and are trying their best to keep competition from the other provinces out.

Add to this the banking system which is technically bankrupt, the bad loans which number more than US$500 billion, the gaping hole in the pension system of more than US$1,200 billion, the unemployment situation, the environmental pollution, the scarcity of food, oil, water, and you have a cocktail of explosive ingredients which could trigger the collapse of the Chinese economy any time.

The Communist Party is also not able to lead any more and it is concentrating on reforming itself quickly and avoid getting trampled down by the steam-roller of China's increasing economy. Many businessmen in the West feel that things in China cannot go on forever and that sooner or later, the Chinese economy would collapse. Ultimately those entrepreneurs who did not rush into China would have reasons to pat themselves on the shoulder for their cool-headedness and for not having gotten carried away by the general euphoria over the development of the Chinese market.

Once the market collapses, China will revert back to become the leader of the Third World. It will be roughly on par with India, but both countries will be a relatively modest player in the industrial Western world.

9.2 Beat Chinese at their own game, export low-cost machines

Many international machine tool manufacturers are experiencing an over-capacity in their global manufacturing plants. They are also confident that their extended workbench plants in Eastern Europe provide them with a good competitive position to fight the Chinese head-on. They feel that they do not need to learn the “Chinese way” of doing business in China, but they are waiting for the import barriers to fall in the beginning of 2006 when the WTO regulations come into play. At that time, they will crank up the production in their global facilities to full capacity and simply import into China thus avoiding all the red tape, getting entangled with the Chinese bureaucracy, having to face corruption, and having to think hard on how to avoid the know-how losses through industrial espionage and Chinese copy cats.

Some German companies continue to rely on the quality of their products, combined with excellent after-sales capabilities and their International reputation. This “German” all-round package, they believe, will eventually impress International customers more than the “Chinese” emphasis on low cost.

9.3 Revive the traditional Sino-German cooperation

Many Chinese machine tool manufacturers have fond memories on the co-operations they had begun during the 80’s and early 90’s with German machine tool manufacturers. At that time however, the Chinese machine tool manufacturers were still mired in the philosophies of State economies and did not have the flexibility to adjust their own operations to interface efficiently with the German know-how partner. Now the Chinese feel that they have absorbed whatever technology and know-how they bought, and more importantly, they feel that their technical education has now reached such a level that they are able to grasp and understand any new know-how that would be brought into play.

The Chinese imagine however that any future cooperation with a German manufacturer should be to the benefit of both organizations and therefore have modified the old system slightly:

In the past, some German entrepreneurs transferred current or outdated know-how as well as blueprints to China and the Chinese were quite happy because they were so far behind that even the outdated German know-how seemed to be very advanced for their organizations. Today the Chinese feel that they want to play an active role in any future partnerships. They know that product cycles in Western companies are getting shorter and in some cases are only limited by the availability of sufficient manufacturing space. Some German manufacturers are prepared to shift current technology, blueprints, moulds and know-how to an overseas partner in order to make way for the next generation of products. They appreciate the opportunity to offload ongoing sales- and service obligations, spare part requirements and the maintenance of the outdated product range. Know-how loss is not an issue any longer, because the new generation of equipment is already under production. This kind of co-operation did not take place in the past because of the unreliability of the Chinese system and the perception by

Germans, that Chinese manufacturers only wanted to get the know-how free of charge, copy it and then turn out their own product. With product cycles becoming ever faster, the Western machine tool manufacturers realize that the Chinese or any Third World country for that matter will not be able to spend the time and resources to go into extensive R&D, just to catch up with the West.

Therefore the Chinese propose to establish a technology pipeline between Germany and China, where the German know-how partner continues to feed out phasing technology to his Chinese partner, who absorbs the technology gradually, adapts the products to regional market needs, and fulfils the German partner's obligations for model continuity, replacement parts and technical repairs.

With this kind of cooperation, the innovation and creativity still rests firmly with the German partner and the Chinese partner would be entrusted with applied R&D and the Chinese partner would adopt the know-how to regional needs.

9.4 Global Partnership

There is a global trend which is worrying German manufacturers: because of increased worldwide competition, global clients who erect for instance a new automotive plant, insist that the latest machine tools are installed on site in order to utilize the maximum benefits in efficiency, precision or quality. As these sophisticated machine tools are being installed where the global demand is, they also require highly qualified operators and sophisticated service personnel. It is in most cases too expensive for the machine tool manufacturer to station his own German technician at these machines to do the necessary adaptations, technical modifications, repairs and applications. It is therefore in the interest of the German machine tool manufacturer to have a local partner on the ground, which not only helps him to rectify technical problems with the newly developed machine, but also feeds back all information necessary to improve this model and to eliminate faults. In this kind of cooperation, the Chinese partner will gradually also take over the applied R&D works and feedback this information to the German Headquarter.

The German machine tool manufacturer will then necessarily have to concentrate on design, R&D and on the development of prototypes. As soon as the prototypes are reliable enough for industrial applications, they will be positioned wherever global clients demand this and there is a real danger that the German machine tool manufacturer looses his innovation capability, if he does not receive sufficient technical feedback from the various sites. German machine tool manufacturers will therefore be interested to enter into co-operations with Chinese companies in order to safeguard their own interests. They must ensure that technical information is fed back to them and they would want to be able to influence decisions on the employments of the technical specialists as well as Management's decision on how to deal with the acquired practical know-how. This development ultimately will not only lead to lose cooperation agreements, but it will also lead to the two partners acquiring shares in each other's companies in order to cement the bond.

9.5 Cooperate "the Japanese Way"

Japan has always been weary of the potential might of China. For this reason the Japanese entered China early, but were always very careful not to transfer too much know-how and also did not establish manufacturing plants for Japanese products in China for a long time. However with the continued recession in the country, and China's stellar growth in the past few years, Japanese managers decided about 2 years ago that they would give up their hesitation. As a result, there has been a flood of manufacturing relocations from Japan to China, but these relocations concern standard products and standard technology. The Japanese core competencies lie in the ability to meld different skills technologies and processes. As a result, they have relocated the manufacturing of highly complex systems to Japan.

Japanese have also learned from the example of Korea, where Toshiba developed the new LCD generations in cooperation with Samsung, only to see Samsung taking the lead, undercutting them and absorbing most of the technology faster than the Japanese could. As a result, the Japanese are now contemplating to manufacture complex products as "Black box" equipment, where sub-suppliers contribute their standard modules and the Japanese system developers modify these modules to suit the requirements of their own machine tool development. This means that the component suppliers themselves are unable to repair the modified components and only the machine tool manufacturer himself has all the knowledge to make the components work in harmony with each other in the finished manufacturing system.

This approach works for many Japanese manufacturers, but there is one inherent problem: The more sophisticated the development becomes, the closer it gets to the physical limits of what can technically be achieved. Once that limit is reached, the manufacturer cannot continue the technical development of the product, but must make a quantum leap to a different industry or a different idea, where again he is able to meld the best from various other industries to form a completely new product.

9.6 Trust in one's own ingenuity and prosper through innovation

There are many German manufacturers who have developed a comfortable niche in the world markets with products that are based on ingenuity, creativity and innovative ideas. Some Germans believe that they may have an advantage over their Asian counterparts. Asians are said to prefer incremental improvements of existing products, whereas it is the forte of the Germans to go for quantum leaps of innovation.

As long as these quantum leaps of innovation are possible, the Germans feel that there is always a place for them in the future manufacturing landscape, particularly as product cycles become ever shorter and many products have to be released to the market as soon as they can be conceived.

This approach works as long as one assumes that Asians are by definition, less creative or less innovative than their European counterparts. There are however historical

examples where China demonstrated that they were centuries ahead of Europe and these times might come back yet.

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11 APPENDIX A

11.1 Challenges and risks in the overall economic development of China

The People's Republic of China is a country in transition. Probably no country of global significance has more unresolved issues concerning its ruling principles and structures. But what really makes forecasting its future so difficult is not only that recent developments have so often defied prediction, but also that virtually opposite, if logical, scenarios are plausible. China emerged over the past 20 years as a paradigm of economic energy determination and progress. Few other areas in the world have been deemed an economic miracle for so long. Anyone who has visited China's large cities over the past few years must be impressed by the energy, pace and scale of development. But behind the dazzling skylines and impressive statistics, another reality exists. A reality of unresolved problems and daunting numbers that suggest a far darker scenario:

China must create 20 million new jobs annually just to keep up with population growth.

The government must deal with an estimated 300 million unemployed or under-employed people.

A "floating population" (dispossessed rural workers who have moved to the cities to find work) of about 200 million is growing by almost 5% annually, representing the largest migration in human history. These migrants exist with no job security, no long term housing and no health care.

There are about 750 million rural peasants who have been largely left out of China's latest boom, creating rising but frustrated, expectations.

China has no functioning pension system, and the cost of creating one is estimated to be around 1,000 US$ billion.

New stock markets are all too often little more than elite manipulated casinos, leaving China without the capacity to form the kind of indigenous pools of investment capital needed to power its own development. There is little or no confidence in the Chinese Stock markets, which actually fell by 2% in 2003, whereas all stock markets in the surrounding countries of Asia have improved by around 25% - 30%.

State banks provide 95% of all financing for local companies. However, having been used to keep State-owned enterprises afloat for too long, the banks are essentially insolvent. It would cost around 700 US$ billion – around 70% of GDP – to clean up the non-performing loans.

Environmental degradation from rapid industrialization, over-population, and uncontrolled resource exploitation is extreme and very difficult to remedy.

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The Chinese Government has become increasingly reliant on ever-larger bond issues for fiscal stimulation, pushing debt onto the next generation.

Estimates of the Government's growing aggregate liabilities (bank debts, unfunded pension plans, bonded indebtedness for infrastructural projects, etc) range from 100% to 200% of GDP.

The Government's ability to collect tax revenue remained weak, yielding less than the equivalent of 15% of GDP.

Fears of an investment bubble caused by uncontrolled, indiscriminate and excessively exuberant investments and growth have led many experts to worry about a melt-down akin to that experienced by Silicon Valley in the late 1990s. These fears are compounded by the fact that China's one-party Government, now almost completely dependent on its economic miracle for legitimacy, has shown few signs of implementing political reforms to complement economic reform.

China's entire system is in a State of perilously balanced transition.

And since every economy is cyclical in nature, most experts are left to wonder what resources the Party and Government will have to draw on, should growth rates drop even to a respectable 3%-4%. What would Beijing rely on for legitimacy if unemployed workers begin agitating; if angry peasants begin to besiege local government offices in large numbers; if factionalism insights a crisis in leadership; if conflicts erupt in the Taiwan Strait; or if the global economy remains sluggish? The real test will be for the Chinese political systems' ability to survive the inevitable cyclical downturns, political shocks or social upheavals that almost inevitably challenge a country, particularly a developing one.

In particular there are 8 main points which could influence our predictions of the development of the Machine Tool Industry and the Precision Tools Industry in China drastically:

11.1.1 Communist Party

The Communist Party continues its efforts to instill communist orthodoxy into people and seeks stability above all, because instability would result in loss of total control and the direction of change would be unpredictable. The Party is caught in a vicious cycle: In order to boost the economy, it opened the country to foreign investment, thus raising the standards for few and condemning the majority of the rural population to neglect. In order to pacify growing unrest, the Party stimulated more growth by inviting more foreign investments into China and the only way how they can now continue to provide increasing growth is by becoming ever closely associated to the Western investors. When the backlash comes and the population rebels against unsatisfactory conditions, it will be the Communist Party who will be at the centre of the criticism, because they are associated with everything bad that the Western influence has brought into China.

However, there has been a marked change within the Communist party leadership itself over the past years. Younger, reform-minded leaders are taking a low-profile approach to change from ideology to pragmatism, because they realize that the party has no justification for staying in power other than performance. Its performance criterion is to deliver a better lifestyle. This “new” ideology is best expressed by Deng's famous quote about it doesn't matter what colour the cat is, as long as it catches mice. Therefore we do not think that collapse is around the corner.

The No. 1 priority of the Chinese leadership today is prestige and status, and that is bestowed not by themselves but by the rest of the world, particularly the international media. Therefore we feel that there will be subtle changes in political norms in China, just as WTO membership has introduced global business norms such as transparency. China now knows it is highly dependent on what goes on in the US. They are aware they cannot just be observers of world developments but have to become co-participants and co-shapers, which is why we believe they are on a voyage towards democratisation.

The first indicators are already appearing: Village elections across the country, independent candidates standing for election of the district people’s congress in Beijing, evolving the Special Economic Zone of Shenzhen into a Special Political Zone (separating government power into decision-making, implementation and supervision and restructuring these three powers into three mechanisms under one government that control each other and cooperate with each other). All these add up to a statement that China is thinking of developing new political norms that signal to the world that it realises the days of sticking to the old status quo are over.

11.1.2 The Environment

For the past 50 years, economic development in China had priority over environmental concerns. Chinese cities are the most polluted in the world and the increasing number of cars in the streets aggravates the problem. China’s energy system has long been based on the utilization of the large coal deposits and this has resulted in heavy pollution, particularly in winter.

The biggest problem in northern China concerns the lack of water. Because of century-long deforestation, northern China has become a rather arid place and the Gobi Dessert is now only 50 km away from Beijing. Beijing’s water table will be completely drained in 10 years. Therefore Government decided to divert water from the Yangtze River via a 1,240km long route north to Beijing (cost: ca 20 US$ billion)

The 3 gorges hydro-power projects and the redirection of the Yangtze River to provide water to the north are endangering the environment and the population.

China’s general problem is that all natural resources are in the West, whereas the industry and the majority of the consumers are in the East.

China had been a major oil exporter until the year 1993. Since then, China has become the major force in global oil imports and these are expected to rise to 60% of demand by

2020. Presently China consumes about 5 million barrels of oil per day and this is expected to rise to about 10 billion per day by 2020. 6 billion per day will have to be imported.

Feeding the ever-increasing population represents another major problem. China is able to produce about 410-430 million tons of grain each year. With the population increasing and with more and more land being allocated to industrial or residential use, the total grain production is expected to fall below 400 million tons which would mean that the Chinese have to import close to 50-100 million tons of grain per annum. Additionally, the quality of the Chinese rice is not always up to world market standards yet and the lowering of import restrictions in connection with the WTO entry of China is expected to result in even more imports of high quality grain from the world markets.

11.1.3 Social Unrest

Urban unemployment is around 18% and this rate increases for the rural population to around 25%. 800 million people live in the countryside and their income has been declining ever since 1997, when Deng Xiao Ping initiated the first phase of the agricultural reforms. Average income per annum in the countryside hovers around US$500-600 which translates into around 1.8 US$ per day.

Particularly for the rural population, economic growth has come at the expense of the environment. Pollution, water scarcity, environmental sacrifices are much more visible in the countryside than there are in the cities. In Beijing for instance, most of the smaller taxis have now been converted to LPG power and the Municipality is spending almost US$28 billion to spruce up the city in preparation for the Olympic Games in 2008. Most of the available environmental programs are directed towards the cities and do not benefit the rural population.

Farming methods in China are still less sophisticated than in the West. With WTO, Chinese farmers may have to face global competition and many will be wiped out, if not sheltered from international competitors. With import restrictions lowered, for every ton of grain imported into China at least one rural farmer will lose his job. It is estimated that there will be 150mio farmers in 2010 trying to move to the prosperous coastal regions and the rich cities, looking for work.

The ideological vacuum left behind by the Communist party is gradually being filled by other groups. Falung Gong meanwhile is said to have more followers than the Party and is seen as a hotbed for subversive elements by the establishment. There is, however, no organised opposition yet.

11.1.4 Economy

The Chinese economy is officially growing at a rate of 7%-9% and it is regarded as the engine of growth for all of Asia. In some industries, almost all the global growth comes from the increased demand originating from China. This goes in particular for raw materials and resources like aluminum steel, copper, but also crude oil. The Chinese economy has been growing at such breakneck speed for more than 30 years and has fortunately not been affected by the global economic crisis.

However the Chinese economy must grow by at least 7.5% per annum in order to absorb:

45 million SOE workers laid-off (30% of SOE staff is underemployed)

150 million rural workers unemployed, another 65mio underemployed

55 million baby boomers who entered the job market each year

38 million unemployed by WTO Effects (20mio rural, 18mio urban)

The only way how the economy can continue to grow at such a fast pace comes through massive fiscal stimuli from the Government and through large infrastructure projects. All in all, the Government earmarked more than $750bn over the past 5 years for such projects, most of which are closed to foreigners with a few exceptions: $28bn for the upgrading of Beijing for the 2008 Olympics, $30bn for the 3 gorges dam (26 pieces of 700 MW turbines over 17 years), $20bn for the high-speed train from Shanghai to Beijing, including several power-generation projects and airports.

11.1.5 WTO

In November 2001, China became the 143rd member of the WTO. This is a true milestone in the development of the Chinese economy which historically has always been inward-looking. China's economy was a closed system and Beijing could make and enforce the rules at will to hinder strong foreign competition. With WTO, hundreds of laws, rules, regulations need to be amended countrywide and within each province. China is no longer the single monolithic State-economy it was 50 years ago, but the gradual opening of China has resulted in each of the 31 provinces developing its own State-economy and all these economies are competing fiercely with each other and defend their local champions wherever possible.

With WTO many ownership restrictions will be phased out and this will result in a weakening of Government control. Increased unemployment and foreign domination of the Chinese economy are likely to follow. With foreign companies entering the Chinese market and being responsible for introducing reforms as well as the resulting job losses, the re-emergence of Nationalism becomes the real danger. The Communist Party is responsible for having brought the foreigners into the country and now cannot defend

the workers who lose their jobs. The Party encouraged Nationalism and is now trapped by letting the foreigners in and seeing the Chinese go bankrupt. The only way out for the Communists Party is to ensure that the economy is booming which means that foreign investment goes up. More foreign investment however generates even more Nationalist backlash and these anti-foreign feelings may erupt one day. If foreigners realize that they are not welcome in China they will not invest, but prefer to import from global manufacturing places where most of them are suffering from over-capacity anyway. Besides, total Foreign Direct Investment into China has reached about 700 US$ billion by now, which means that China will gradually built up her own manufacturing over-capacity and this will reduce the incentive further for foreigners to invest in the country. We therefore feel that China gains little economic advantage from WTO accession, except for prestige and a place in the sun. China assumes her rightful place in the community of nations as one of the strongest world economies.

For details on the facts of China's WTO accession on the Machine Tool Industry, please refer to the separate Annex on WTO.

11.1.6 Corruption

According to recent Government statistics, 50% of the $4bn contracts signed with Chinese State-owned enterprises are fraudulent. The economic corruption eats about 17% of the country's annual GDP. Tax evasion in the private industry runs up to about 50% of all taxes due. The total losses from tax evasion schemes are estimated to be around $15 billion. Two-thirds of the biggest State firms produce false accounts and it is estimated that around 20% of the spending on infrastructure projects is lost through bribery and fraud. The total losses caused by corruption are estimated to be as high as US$150 million per annum.

WTO is expected to help reduce corruption because it will also result in more transparency and better corporate governance. With the shift from State-owned enterprises to private industries, corruption is also becoming less of a problem because the private industry especially for small- and medium-sized enterprises, negotiations are usually done with the owner himself and he in most cases is interested in getting the best possible price.

However, corruption is still affecting every businessman's life and great care should be taken by Western businessman not to be seen to take part in these practices.

Corruption also comes along in connection with cronyism and "guan xi", a system of personal relationships, which was necessary for anyone wanting to do business with State-owned enterprises in the old system. Personal relationships are important in China, but their effect on doing and concluding business in China is gradually weakening. The system of personal relationship comes along with a system of personal favours and this is intertwined with the problem of corruption.

11.1.7 The State-owned Enterprises (SOE)

Before the reforms took hold, there were about 150,000 State-owned enterprises employing more than 120 million workers. This number has meanwhile dropped to about 50,000 SOE's employing 63 million staff. SOE's are usually found in the heavy-Industry sectors and/or in strategically sensitive industries. They were traditionally thought to be responsible for waste of resources, a distortion of policy, a danger to the banking system and the cause for much of the misery for their workers. The sole duty of State-owned enterprises is to turn raw materials into products under the guidance of the relevant Party Secretary. Their job is to fulfill the production quota and they have no influence on design, procurement, marketing or staffing. SOE managers are being judged on output quota and growth, as a result there is massive over-production in China to the tune of $5-6bn per annum.

Government used to provide subsidies to keep SOEs going because they created employment. SOEs are responsible for 85% of all domestic lending, but they rarely pay back the loans but roll them over or replace them by new ones.

About half of all SOEs have been liquidated to date. 20% were privatized, 70% went bankrupt and 10% were merged or acquired. The reforms of all State-owned enterprises require about $300 billion and this can only work if the economy continues to grow at present speed. $80 billion debts to the banks were already written off, but so far not a single company went bankrupt although the respective laws exist. SOEs no longer provide "the iron rice bowl" by guaranteeing life-long employment to their workers, providing low cost housing, schooling, medical support and a life-long career.

11.1.8 The Banking System

By Western standards the 4 major State banks in China are bankrupt. The Bank of China, the Agricultural Bank of China, the Industrial and Commercial Bank and the China Construction Bank already reported in 1999 that more than US$500bn loans (50% of all loans) were bad. Then China tried to clean up the banking system by transferring these to 4 major asset management companies (AMC) who should try to recover as much as possible by selling off the affected SOE assets. The AMCs are hesitant to sell off their own bad loans because the sale of SOEs would add to the number of bankruptcies.

Privately held funds in China are estimated to be around US$1,000 billion. Saving rate is extraordinarily high at 42% and even the recent domestic boom which is powered by consumer spending has not resulted in a reduction of the private saving rate.

China's foreign currency reserves currently stand at US$360 billion, the second highest after Japan. Combined with Hong Kong (US$120 billion), the total Chinese currency reserves have reached a staggering US$480 billion.

The trade deficit with the US has reached US$130 billion in 2003 and is a cause for complaints by the US. However, China has a balanced Trade relationship with other

countries and even produces a substantial trade deficit in the relationship with Asian countries. Therefore the Chinese leadership sees little reason to revalue the Chinese currency.

In addition, because of the bankrupt domestic Chinese banking system, the Chinese Government is hesitant to open the market to foreign banks because they fear that most of the privately held funds would be transferred immediately to foreign banks which would drive the State banks into ruin.

The recent run on Chinese IPO stocks illustrates the dilemma: Whilst the stock market for Shanghai's B-shares (shares by Chinese mainland companies, open for Foreign investors) was down by 2% in 2003, the Chinese IPO's for companies like China Life, AviChina, China Resources, PICC and others, which were placed on the Hong Kong stock market, were 180 times oversubscribed and brought China Life $3bn. The Chinese "Red Chip" companies on Hong Kong's Hang Seng index rose by 55% in 2003, whereas the HIS itself only appreciated by 32%. This indicates that there is an enormous interest in Chinese shares, but only if they are placed on International Stock Exchanges and not in China, where they are subject to Government manipulation.

11.1.9 Summary

China is so vast and complex; almost any view can find corroboration. During the SARS outbreak in March 2002 the whole world was speculating on the end of the China boom. Four months later, United States Secretary John Snow was suggesting revaluing the yuan because of its large trade surplus. All this hype makes it difficult for the rest of the world to cope with the Chinese phenomenon. The only way to understand China comes from adoption of a holistic view, a look at the geopolitical perspective, the economic dynamics of political change, the transformation of its businesses, as well as factor in the unreliability of statistics.

Today there are basically four schools of thought concerning where China will be heading:

Sudden death
The first school predicts a sudden regime death for the Chinese communist party. After 50 years in power, without a single election, it faces a crisis of legitimacy.

Signs of collapse lie all around, triggered by massive rural emigration, get-rich-quick practices, mounting corruption, lawlessness, widening income disparity, weak public finances and a proliferation of sects to fill the vacuum left by communist ideals.

Introverted China
The second view is that of China as a second-rank, medium-sized and introverted regional power. China formed 30 per cent of the world economy in 1820, fell to 6 per cent by 1950, and fell to about 1.5 per cent by the time Mao Zedong died in 1976. Now

it's back up to 3.5 per cent, which shows some recuperation but is still well below 1950 levels. The view contends that the communist regime has been doing pretty well but continues to face huge problems, therefore its threats and demands should not be taken too seriously.

Rising global Power

The third view is that China is an 800 pound gorilla about to unleash itself in the world jungle. This view of a belligerent, assertive and rising power is widely represented in some circles in Asia-Pacific and the US.

The emphasis here is on the controversial size of its military budget, which is estimated to be about US$60 billion (100 US$ billion) a year, dwarfing most of its neighbours. China is represented as Germany a century ago, rife with internal social tensions, growing nationalism and xenophobia, and seeking its own place in the sun.

Move towards democracy

The fourth one is of market democratisation - that China has no option in the long run but to integrate itself into a pre-constituted world.

Here, China is the growth miracle, enjoying 9 per cent growth year on year right through to 2030, when it begins to overtake Japan. The communist system is a legacy of its past and extracting itself from that is the name of the game.

It is heading towards absorbing the norms of the Western world, introducing the rule of law, greater political freedoms, modern means of communications and there's no going back. When you join the rest of the world, you do so on the rest of the world's terms.

This does not mean China will begin to imitate the West, but there will be an evolution of its existing systems with more accountability built into it.

Most likely development scenario

The key signs are the achievement of China's diplomacy in entering the World Trade Organisation, accelerated by the leadership changes in China in 1998 from Mr Li Peng as Premier to Mr Zhu Rongji in 1998 on to Mr Wen Jiabao in 2003, followed by winning the 2008 Olympic Games.

Today, the expectations of the whole of China and the international business community are riding on 2008 - which has become the equivalent of the European Commission's creation of an internal market in 1992.

In China's case, having won this victory means four billion people worldwide will be watching the Beijing Games. It's self-evident that increasingly over the next few years, journalists and TV crews will be walking around China turning the spotlight on human

rights, labour abuses and legal biases. Too much of this would not give China a good image.

But although China has got off in the new century on the right foot, the country will be in for a rough ride. It has never been and is not going to be smooth. An example in case:

The State-owned Enterprises account for only 40 per cent of total output but take up 80% of total resources. So the question facing the government is how to unlock all the resources going to the State enterprises and feed the growth in financial markets that will encourage more private business, which account for 80% of new jobs in China today? But in the big cities of China, 90% of the employed population are employed by the government or State enterprises. So, for the party, it is a choice between massive unemployment in the cities or the destruction of its peoples' savings by pouring them into these loss-making State enterprises.

But one thing is clear. There is no going back or slowing down growth. Every year, the leadership knows it has to create 20 million new jobs. If it manages to produce only 12 million jobs, every year that comes by, there will be eight million new people on the labour market. It's a race against time. That's why China is so precarious.

To conclude our analysis of the risks and challenges facing the future development of China, we believe that until the Olympics in 2008 in Beijing (or until the World Expo in Shanghai in 2010) China will continue to develop in a pragmatic way with continued high growth rates of around 8-9%. Barring any unforeseen political developments i.e. the independence declaration of Taiwan, the integration of Asian economies will continue. Greater China (China, Hong Kong, Taiwan) will drive the economies of Japan (+2% of GDP) and ASEAN (+3% of GDP).

Within Asia, the emergence of China signals to many countries that China only resumes its rightful place as the dominant Nation in Asia, which it had been for Centuries before.

The Pacific Century has finally arrived.

11.2 Relevant causes of 5 year plan regarding the machinery industry

During the period of the Ninth Five-Year Plan (1996-2000) China has already experienced much economic and social progress, building a solid ground for implementing the Tenth Five-Year Plan.

However, many problems still persisted in 2000: China suffered from an inappropriate industrial structure, an imbalanced economic development among different regions and low competitiveness on the international markets. Moreover, the country was lagging comparatively backward in science, technology and education.

Guiding principles

In 2001, China implemented the next Five-Year Plan, including guiding principles and major tasks for the national economic and social development, in order to take further steps to solve the above mentioned problems. The Plan embodies the following major guiding principles:

Rapid growth

One major aim is to maintain a fairly rapid growth rate in the national economy, based on strong market demand and good economic returns.

After having examined the overall condition of all sectors of the economy, China has set the target for the average annual economic growth rate in the Tenth Five-Year Plan period at around 7%, which is slightly lower than the actual growth rate in the Ninth Five-Year Plan period (8.3%), but still quite high, especially compared to the expectations of other countries.

Reforms

The emphasis is the acceleration of industrial reform to build up a modern corporate system and, thereby, promoting the transformation to a shareholding based system transformation as well as reinforcing efficient management; especially promoting the reform of State-owned enterprises to separate the functions of government and enterprises to ensure competitiveness in global markets.

Opening up

Efforts are made to expose Chinese markets to the rest of the world and strengthen cooperation with other countries, which is also due to China’s entry of the WTO.

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Improved technology
Furthermore, in order to narrow the gap between China and the developed countries, emphasis is put on the revitalization of the nation through accelerating advancement and innovation of science and technology, and assigning proper roles to talented personnel.

Overall, the Tenth Five-Year Plan contains fewer specific targets than the previous one and sets more tentative ones, leaving some latitude in order to be able to adjust to structural changes.

The Tenth Five-Year Plan regarding the machinery industry
The introduction of China's Tenth Five-Year Plan is aimed at improving and readjusting the industry's structure to accelerate the development of products, which are badly needed, thus, laying a solid foundation for the vitalization of the machinery industry by 2010 and becoming a pillar industry of national economy.

With regard to the Tenth Five-Year Plan, the main tasks for the machinery industry are:

- Restructuring the machinery industry

- Significant advances were already made in the establishment of modern corporate structures in large and medium-sized State-owned enterprises. It is aspired to continue this strategic reorganization of the machinery industry in order to effectively compete in world markets.

- Renovation of old industrial plants and support of key sectors and corporations are carried out, while, on the contrary, outmoded industrial production capacity is eliminated, thus, reducing excess production capacity.

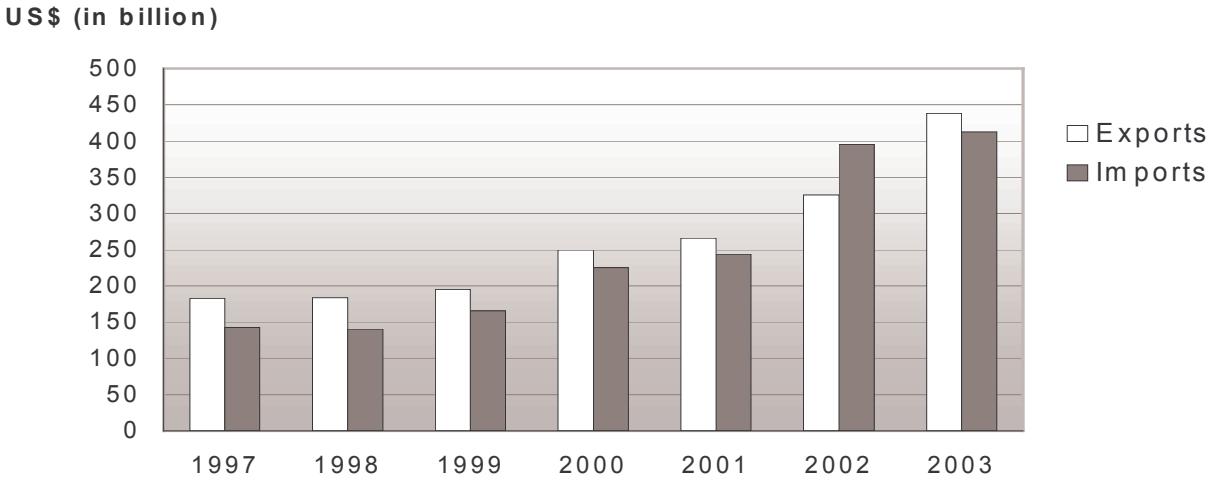
Modifying product and technology structure
China tries to make full use of high and value-added technologies and information techniques, depending on both domestic innovation and imported technology. The intention is to rebuild and develop the mechanical manufacturing industry and to promote the technical innovation and industrial upgrading of the whole sector. Therefore, priority is given to R&D, adhering to the following guidelines:

- increasing product variety,
- improving product quality,
- raising productivity,
- saving energy,
- and reducing waste.

Changing the unbalance between supply and demand

The Chinese machinery industry aims to change from an extensive importing country into a strong foreign trade country. A majority of the equipment, which is needed by different sectors of the machinery industry, will be supplied by the domestic market by 2005. The following graph reflects the changing balance between China's exports and imports:

Figure 11: China's imports and exports, 1997 - 2003



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11.3 WTO impact on the Chinese industries

The preliminary stage of the globally acting organisation WTO was a general agreement on tariffs and trade (GATT).

The basic principles for the member States were:

- No import / export limitations,
- No quota systems with regard to quantity,
- No discrimination against foreign companies,
- Common definition and application rules for anti-dumping measurements and custom fees,
- Reduction of non-tariff trade barriers, e.g. product norms and standards.

China participated in the foundation of the GATT in 1947 but withdrew its membership in 1950 after the foundation of the “People’s Republic of China”. In 1982, China applied for observer status in the GATT, which was granted only few months later, and in 1986 it decided to resume its membership with the GATT. Following this, the GATT Council established a working party, which was requested to address by all GATT members concerning questions about China’s foreign trade regime.

When in 1995 the WTO was founded as a successor to the GATT, the new body continued these negotiations. It then took another 6 years before finally China’s membership was formally approved in the fourth ministerial conference in Doha, Qatar in November 2001. China became the 143rd member of the WTO, effective on 11 December 2001.

These accession negotiations with China contained three major aspects:

- China had to provide every member of the WTO with detailed information about the prior trading regime and about the commitments of the GATT negotiations in the last 15 years.
- Each WTO member had to negotiate individually with China about market access, concession and commitments in the goods and services areas.

- China was involved in multilateral negotiations with the WTO members concerning the laws and regulations, which are related to trade.

In order to gain WTO membership, China agreed to remove trade barriers and to open its market to foreign investors, and in addition, to modify its legal framework to increase transparency and predictability of business deals.

11.3.1 Trading rights

Before 2001, China restricted imports and exports to a small group of companies, being only allowed to trade a small range of products. These appointed companies tended to be predominantly State-owned enterprises and manufacturing companies.

China is committed to liberalize the trading rights, and therefore full trading rights will be established latest by December 2004. These rights will automatically apply to the following enterprises:

- Chinese enterprises,
- Chinese-foreign Joint Ventures,
- Wholly-foreign owned enterprises,
- Foreign individuals (incl. proprietorship).

Timetable for commitments related to trading rights

December 2001:
China established full trading rights for Chinese enterprises with registered capital of at least RMB 5 million.

December 2002:
China established full trading rights for Chinese enterprises with registered capital of RMB 3 million.

China established full trading rights for joint ventures with minority foreign ownership.

December 2003:
China established full trading rights for Chinese enterprises with registered capital of RMB 1 million.

China established full trading rights for joint ventures with majority foreign ownership.

December 2004:
Chinese companies will not be required to have registered capital to gain full trading rights.

China has already implemented full trading rights for Chinese enterprises. But regarding foreign-Chinese Joint ventures, the Chinese government could not accomplish their promises yet. This means that neither joint ventures with a minority ownership nor ones with a majority ownership are allowed to operate as trading companies with full trading rights. Instead, the Chinese government has limited the rights of foreign trading companies by restrictions relating to a minimum of registered capital (RMB 50 million) to import levels, export levels or to prior experience.

Table 4: China's top trade partners (in US$ million)

Rank 2003	Economy	2002	2003	%change (02/03)
1	Japan	101,905.4	133,573.4	31.1
2	United States	97,180.6	126,334.4	30.0
3	Hong Kong	69,206.7	87,407.7	26.3
4	South Korea	44,649.0	63,231.1	43.4
5	Taiwan	44,071.2	58,367.0	30.7
6	Germany	27,800.5	41,876.3	50.7
7	Malaysia	14,270.5	20,127.8	41.0
8	Singapore	14,018.1	19,352.3	37.9
9	Russia	11,927.5	15,760.6	32.1
10	Netherlands	10,676.8	15,438.7	44.6

11.3.2 Import regulations (Tariffs and Customs)

Concerning import tariffs, China is committed to reduce the tariff rates to enhance the access to its markets for foreign companies. China also assured that the market entry opportunities provided by reduced tariffs will not be annulled by an increase of the customs value of these goods.

Timetable of commitments related to tariffs and customs

January 2001:
China began to reduce tariffs from a base average of 25% yearly by 7% for the following sectors: agricultural equipment, construction equipment, paper and paper products, chemicals, steel, medical and scientific equipment, soda ash and cosmetics.

China agreed to adopt the internationally harmonized rules of origin once these are completed.

January 2002:
China began to reduce tariffs for computers, semiconductors and other information technology related products.

The Customs Administration issued the "Measured for Examining and Determining Customs Valuation of Imported Goods".

January 2003:
Reduction of tariffs on chemicals

January 2005:
Elimination of all tariffs related to information technology

The gradual reduction of tariffs will promote foreign trade, especially imports. As a result, China is expected to boost to an international trade partner, importing goods with a value of more than 1 billion US$ in the following three years.

Until today the Administration of Customs did not realize the commitment to fair customs, meaning that imported goods should be valued on their transaction price instead of valuing these on reference price, which usually tends to be higher.

Table 5: China's top imports (in US$ million)

Commodity Description	2001	2002	2003	%change (02/03)
Electrical machinery & equipment	55,888.5	73,254.9	103,925.9	41.9
Power generation equipment	40,553.9	52,152.0	71,500.2	37.1
Mineral fuel & oil	17,545.7	19,322.1	29,272.5	51.5
Iron & steel	13,038.1	16,011.9	25,596.9	59.9
Optical & medical equipment	9,774.7	13,480.0	25,137.5	86.5
Plastics & articles thereof	15,260.6	17,380.9	21,032.6	21.0
Inorganic & organic chemicals	10,619.4	13,105.2	18,736.9	43.0
Vehicle & parts other than rail	4,531.4	6,479.5	11,814.8	82.5
Ore, slag & ash	3,430.0	4,280.7	7,171.9	67.5
Copper & articles thereof	4,887.0	5,667.9	7,165.4	26.4

11.3.3 Export regulations

In its WTO accession China committed that it would not maintain any restrictions on exports, such as duties, taxes or other charges, except those, which are justified under WTO rules. The WTO regulations only permit fees and charges for the cost of services, which should not represent an indirect protection for domestic products. Until today China imposes fees and charges on exports of some raw materials as well as intermediate products.

In both 2002 and 2003, the WTO members raised their concerns about continuing export regulations of raw materials and intermediate products bilaterally with China.

However, China has refused to change its export regulation practices in this area until today.

Table 6: China's Top Exports (in US$ million)

Commodity Description	2001	2002	2003	%change (02/03)
Electrical machinery & equipment	51,306.3	65,119.4	88,977.6	36.6
Power generation equipment	33,584.8	50,815.5	83,468.9	64.3
Apparel	32,412.0	36,570.0	45,759.2	25.1
Toys & games	9,082.6	11,601.6	13,279.9	14.5
Footwear & parts thereof	10,086.5	11,090.5	12,955.0	16.8
Furniture & bedding	7,560.6	9,855.9	12,895.5	30.9
Iron & steel	8,254.3	9,571.0	12,864.8	34.4
Mineral fuel & oil	8,416.3	8,371.9	11,110.2	31.7
Inorganic & organic chemicals	7,462.7	8,589.6	10,734.8	25.0
Optical & medical equipment	6,980.4	7,367.2	10,564.3	43.5

11.3.4 Distribution Services

Foreign companies were prohibited from distributing products (wholesaling service, through agents, retailing, franchising). Furthermore, it was not allowed to provide related services such as repair or maintenance services.

Timetable for commitments related to the distribution of products

December 2001:
China committed to authorize foreign-Chinese Joint ventures and wholly foreign-owned enterprises to distribute products made in China.

China permitted foreign-service suppliers to supply retailing services for almost any goods, if these were made in China or imported by joint ventures with a minority foreign ownership.

December 2002:
China permitted foreign-service suppliers to provide wholesaling services as well as commission agents' services for almost any goods, if these were made in China or imported by a joint venture with a minority foreign ownership.

December 2003:
China permitted foreign-service suppliers to supply wholesaling services as well as commission agents' services for almost any goods, if these were made in China or imported by a joint venture with a majority foreign ownership.

China committed to permit foreign-service suppliers to supply retailing services through majority foreign-owned joint ventures.

December 2004:
No registered capital for a Chinese company is required for full trading rights.

China permits foreign-service suppliers to supply wholesaling services as well as commission agents' services through wholly foreign-owned enterprises.

China committed to authorize foreign-service suppliers to supply retailing services through wholly foreign-owned enterprises and committed to eliminate all limitations for pharmaceutical products, pesticides, mulching films and processed oil.

Until 2006 the regulations for distribution service have to be fully liberalized.

China brought into effect its commitments for wholesaling services, commission agents' services and retailing services provided by foreign-invested enterprises, but only for goods manufactured in China. Additionally, until today China only allows Joint Ventures with a minority foreign ownership to provide these services under several restrictions.

11.3.5 Investment

Before China's accession to the WTO, it insured to eliminate all WTO-inconsistent requirements for foreign investments, such as export performance (import amount is restricted to export amount), local content (provide benefits to the incorporation of local inputs), foreign exchange balancing (imports are related to the amount of foreign exchange a company earns) and the need for technology transfer (technology transfer as a necessary requirement for an import or foreign investments). However, without formal requirements, most of the revised laws and investment regulations still demand for a technology transfer.

Additionally, some Chinese government officials still consider factors, such as export performance or local content, when deciding whether to approve an investment or to recommend approval of a loan from a Chinese policy bank, which is often essential to the success of an investment project.

Since 2002, when Chinese officials issued the Sectoral Guidelines Catalogue for Foreign Investment, there had been no changes concerning the opening of certain sectors to foreign investment, such as for travel agencies, human resource companies, cinemas, railway cargo, and publications distribution. This catalogue also signaled the opening of a number of other sectors not covered by China's accession agreement. One exception to this progress is the field of biotechnology, seed development and production, which China changed to the "prohibited" category.

11.3.6 Services

With entry into the WTO, the Chinese government committed to eliminate many existing restrictions on market access. They promised to open their markets for a wide range of services including banking, insurance, telecommunications, and professional services.

Additionally, China made some commitments, which apply to all sectors. The most important of these horizontal commitments involve acquired rights and the licensing process.

The acquired rights commitment
This commitment allows service companies, which hold pre-WTO accession rights reaching beyond the actual commitments of the WTO, to continue operating with these rights.

The licensing area commitment
This commitment obliged China to streamline and increase the transparency of the allocation of licenses to foreign companies intending to operate in China. Before China's accession, foreign companies were not allowed to apply for a license without an invitation from the Chinese authorities. The actual application suffered from a lack of transparency as well as from delays and discretions.

Today there are still many existing problems concerning transparency, with specific market barriers, and other regulation issues. Despite the fact that China opens its markets slowly to foreign companies, they still maintain and erect high barriers of entry in order to stop foreigners to invest in China. Exaggerated capital requirements for foreign companies in the insurance, banking, telecommunications or distribution sector are an illustration of this.

Other than that, there were some positive signals in 2003 as more foreign insurers and financial institutions obtained licenses, and China finally opened up the non-bank motor vehicle financing sector.

11.3.7 Transparency

After China's accession to the WTO, a couple of improvements were made regarding transparency. The most important commitment concerns the procedures for adopting and revising laws and regulations: Nowadays they can be commented by the public before implementation. Agreement was also found on translating all trade related laws and regulations in one ore more WTO languages, including English, French or Spanish.

In 2002, the Chinese government reviewed more than 2500 trade related laws and regulations regarding their consistency with WTO regulations. As a result they kept 830 of these, amended 325 and adopted 118 new regulations, which is a substantial reduction of 1227 laws and therefore an important simplification.

Despite the fact that the Chinese government committed public comments on new laws and regulations before their implementation, many Chinese ministries and agencies continue to follow the practice prior to Chinas WTO accession.

11.3.8 Intellectual Property rights

Although new laws and regulations were introduced to set up a more effective IPR environment, the IPR problems still increase. This is because of the widespread production, distribution and end-use of counterfeit and pirated products, brands and technologies. Violations include the rampant piracy of film, music, publishing and software products, infringement of pharmaceuticals, chemicals, information technologies and other patents, and counterfeiting of consumer goods, electrical equipment, automotive parts and industrial products.

In July 2003, the State Council's Development research centre reported enormous losses for IPR rights holders, with the market value of counterfeit goods in China lying between 19 US$ billion and 24 US$ billion.

In order to control the expansion of counterfeit products and to protect the Intellectual property rights, the Chinese government has to lower the thresholds for criminal prosecution and increase criminal penalties for IPR violators to deterrent levels. It would also be necessary to establish a more effective communication between China's courts, the investigative units and the lawmaking bodies.

In October 2003, Vice Premier Wu was appointed to head a leading group on IPR issues in order to reduce bureaucratic resistance and confusion on IPR enforcement among the numerous Chinese government entities with responsibilities in this area. In remarks following her appointment, she acknowledged China's IPR enforcement problem and explained that China was paying increasing attention to IPR enforcement. According to Vice Premier Wu, China does not just implement its WTO commitments but also attracts more foreign investment as it opened up its market and accelerates China's economic and social progress. She pledged that China would intensify its IPR enforcement efforts and penalize those who commit IPR infringement.

11.3.9 Advantages for China

- China gets a voice and place in the international community.
- Closer economic integration with the world for China.
- USUS will export additional US $30bn to China.
- China's status in the world would be on par with the US.
- Reformers apparently have the upper hand at present.
- Annual FDI may be doubling to $80bn, 80% of all Asian investments go to China.

- Huge domestic market with an explosive demand.
- Foreign companies establish production lines, upstream will follow.
- Potential contribution to GDP growth: 2% (7mio jobs created).
- Exports of labour-intensive products + imports of high-tech: Net gain of $20bn per year.
- Light manufacturing will move from SEA to China as concerns of US sanctions fade.
- Out phasing of textile quotas in 2005 draws industries away from Philippines, Thailand, Malaysia and Indonesia.

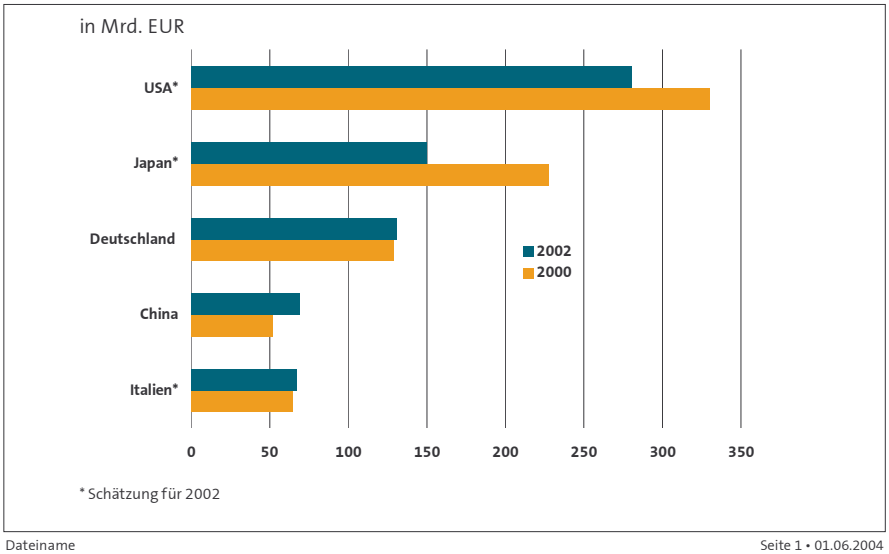
11.4 Key figures of German and Chinese machinery industry

China und der deutsche Maschinenbau

Die VR China hat für den deutschen Maschinen- und Anlagenbau enorm an Bedeutung gewonnen. Auch das gute Exportergebnis des vergangenen Jahres ist abermals hauptsächlich den florierenden Geschäften mit China zu verdanken. Mit 6,2 Mrd. € Ausfuhrvolumen in 2003 ist die Volksrepublik nun nach den USA und Frankreich drittwichtigster Exportmarkt des deutschen Maschinenbaus.
Die Betrachtung der wachsenden Volksrepublik ist als Markt, Konkurrent, Handelspartner sowie als Standort von Interesse. Einige Aspekte verdeutlichen die folgenden Abbildungen. Bei Rückfragen steht Ihnen die Abteilung Volkswirtschaft und Statistik des VDMA gerne zur Verfügung.

Volkswirtschaft und Statistik

Umsatz im Maschinenbau

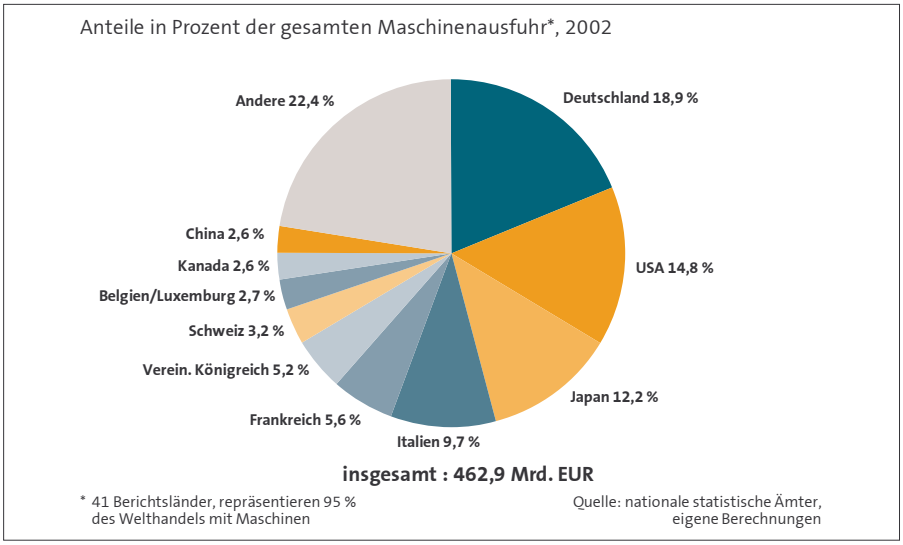


Dateiname Seite 1 • 01.06.2004

China ist seit 2002 (mit einem Umsatz von 68,5 Mrd. €) weltweit der viertgrößte Maschinenhersteller. 2001 lag noch Italien auf dem 4. Platz.

Volkswirtschaft und Statistik

Maschinenausfuhr der wichtigsten Lieferländer



Dateiname Seite 2 • 28.05.2004

Der Welthandel mit Maschinen zeigt ein anderes Bild: Deutschland ist Exportweltmeister; China folgt erst auf Rang 10.

Volkswirtschaft und Statistik

Maschinenbau in der VR China, 2002

Umsatz	**69 Mrd €**
- Export	**12 Mrd €**
+ Import	**31 Mrd €**
= Inlandsmarkt	**88 Mrd €**
Exportquote	**17,5 %**
Inlandsmarktversorgung durch Anbieter aus der „VR China“	**69,1 %**
Importquote	**35,2 %**

Dateiname Seite 3 • 28.05.2004

China produziert (noch) vorwiegend für den heimischen Markt und deckt zu mehr als 2/3 den eigenen Bedarf durch die inländische Produktion.

Volkswirtschaft und Statistik

Kennzahlen - Vergleich, 2002 Maschinenbau

	VR China	USA	Japan	Deutschland
Exportquote*	17,5 %	24,4 %	37,6 %	67,0 %
Importquote**	35,2 %	23,7 %	11,9 %	42,7 %
Inlandsmarkt	88 Mrd €	280 Mrd €	130 Mrd €	73 Mrd €

* Export im Verhältnis zum Umsatz

** Import im Verhältnis zur Inlandsmarktversorgung

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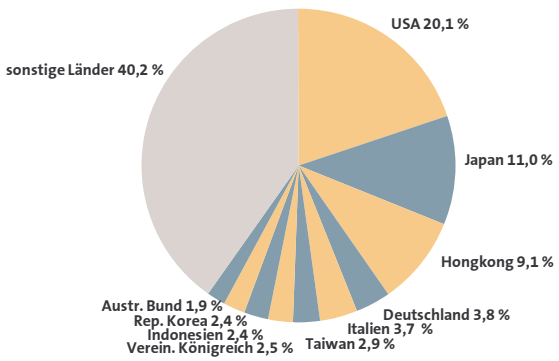
Die VR China ist der drittgrößte Maschinenmarkt. Die Exportquote ist noch vergleichsweise niedrig, die Importquote relativ hoch.

Volkswirtschaft und Statistik

Maschinenausfuhr der VR China in einzelne Länder, 2003



insgesamt: 16,2 Mrd. Euro

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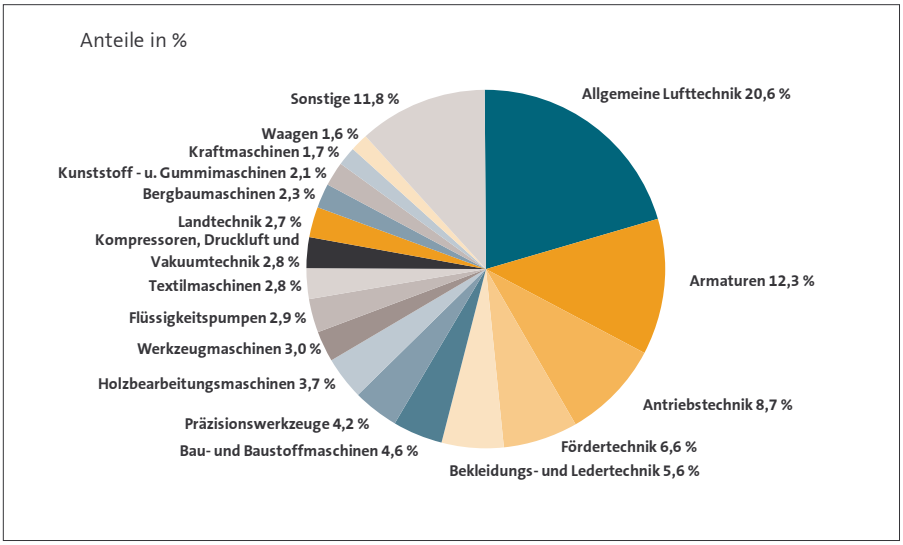
China exportiert vorwiegend in hochindustrialisierte Märkte. Dies liegt auch daran, dass in China viele ausländische Produzenten tätig sind, die mit ihren hochwertigen Produkten in diesen Ländern einen Absatzmarkt finden.

Volkswirtschaft und Statistik

Maschinenausfuhr von China, 2003 nach Fachzweigen

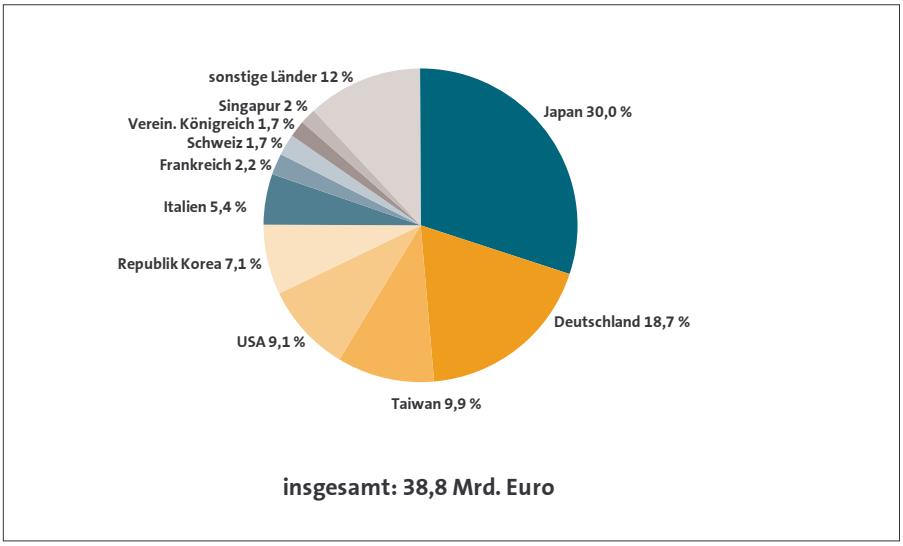


Dateiname Seite 6 • 28.05.2004

Der größte Exportposten Chinas ist die Allgemeine Lufttechnik, gefolgt von den Armaturen und der Antriebstechnik. Das Hauptgeschäft des chinesischen Maschinenbaus besteht dabei insbesondere aus Standardteilen.

Volkswirtschaft und Statistik

Maschinenimporte von China, 2003 nach Lieferländern

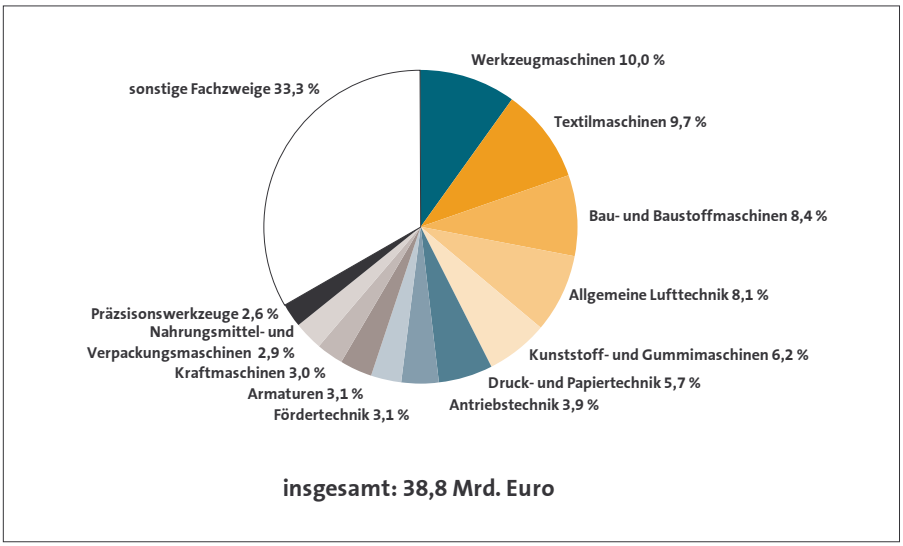


Dateiname Seite 7 • 28.05.2004

Deutschland ist nach Japan der zweitwichtigste Maschinenlieferant Chinas. Dies spiegelt wider, dass China auf den Import von technisch hochentwickelten Maschinen angewiesen ist.

Volkswirtschaft und Statistik

Maschinenimporte von China, 2003 nach Fachzweigen

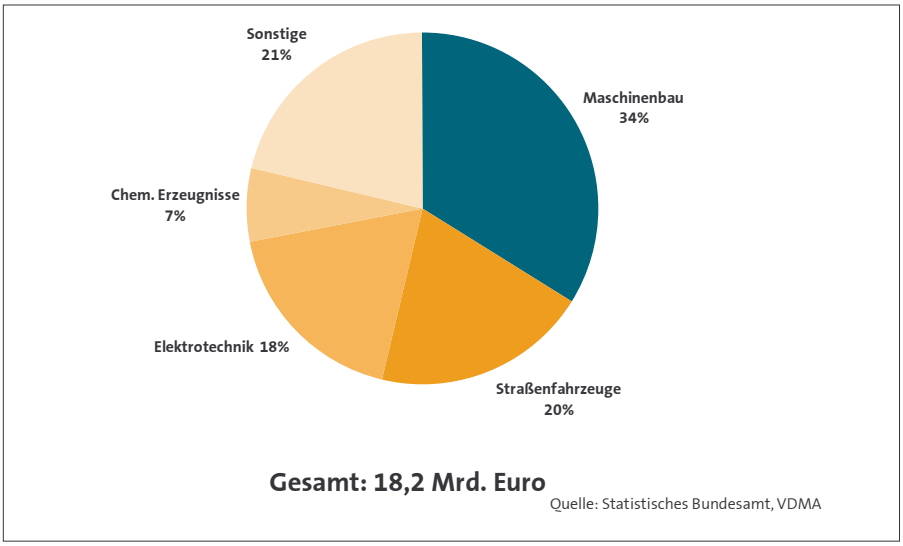


Dateiname Seite 8 • 28.05.2004

China hat einen hohen Bedarf an Werkzeugmaschinen, auch um die eigene Maschinenproduktion aufzubauen. Ein starker Bedarf besteht ferner an Textilmaschinen; denn schließlich ist China ein wichtiger Standort für die Textilbranche.

Volkswirtschaft und Statistik

Deutsche Exporte nach China nach Industriezweigen, 2003



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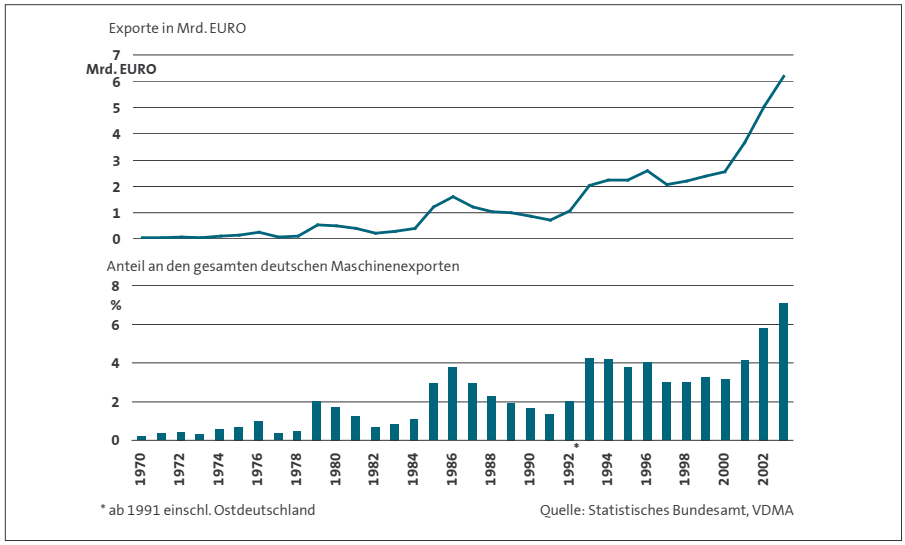
Der größte Anteil der deutschen Exporte nach China kommt aus dem Maschinenbau, gefolgt vom Straßenfahrzeugbau und der Elektrotechnik.

Volkswirtschaft und Statistik

Deutsche Maschinenexporte in die VR China



Dateiname

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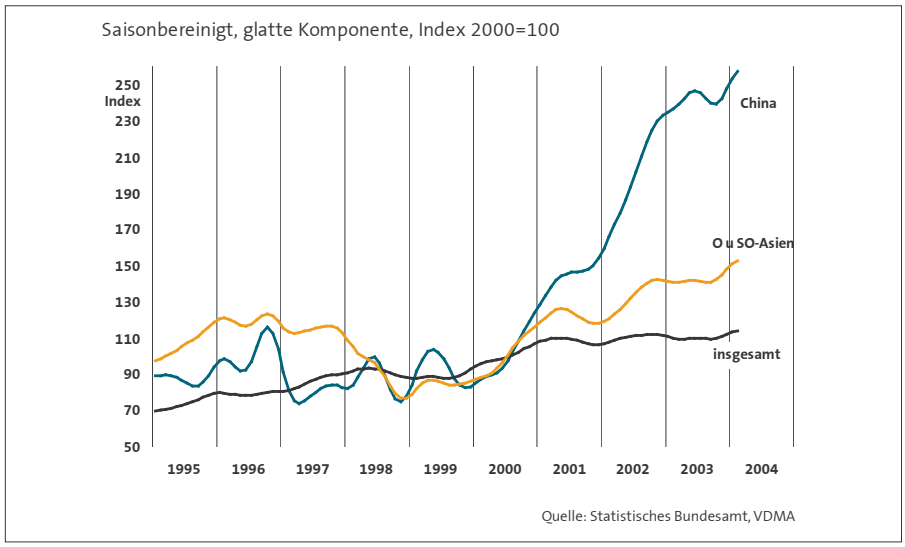
Die Bedeutung Chinas als Kunde des deutschen Maschinenbaus ist enorm gestiegen. China ist inzwischen, nach den USA und Frankreich, der drittwichtigste Abnehmer deutscher Maschinenbauprodukte.

Volkswirtschaft und Statistik

Export nach Regionen



Dateiname

Seite 11 • 02.06.2004

Während die gesamten deutschen Maschinenexporte seit 2000 mit Jahresraten von durchschnittlich 5,5 % zulegten, schossen die Exporte nach China ab diesem Zeitpunkt mit einem durchschnittlichen Anstieg von 27 % regelrecht in die Höhe.

Volkswirtschaft und Statistik

Deutsche Maschinenexporte in die VR China

Fachzweig	Wert in Mio EUR 2003	Änderung 2003/2002 in %	Rangfolge* 2003
Textilmaschinen	851	50,6	1
Werkzeugmaschinen	521	25,2	2
Druck- und Papiertechnik	443	-12,5	2
Hütten- und Walzwerkseinrichtungen	403	21,1	1
Kunststoff- und Gummimaschinen	351	23,6	2
Allgemeine Lufttechnik	317	22,8	3
Antriebstechnik	306	48,1	7
Bau- und Baustoffmaschinen	303	4,8	5
Fördertechnik	242	5,0	8
Nahrungsmittel- und Verpackungsmaschinen	191	11,8	6
Flüssigkeitspumpen	172	69,1	6
Verfahrenstechnische Maschinen und Apparate	166	21,6	3
Holzbearbeitungsmaschinen	164	75,9	2
Kompressoren, Druckluft-/Vakuumtechnik	142	12,7	4
Kraftmaschinen	133	-19,1	11

*) Rang des Landes innerhalb der gesamten Maschinenausfuhr des Fachzweiges

Für manchen Fachzweig ist China der wichtigste Absatzmarkt weltweit. Nach den Textilmaschinen gilt das insbesondere für den Bereich der Metallurgie; beides Bereiche, in denen China zu den weltweit größten Produzenten zählt.

Volkswirtschaft und Statistik

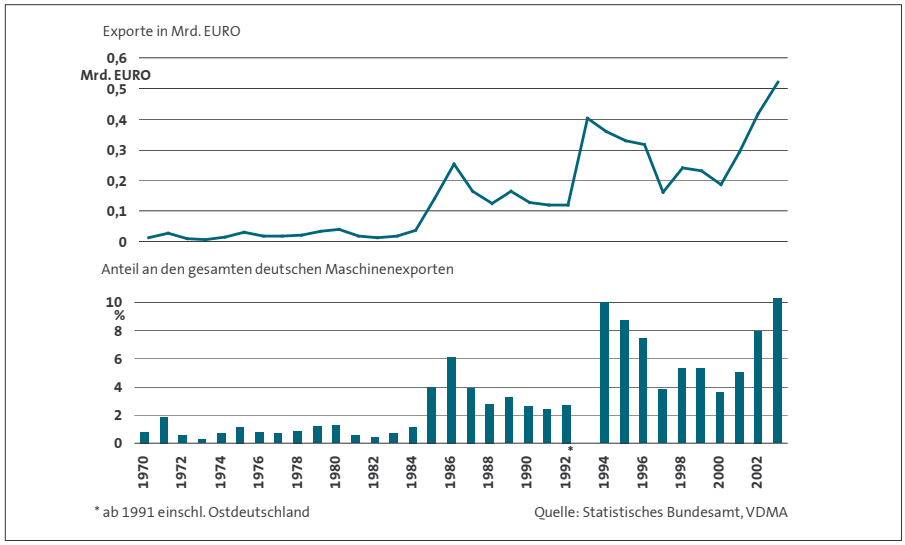
Deutsche Maschinenexporte in die VR China

Fachzweig	Wert in Mio EUR 2003	Änderung 2003/2002 in %	Rangfolge* 2003
Bergbaumaschinen	121	- 6,8	2
Industrieöfen, Brenner und Feuerungen	111	- 7,6	1
Armaturen	109	16,7	10
Präzisionswerkzeuge	108	3,7	13
Fluidtechnik	72	88,6	8
Aufzüge und Fahrtreppen	58	9,6	2
Bekleidungs- und Ledertechnik	53	- 6,2	3
Prüfmaschinen	52	12,0	1
Waagen	27	72,3	5
Landtechnik	21	25,3	30
Gießereimaschinen	20	53,0	1
Feuerwehrgeräte	8	-45,4	1
Schweißtechnik (ohne elektrische)	3	-26,9	9
Reinigungssysteme	2	24,3	29
Gesamt	6.177	22,2	3

*) Rang des Landes innerhalb der gesamten Maschinenausfuhr des Fachzweiges

Volkswirtschaft und Statistik

Deutsche Werkzeugmaschinenexporte in die VR China

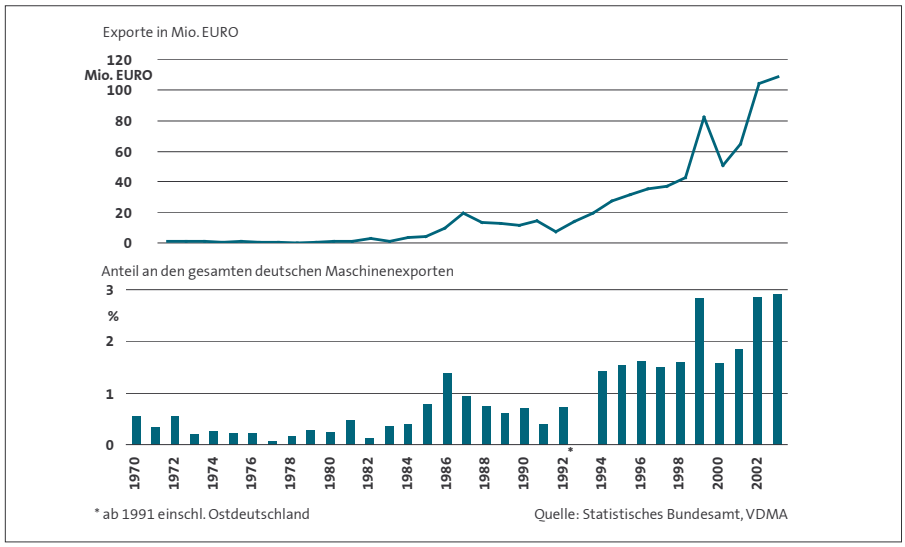


Dateiname Seite 14 • 28.05.2004

Auch für die Werkzeugmaschinen zeigt sich der Bedeutungszuwachs Chinas als Absatzmarkt. Inzwischen gehen rund 10 % der Exporte dieser Branche in die Volksrepublik. Nach den USA ist damit China der zweitwichtigste Absatzmarkt für die deutschen Werkzeugmaschinenhersteller.

Volkswirtschaft und Statistik

Deutsche Präzisionswerkzeugmaschinenexporte in die VR China

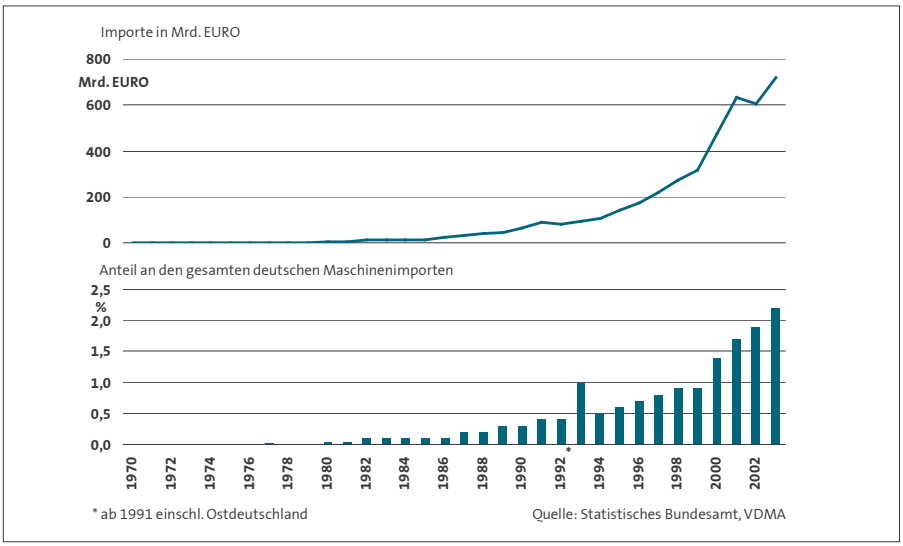


Dateiname Seite 15 • 28.05.2004

Ein beträchtlicher Anstieg der Exporte in die VR China zeigt sich für die Präzisionswerkzeuge, insbesondere seit Anfang der 90er Jahre. Allerdings liegt China hier (mit Rang 13) nicht unter den ersten Plätzen der wichtigsten Absatzländer.

Volkswirtschaft und Statistik

Deutsche Maschinenimporte aus der VR China

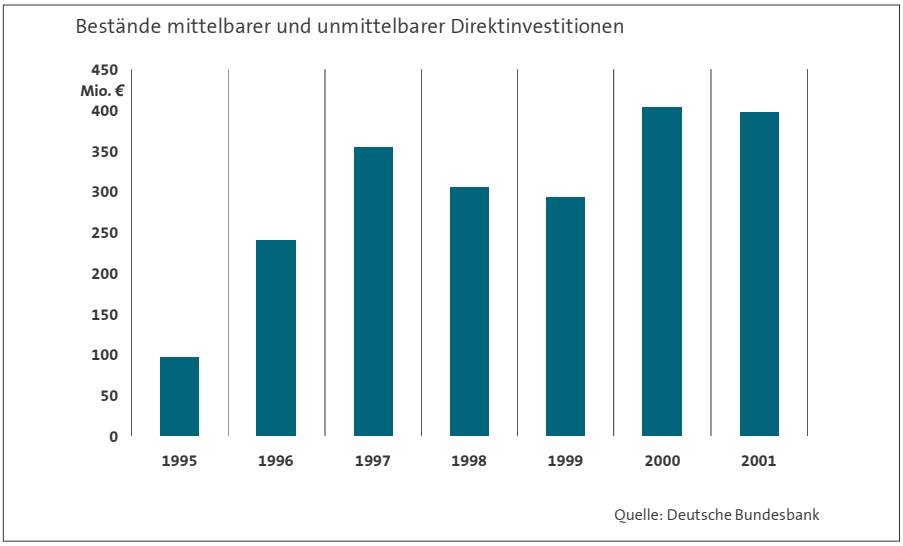


Dateiname Seite 16 • 02.06.2004

China ist für Deutschland nicht nur als Kunde deutscher Maschinen wichtiger geworden. Auch die Maschinenimporte aus der Volksrepublik haben zugenommen. Der Anteil an den gesamten Maschinenimporten liegt aber noch recht niedrig und China nimmt Platz 15 unter den Lieferländern ein.

Volkswirtschaft und Statistik

Direktinvestitionen des deutschen Maschinenbaus in China



Dateiname Seite 17 • 28.05.2004

Die wachsende Bedeutung Chinas als Markt und als Standort zeigt sich an den Direktinvestitionen des deutschen Maschinenbaus. Sie sind seit 1995 um das vierfache angestiegen.

Chapter 11: APPENDIX A

11.5 Product Piracy and Certification in China

Inhalt

1. Einführung

Produkte mit hoch entwickelter Technologie werden in China häufig nachgebaut. Der dadurch entstehende finanzielle Schaden ist für die betroffenen Firmen beträchtlich. Hinzukommen können Imageverluste durch Nachbauten schlechter Qualität. Aufgrund des WTO-Beitritts Ende 2001 hat China seine Marken-, Patent- und Urhebergesetze überarbeitet, um dem TRIPS Abkommen (Agreement on Trade-Related Aspects of Intellectual Property Rights) und anderen internationalen Abkommen (PVÜ, Pariser Verbandsübereinkunft zum Schutz des gewerblichen Eigentums) gerecht zu werden. Die rechtlichen Möglichkeiten, gegen Nachbauer vorzugehen, haben sich nach chinesischem Recht aufgrund des WTO-Beitritts Chinas zwar verbessert, aufgrund tatsächlicher Gegebenheiten bleibt der effektive Schutz aber schwierig und aufwändig. Das A und O der Verfolgung von Nachbauten ist die Eintragung gewerblicher Schutzrechte in China. Melden Sie Ihre Schutzrechte in China an! Wichtig ist es aber auch, nicht nur die rechtlichen Möglichkeiten, wie die Eintragung von Schutzrechten oder gerichtliches Vorgehen gegen Nachbauer auszuschöpfen, sondern auch das technische Instrumentarium, wie z.B. Sicherheitslabels auf den Produkten, zu nutzen und weitere Möglichkeiten, z.B. die Zusammenarbeit mit Behörden, kreativ einzusetzen. Vorliegende Publikation möchte einen Überblick über die rechtlichen Gegebenheiten verschaffen und Lösungsmöglichkeiten sowie Strategien aufzeigen. Gleichzeitig rufen wir Mitglieder des VDMA dazu auf, uns ergänzende und der Lösung des Nachbauproblems dienliche Vorschläge und Erfahrungen mitzuteilen, um so einen aktiven Erfahrungsaustausch zu ermöglichen.

2. Gewerbliche Schutzrechte

Nicht jeder Nachbau ist verboten. Ist die Technologie durch Patente oder andere

gewerbliche Schutzrechte geschützt, ist es grundsätzlich erheblich leichter und Erfolg versprechender, Verletzungen zu verfolgen. Dies gilt insbesondere für China.

Chapter 11: APPENDIX A

2.1. Patent, Geschmacksmuster und Gebrauchsmuster

2.1.1. Eintragung

Ein internationales Abkommen, das die Erteilung sog. "Weltpatente" vorsieht, gibt es nicht. Mit dem PCT-Vertrag (Patentzusammenarbeitsvertrag) wurde aber die Möglichkeit eines vereinfachten Anmeldeverfahrens geschaffen. Auch China ist diesem Vertrag beigetreten, so dass sehr schnell, mit nur einem Verfahren ein Patent in vielen Ländern angemeldet werden kann. Anschließend muss das Verfahren vor den nationalen Patentbehörden jedoch weiter verfolgt werden. Nach chinesischem Recht kann eine Erfindung durch Eintragung eines Patents (invention patent) geschützt werden, eine technischen Neuerung kann als Gebrauchsmuster (utility model patent) angemeldet werden. Das Gebrauchsmuster wird als Unterform des Patents auch als "kleines Patent" bezeichnet. Auch das Geschmacksmuster (design) fällt unter das Patentgesetz. Ausländer müssen sich in Patentangelegenheiten von einem Patentvertretungsorgan vertreten lassen, oder ein internationales Patentverfahren betreiben. Das State Intellectual Property Office of the People's Republic of China (SIPO) prüft nach Erhalt des Patentantrags, ob das angemeldete Produkt oder Verfahren neu, erfinderisch und gewerblich anwendbar ist. Verläuft die Prüfung positiv, wird der Antrag nach Ablauf von 18 Monaten nach Antragstellung veröffentlicht. Binnen drei Jahren erfolgt dann die materielle Prüfung. Ist auch diese erfolgreich, wird das Patent erteilt, registriert und bekannt gemacht. Es wird mit dem Tag der Bekanntmachung wirksam. Gegen negative Entscheidungen des SIPO kann der Antragsteller binnen drei Monaten vom Tag des Empfangs der Mitteilung an nochmalige Prüfung verlangen. Gegen den nach der zweiten Prüfung ergangenen Beschluss kann der Antragsteller innerhalb von drei Monaten Klage vor dem Volksgericht erheben. Von dem Jahr an, in dem das Patent erteilt wird, muss der Patentberechtigte Jahresgebühren zahlen. Zahlt er nicht, erlischt das Patent.

2.1.1.1. Patent

Erfindungen sind nur dann patentfähig, wenn es sich um eine neue technische Lösung handelt, die sich auf ein Erzeugnis, ein Verfahren oder deren Verbesserung bezieht. Für wissenschaftliche Entdeckungen oder Regeln und Verfahren für gedankliche Aktivitäten wird ein Patent nicht erteilt. Man erhält auch kein Patent für Diagnoseverfahren und Verfahren zur Behandlung von Krankheiten. Stoffe, die durch Kernumwandlung entstehen, sind ebenfalls nicht patentfähig. Patente werden außerdem nicht erteilt für Erfindungen, die gegen Gesetze oder die Moral verstoßen oder das öffentliche Interesse verletzen, sowie Tierarten und Pflanzensorten. Neu ist die Erfindung dann, wenn sie weder in China noch im Ausland schriftlich veröffentlicht worden ist, wenn sie weder öffentlich benutzt noch anderweitig der Öffentlichkeit in China zugänglich gemacht wurde und keine frühere Anmeldung derselben Erfindung durch Dritte vorliegt. In China gibt es eine sechsmonatige Neuheitsschonfrist für veröffentlichte technische Lösungen, die entweder auf anerkannten Ausstellungen oder Fachtagungen oder missbräuchlich durch Dritte offenbart wurden. Dies bedeutet, dass eine Veröffentlichung (nur) unter den genannten Voraussetzungen die Patenteintragung nicht hindert, der Neuheit der Erfindung also nicht schadet. Eine Erfindung liegt vor, wenn die Leistung

gegenüber dem Stand der Technik hervorstechende wesentliche Merkmale aufweist und einen beträchtlichen Fortschritt darstellt. Zur Beurteilung wird der sog. Durchschnittsfachmann herangezogen. Was über dessen Können hinausgeht, ist erfinderisch.

Die gewerbliche Anwendbarkeit ist gegeben, wenn die Erfindung auf einem beliebigen gewerblichen Gebiet ausführbar, wiederholbar und nützlich ist. Patentanmeldungen für Ausländer, die keinen ständigen Wohn- oder Geschäftssitz in China haben, müssen über eine der 22 für Ausländer zugelassenen chinesischen Patentanwaltskanzleien erfolgen. Dem Patentinhaber wird nach der Erteilung des Patents ein Ausschließlichkeitsrecht verliehen, das es Dritten verbietet, ohne Erlaubnis des Patentinhabers das patentierte Erzeugnis gewerbsmäßig herzustellen, zu gebrauchen, zu verkaufen (oder zum Verkauf anzubieten) oder zu importieren. Unter "Anbieten zum Verkauf" versteht das Oberste Volksgericht der Volksrepublik China Handlungen wie das Bewerben der patentgeschützten Waren oder das Ausstellen der Ware in Schaufenstern oder auf Messen. Eine Patentverletzung ist nunmehr auch gegeben, wenn die handelnde Person, welche die patentgeschützte Ware gebraucht oder verkauft, gutgläubig ist. Allerdings sind Gutgläubige von Schadensersatzpflichten befreit, wenn sie ihre Gutgläubigkeit und den rechtmäßigen Bezug der Waren beweisen können. Bei der Rechtsdurchsetzung gegenüber Dritten stehen dem Patentinhaber zwei Instrumente zur Verfügung: Er kann ein gerichtliches Verfahren beim Verletzungsgericht einleiten oder sich an eine Patentverwaltungsbehörde wenden und dort die Patentstreitigkeit durch ein Verwaltungsverfahren beilegen, s.u. 2.1.2.

2.1.1.2. Gebrauchsmuster

Schutzfähig sind nach chinesischem Recht technische Neuerungen, die eine neue technische Lösung hinsichtlich Form oder Struktur (oder deren Kombination) eines Produkts, das für den praktischen Gebrauch bestimmt ist, darstellen. Verfahren aller Art, Gegenstände ohne Raumform (Gase, Flüssigkeiten), unbewegliche Bauwerke, große Industrieanlagen usw. sind keine Gegenstände, für die ein Gebrauchsmuster eingetragen werden kann. Das Gebrauchsmuster muss neu, erfinderisch und gewerblich anwendbar sein. Allerdings wird im Vergleich zum Patent beim Gebrauchsmuster ein geringerer Grad an erfinderischer Leistung verlangt. Aber auch patentfähiges Wissen kann als Gebrauchsmuster eingetragen werden. Ob ein patentfähiges Wissen als Patent oder Gebrauchsmuster eingetragen wird, ist letztlich eine Frage der firmeneigenen Strategie.

2.1.1.3. Geschmacksmuster

Jedes neue Design eines Erzeugnisses hinsichtlich Form, Muster, Farbe oder deren Kombination ist schutzfähig, sofern es gewerblich nutzbar ist und das Design ein ästhetisches Empfinden hervorruft. Das Geschmacksmuster muss sich auf ein Produkt beziehen, das in Serienfertigung hergestellt wird. Das Design eines kunsthandwerklichen Erzeugnisses, das nicht wiederholbar ist, ist nicht Gegenstand des Gebrauchsmusterschutzes. Für die Eintragung des Schutzrechtes ist erforderlich, dass nicht bereits ein identisches oder ähnliches Geschmacksmuster, das vor dem

Anmeldetag in Veröffentlichungen in China oder in anderen Ländern offenbart oder in China öffentlich benutzt worden ist, eingetragen wurde.

2.1.2. Verletzungsverfahren

Im Patentverletzungsprozess (auch bei Verletzung von Gebrauchs- oder Geschmacksmustern) kann der Patentinhaber den Verletzer auf Unterlassen und Schadensersatz in Anspruch nehmen. Der Patentinhaber kann wählen, ob der Schadensersatz nach dem entgangenen Gewinn oder dem Verletzergewinn berechnet wird. Ist der Schadensersatz auf der Basis dieser Berechnungsmethoden nicht zu ermitteln, kann er auch aufgrund einer fiktiven Lizenzgebühr festgesetzt werden. Ist der Marktwert der Lizenz nicht feststellbar, kann das Gericht nach seinem Ermessen den Verletzer zu einem Schadensersatz zwischen 5.000 und 300.000 RMB verurteilen. In besonders schweren Fällen kann die Summe höher liegen, darf aber den Betrag von 500.000 RMB nicht überschreiten.2 Der Patentinhaber kann nunmehr sowohl Anwaltsgebühren als auch andere Rechtsverfolgungskosten im Rahmen seines Schadensersatzanspruches geltend machen.

Keßler/Qiao, RIW 2003, S. 174 ff.

Vorläufiger Rechtsschutz:

Ein einstweiliges Verfahren im Sinne der deutschen Zivilprozessordnung kennt die chinesische Zivilprozessordnung nicht. Um für den Patentinhaber eine Möglichkeit zum vorläufigen Schutz zu schaffen, wurden diesbezügliche Bestimmungen mit der Revision des Patentrechts 2001 ins Patentgesetz aufgenommen. Danach kann der Patentinhaber bei schwerwiegender Verletzung seines Patents vor der Hauptklage eine einstweilige Anordnung beantragen. Ist der Sachverhalt klar und sind die Interessen des Antragstellers beeinträchtigt, kann das Gericht die Unterlassung der Verletzungshandlung und / oder Beschlagnahme der gefälschten Produkte und der Produktionsmittel anordnen. Da der zugesprochene Schadensersatz in der Regel sehr niedrig ist und vorläufiger Rechtsschutz häufig nicht zu erhalten ist, ist das Gerichtsverfahren oft

nicht befriedigend. Alternativ oder parallel zum Gerichtsverfahren kann ein Verwaltungsverfahren durchgeführt werde n. Die Patentverletzungsstreitigkeiten werden von den Patentverwaltungsbehörden durch Schlichtung und Verwaltungsentscheidung beigelegt. Im Verwaltungsverfahren kann der Verletzer angewiesen werden, die Verletzungshandlung zu unterlassen. Gegen die Verwaltungsentscheidung kann innerhalb von 15 Tagen Klage erhoben werden, sonst wird sie nach Verstreichen dieser Frist rechtskräftig und kann im Wege des Zwangsvollstreckungsverfahrens durchgesetzt werden. Hinsichtlich des Schadensersatzanspruches muss der Patentinhaber sich an die Volksgerichte halten, s.o. Allerdings können die Behörden Bußgelder in Höhe bis zu 50.000 RMB verhängen und den Verletzer zur Richtigstellung und deren öffentlicher Bekanntmachung verpflichten. Sie können auch das durch die Verletzung erlangte Einkommen herausverlangen. Des Weiteren kann eine Freiheitsstrafe von bis zu drei Jahren festgesetzt werden, wenn das illegale Einkommen

über 100.000 RMB liegt, der wirtschaftliche Verlust des Verletzten 500.000 RMB überschreitet, oder ein besonders schwerer Fall vorliegt bzw. der Beschuldigte schon zweimal ein Bußgeld zu zahlen hatte.

2.2. Marke

Nach dem chinesischen Markengesetz sind Marken visuell wahrnehmbare Zeichen, die geeignet sind, Waren einer Person von denen einer anderen Person zu unterscheiden. Hierzu zählen nunmehr Wörter, Abbildungen, Schriftzeichen, Zahlen, dreidimensionale Gestaltungen, Farbzusammenstellungen und Kombinationen dieser Elemente.

2.2.1. Eintragung

Die Eintragung der Marke verschafft dem Markeninhaber ein Exklusivrecht gegenüber Wettbewerbern für die betroffenen Waren bzw. Branchen. Damit hat er eine gute Ausgangsbasis für die Bekämpfung von Produkt- und Markenpiraterie und stärkt damit seine Rechtsposition gegenüber Geschäftspartnern, Lizenznehmern, Handelsvertretern etc. Schutzfähig sind Marken für Güter und Dienstleistungen sowie Kollektivmarken und Prüfzeichen. Der Markenschutz sollte zu einem möglichst früheren Zeitpunkt gesichert werden. Andernfalls besteht das Risiko, dass Verhandlungspartner oder Dritte die Marke treuwidrig für sich registrieren lassen. Für die Markenanmeldung bestehen mehrere Möglichkeiten. So kann die Anmeldung national erfolgen, also in China. Für die Anmeldung ist die Einschaltung einer Kanzlei in China erforderlich. Des Weiteren ist die Übersetzung des Waren-/Dienstleistungsverzeichnisses ins Chinesische erforderlich. Dabei ist für jede Waren-/Dienstleistungsklasse eine gesonderte Anmeldung einzureichen. Die chinesische Marke deckt Hong Kong, Macau, Taiwan nicht ab. Seit der Neufassung des Markenrechts besteht die Möglichkeit gegen Entscheidungen der Markenbehörden gerichtlich vorzugehen. Es besteht aber auch die Möglichkeit einer internationalen Registrierung nach dem Madrider Markenabkommen. Dies setzt eine identische Markenregistrierung in Deutschland voraus, wobei die Registrierung der Marke bei der WIPO (World Intellectual Property Organization) mit Schutzerstreckung auf China erfolgt. Hier ist die Einschaltung von Anwälten in China nicht nötig. Es erfolgt auch keine Übersetzung ins Chinesische. Die Registrierung für beliebig viele Waren-/Dienstleistungsklassen ist möglich. Die Marke genießt in China den gleichen Schutz wie eine nationale chinesische Marke. Nationale Anmeldung oder internationale Registrierung? Besteht bereits Markenschutz in Deutschland, ist eine internationale Registrierung in der Regel recht problemlos zu erhalten. Dies bietet sich insbesondere dann an, wenn die VR China ohne größere Aktivität vor Ort mit abgedeckt werden soll.

Die nationale Anmeldung ist insbesondere dann empfehlenswert, wenn man auf dem chinesischen Markt aktiv ist, da nur dann eine Markenanmeldung in chinesischen Schriftzeichen erfolgt.

vgl. Glatter, ASIA BRIDGE 8/2002, S. 27

2.2.2. Verletzungsverfahren

Der Katalog, der Maßnahmen, die durch die Administration for Industry and Commerce sowie die Gerichte im Fall von Verletzungshandlungen ergriffen werden können, ist erweitert und verschärft worden: So kann nunmehr die Ausrüstung, mit der gefälschte Marken hergestellt werden, nicht nur beschlagnahmt sondern auch zerstört werden. Kann der Markeninhaber weder seinen durch die Verletzung erlittenen Schaden noch den Gewinn des Verletzers nachweisen, kann das Gericht einen Schadensersatz bis zu 500.000 RMB zusprechen. Auch ist jetzt klargestellt, dass der Verletzer die Kosten, die dem Markeninhaber durch die Verfolgung der Verletzung entstanden sind, in vernünftigem Umfang zu ersetzen hat. Die Gerichte können einstweilige Verfügungen zur Vermögens- und Beweissicherung erlassen. Entscheidungen über entsprechende Anträge sind innerhalb von 48 Stunden zu fällen. Bei Geltendmachung von Schadensersatzansprüchen gegen Verkäufer von gefälschten Markenwaren muss nunmehr der Verkäufer beweisen, dass er die Markenware rechtlich einwandfrei erworben hat und die Lieferanten benennen.

3. Unlauterer Wettbewerb

Liegen keine eingetragenen Schutzrechte vor, ist der Schutz von Technologie, Geschäftsgeheimnissen etc. deutlich schwieriger. Aber auch das chinesische Recht kennt ein Gesetz, das unlautere Wettbewerbshandlungen ahndet. Unlauterer Wettbewerb im Sinne des chinesischen Gesetzes über den unlauteren Wettbewerb (UWG) sind Handlungen, mit denen Gewerbetreibende in Verletzung des Gesetzes die Rechte und Interessen anderer Gewerbetreibender schädigen und die sozioökonomische Ordnung stören. Im Einzelnen sind dies:

- die Nachahmung eingetragener Marken anderer die Irreführung über die betriebliche Herkunft durch Nachahmung der Bezeichnung, Verpackung oder Ausstattung einer bekannten Ware anderer
- die Irreführung über die betriebliche Herkunft durch Nachahmung der Firmierung oder des Namens anderer Missbrauch von Monopolen durch öffentliche Unternehmen oder andere Gewerbetreibende mit Monopolstellung
- Handel von Waren durch Bestechung oder rechtswidrige Zahlung von Provisionen oder durch rechtswidrige Gewährung von Rabatten
- Irreführende Werbung
- Verletzung von Geschäftsgeheimnissen
- Verkäufe, die mit rechtswidrigen Prämien oder Verlosungen verbunden sind
- Beeinträchtigung des Ansehens des Mitbewerbers oder Schädigung des Rufs der Waren des Mitbewerbers durch Verleumdung
- Zusammenarbeit mit Mitbewerbern auf Ausschreibungen, um die Ausschreibungspreise zu manipulieren oder um Mitbewerber von einem gerechten

- Wettbewerb zu verdrängen.

Die Verfolgung von Nachbau nur auf der Basis des UWG, also ohne gewerbliche Schutzrechte geltend machen zu können, ist in China wenig aussichtsreich. Ist eine Schutzrechtseintragung nicht möglich, ist es besonders wichtig, im Vorfeld die vertraglichen und nicht-juristischen Möglichkeiten zu nutzen. So ist darauf zu achten, dass bei einer Kooperation mit einem chinesischen Vertragspartner der Know-how-Fluss durch vertragliche Regelungen (Lizenzvertrag4, Geheimhaltungsvereinbarung) geregelt ist. Es ist besonders darauf zu achten, das der Vertragspartner nur gezielt Know-how erhält und bewusst bestimmtes Know-how. nicht erhält. So sind vertrauliche Unterlagen auch immer deutlich als solche zu kennzeichnen. Auch sollte der chinesische Vertragspartner dazu verpflichtet sein, entsprechende Geheimhaltungsvereinbarungen mit seinen Arbeitnehmern zu schließen. Lässt man in China fertigen, sollte man nur Teile, nicht aber ganze Baugruppen fertigen lassen und sich die Montage selbst vorbehalten. Man sollte nach Möglichkeit Software und Prozess-Know-how nicht aus der Hand geben, da sich Nachbauer erfahrungsgemäß in diesen Bereichen schwerer tun.

3.1. Kennzeichenschutz

Das UWG ergänzt das Markenrecht. Die Schutzwirkung des Markenrechts erstreckt sich nicht auf Bezeichnung, Verpackung oder Ausstattung der Ware. Nach dem UWG dürfen Gewerbetreibende ihre Mitbewerber nicht schädigen, indem sie die charakteristische Bezeichnung, Verpackung oder Ausstattung einer bekannten Ware anderer benutzen, wenn dabei Verwechslungsgefahr besteht oder Kunden hinsichtlich der Warenherkunft irregeführt werden können.

4 vgl. Deutsch-Chinesischer Standardvertrag für Know-how- und Patentlizenzen, bfai 2003

Eine Ware kann als bekannt angesehen werden, wenn sie im Geschäftsverkehr eine bestimmte Bekanntheit genießt bzw. wenn sie dem einschlägigen Publikum bekannt ist. Unter spezieller Bezeichnung, Verpackung oder Ausstattung einer Ware werden solche Kennzeichnungen verstanden, die keine allgemeine Anwendung auf gleiche oder gleichartige Waren finden und die als solche Unterscheidungskraft besitzen.

3.2. Geschäftsgeheimnis

Geschäftsgeheimnisse im Sinne des UWG sind technische und geschäftliche Informationen, die der Allgemeinheit nicht zugänglich sind, ihrem Rechtsinhaber wirtschaftliche Vorteile bringen können und praktisch anwendbar sind. Verletzungshandlungen im Sinne des Gesetzes liegen vor bei:

- Erlangung von Geschäftsgeheimnissen durch Diebstahl, Gewährung materieller Vorteile, Drohung oder andere unlautere Mittel
- Offenbaren, Gebrauchen oder Weitergabe der durch die o.g. Mittel erlangten Geschäftsgeheimnisse zum Gebrauch an Dritte

- Offenbaren, Gebrauchen oder Weitergabe der erlangten Geschäftsgeheimnisse in Verletzung der Vereinbarung oder gegen den Willen des Rechtsinhabers zum Gebrauch an Dritte
- Offenbaren, Gebrauchen oder Weitergabe der erlangten Geschäftsgeheimnisse von Arbeitnehmern in Verletzung der Vereinbarung oder gegen den Willen des Arbeitgebers zum Gebrauch an Dritte.

Sofern ein Dritter, der von den Geschäftsgeheimnissen erfährt, weiß oder wissen muss, dass diese durch rechtswidrige Handlung erlangt wurden, wird er ebenfalls als Verletzer angesehen. Der Verletzer kann gerichtlich oder verwaltungsrechtlich verfolgt werden. Ein Verwaltungsverfahren kann von Amts wegen oder auf Antrag eingeleitet werden. Die Verwaltungsbehörde kann von dem Schädiger Unterlassung des wettbewerbswidrigen Verhaltens und die Beseitigung der Auswirkungen verlangen, eine Geldbuße verhängen, die Geschäftslizenz widerrufen oder die Beschlagnahme rechtswidriger Gewinne anordnen. Auf Antrag des Geschädigten kann sie den Schädiger auch zur Zahlung von Schadensersatz veranlassen.

4. Strategische Möglichkeiten - praktische Tipps

Warten Sie nicht, bis das Kind in den Brunnen gefallen ist, reagieren Sie nicht nur, agieren Sie rechtzeitig. Ein sehr wichtiger Schritt dazu ist die Eintragung gewerblicher Schutzrechte. Dies ist gerade in China am effektivsten. Nutzen Sie aber nicht nur die rechtlichen, sondern auch technische und strategische Möglichkeiten:

Wo es geht, sollten Sie an Ihren Produkten beispielsweise Sicherheitslabels/ Anti-fake-Aufkleber anbringen. Wichtig ist es auch, das eigene Vertriebspersonal (Händler) zu schulen und um Meldung entdeckter Fälschungen zu bitten. Daneben empfiehlt es sich, guten Kontakt zu den zuständigen Verfolgungsbehörden zu halten. Es gibt in China zwei Zusammenschlüsse der Wirtschaft, die es sich zur Aufgabe gemacht haben, die Produkt- und Markenpiraterie zu bekämpfen: Die CACC, China Anti-Counterfeiting Coalition, Gründung 1998 und den QBPC, Quality Brands Protection Committee, Gründung 2000. Kommt eine Mitgliedschaft in Frage? Beide Organisationen betreiben Lobbyarbeit, indem sie die Gesetzgebung unterstützen, zu Reformen zur Erreichung internationaler Standards anregen, Regierungsmitglieder von der Bedeutung des Themas überzeugen und Aufklärungsarbeit bei Verbrauchern und den Zollbehörden betreiben. Bei Messeteilnahme in China sollte das Standpersonal Ihrer Firma sensibilisiert sein und in der Lage sein, Fälschungsfälle zu melden und entsprechend zu reagieren. Dazu muss sich die Standleitung mit den vorhandenen eingetragenen Schutzrechten der eigenen Produkte vertraut gemacht haben. Hilfreich ist es, vor Ort im Verletzungsfall über Material zu verfügen, das die eigene Schutzrechtssituation belegt (Mappe mit Auszug aus dem Markenregister oder Abschrift aus der Patentrolle).Da schnelles Vorgehen unerlässlich ist, sollten zur Beschleunigung des Verfahrens einiges beachtet werden:

Benachrichtigen Sie möglichst frühzeitig, d.h. schon vor der Messe Ihren Rechtsanwalt. Nehmen Sie eine notarielle, legalisierte Vollmacht für den Rechtsanwalt mit, die auch in die chinesische Sprache übersetzt ist. Ihr Rechtsanwalt wird ein chinesisch-sprachiges Dokument vorbereiten, dass einen Antrag auf sofortige Beschlagnahme enthält. Auf

chinesischen Messen ist die Administration for Industry and Commerce (AIC), welche die behördlichen Maßnahmen ergreift, in aller Regel mit einem Stand/Büro vertreten. Informieren Sie sich frühzeitig, wo sich dieser Stand befindet. Die Behörde ist nach unseren Erfahrungen in der Regel kooperationsbereit. Versuchen Sie Beweise zu sichern, z.B. indem Sie digitale Fotos (Entwicklung entfällt) von dem Markenverletzenden Produkt aufnehmen (nicht immer möglich, den Versuch ist es aber wert), die Sie der AIC unter Nennung der Standnummer des potentiellen Verletzers vorlegen können. Bedenken Sie, dass die Beweissituation bei Patentverletzungen oft schwieriger ist als bei Markenverletzungen. Die Patentbehörden, die in der Regel auf Messen nicht vertreten sind, müssen eingeschaltet werden. Manch eine Patentverletzung lässt sich während einer Messe kaum beweisen.

5. Checkliste

Mit freundlicher Genehmigung von Herrn Rechtsanwalt Elliot Papageorgiou, rouse & co. international, London5.

5.1. Reaktive Maßnahmen

5.1.1. Kennen Sie Ihr Problem?

Ø Umfang des Fälschungsproblems – wichtig, um die Proportion zu dem Investitionsbudget zu wahren

Ø Herstellungsort der Nachahmungen

Ø Bestimmungsort der gefälschten Artikel

Ø Wie entdecke ich die Nachahmungen?

5.1.2. Investieren Sie in Nachforschungen

Ø Anfängliche Analyse und kontinuierliche Überprüfung

5.1.3. Kennen Sie Ihre Rechte? Schließen Sie die Defizite

Ø Seien Sie vorsichtig, Ihre globale Strategie schablonenhaft auf Länder wie China anzuwenden

5.1.4. Kennen Sie die Möglichkeiten der Rechtsdurchsetzung?

Ø Einstweiliger Rechtsschutz, zivil- und strafrechtliche Maßnahmen

Ø Behördliche Maßnahmen – sehr wichtig in China! (über 91% aller Fälle)

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5.1.5. Durchsetzung von Rechten ohne Einschaltung der Gerichte – denken Sie unorthodox:

Ø Gesetzliche Regelungen außerhalb des Gewerblichen Rechtsschutzes:

- Gesundheits- und Sicherheitsvorschriften

- Regelungen für bestimmte Industriebranchen

- Zoll

5.1.6. Warnung vor örtlichen Einflüssen

Ø Strategische Wahl des „Schlachtfeldes“

5.1.7. Denken Sie global

Denken Sie: Herstellungsland, Transitland, Verbraucherland – schlagen Sie dort zu, wo es am effektivsten und gewinnbringendsten für Sie ist

5Adresse vgl. unter 6.1

5.2. Proaktive Maßnahmen

5.2.1. Aus- bzw. Fortbildung

Ø Verwaltungsbehörden

Ø Zollbehörden

5.2.2. Etablieren Sie ein Frühwarnsystem

Ø Definieren Sie die Hauptzentren der Fälschungen

Ø Etablieren von Standards für Berichtssystem

Ø Beobachtung der Schlüsselmärkte

5.2.3. Bestmögliche Nutzung der Zollverwaltung:

Ø Bessere Möglichkeiten der Anmeldung/Registrierung

Ø Sorgen Sie für ein Maximum an Information und deren kontinuierliches Update

Ø Stellen Sie sicher, dass Sie örtliche/vor Ort Unterstützung für den Zoll zur Verfügung haben

5.2.4. Überprüfen Sie die Praktiken Ihres eigenen Unternehmens

Ø Sicherheitslabels / Identifikationstechnologie

Ø Lizenzvereinbarungen mit Lieferanten (“unauthorisierte Ware”) – Eigentum an Werkzeugen und Formen; Zulieferer und Komponentenhersteller

5.2.5. Zeitgerechte Unterstützung

Ø Verfügbarkeit von Beweisen und Informationen, Aktualität

5.2.6. Fokus und Budget

Ø Setzen Sie Prioritäten

Ø Teilen Sie Informationen mit anderen

Ø Schließen Sie sich zusammen (Koalitionen)

Ø Informieren Sie Ihre externen Berater über das vorhandene Budget und wählen Sie die bestmöglichen Maßnahmen auf Basis der vorhandenenfinanziellen Mittel

5.3. Rechtsdurchsetzungsmöglichkeiten

Berücksichtigen Sie:

Ø Ob es sich um eine Marken-, Designverletzung oder unlauteren Wettbewerb handelt

Ø Den konkreten Umfang der Rechtsverletzung – die strategische Durchsetzung

Ø Was sind die zur Verfügung stehenden Mittel?

Ø Gesetzeslage ./. Realität

Ø Zunehmende Handelsvolumina

Ø WTO-konforme Gesetzgebung

Verwaltungsbehörden:
Ø Administration for Industry and Commerce (AIC) – für Marken und unlauteren Wettbewerb

Ø Technology Supervision Bureau (TSB) - Fälschungen, Etikettierung, Produktqualität

Ø National Copyright Administration – für Urheberrechtsverletzungen

Ø Patent Administration Authority (PAA) – für Patente, Gebrauchs- und Geschmacksmuster Strafbehörden:

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Public Security Bureau (Polizei) – zuständig für die Verfolgung strafbewehrter Verletzungen geistigen Eigentums

- Gerichtliche Verfolgung
- Strafmaß: Freiheitsstrafe bis zu 7 Jahren oder Geldstrafe
- Es gibt nur wenige Fälle, da die Behörden selten gewillt sind, strafrechtlich gegen IP-Verletzungen vorzugehen (Haltung ändert sich jedoch)
- Zoll

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Literaturhinweise

Wirksame Bekämpfung von Marken- und Produktpiraterie - Ein praktischer Leitfaden für die europäische Investitionsgüterindunstrie ORGALIME, Oktober 2001 erhältlich in deutscher, englischer oder französischer Sprache kostenloser Download unter www.vdma.org (Mitgliederzugang) unter der Rubrik Recht und Steuern/Recht/Auslandsrecht European Union Chamber of Commerce in China Intellectual Property Rights Working Group Position Paper 2002 – 2003 Glatter, Verstärkter Schutz - Neu gefasstes Markenrecht bietet bessere Grundlage für den Kampf gegen Produktpiraterie, ASIA Bridge 8/2002. S. 27 Koppitz, Weiter verbesserter Markenschutz in China? China Nachrichten 3/02, S. 12 Chem, New and Improved Patent Law, China Law & Practice, July/August 2001 Wang/Cai, New Changes to Copyright Protection in China, China Law & Practice,December 2001/January 2002 Baker & McKenzie, Intellectual Property Guide People's Republic of China, 2002 Harnischfeger-Ksoll/Ranft, Handbuch Wirtschaft und Recht in Asien, Länderteil China Keßler/Qiao, Aktuelle Entwicklungen im Patent- und Markenrecht der Volksrepublik China, RIW 2003, S. 174 VR China - Deutsch-chinesischer Standardvertrag für Know-how- und Patentlizenzen, Text und Kommentierung, Bundesagentur für Außenwirtschaft bfai, Agrippastr. 87-93, 50676 Köln VDMA Abteilung Recht, focus Recht: Nachbau in der Investitionsgüterindustrie Frankfurt am Main, Juni 2003 HV 685-9mmChin1.doc/HV_Schutz_Markenpiraterie_China.pdf

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11.6 China Compulsory Certification

Nachfolgend informiert die Abteilung Außenwirtschaft über die obige Zertifizierung:

Zum 01.05.2002 verkündete die (neu gegründete) State General Administration for Quality Supervision, Inspection and Quarantine of the PRC (AQSIQ) und die Certification and Accreditation Administration of the PRC (CNCA), dass zum 01.05.2003 die oben genannte neue Zertifizierung CCC in China verpflichtend in Kraft treten wird. Ende April 2003 wurde die Einführung wegen SARS auf den 01. August 2003 verschoben. Nach Aussage der CNCA soll das China Compulsory Certification Siegel (CCC) die Gleichbehandlung in- und ausländischer Produkte gewährleisten. Es ersetzt die bisher geltenden Zeichen CCEE (Great Wall) für inländische Produkte sowie CCIB (Zeichen des China Import & Export Commodity Inspection Bureau) für Importprodukte. Die bisherigen Siegel behielten in der Übergangszeit bis zum 30. Juli 2003 ihre Gültigkeit. Seitdem erfolgt die obligatorische Zulassung unter dem neuen System.

Als durchführende Behörde wurde von der CNCA das China Quality Certification Center (CQC, www.cqc.com.cn) autorisiert. Dieses hat wiederum in China über 60 Labors mit den Produktprüfungen beauftragt. Bisher wurde noch keine ausländische Firma (im Gegensatz zur Druckkessel-Zertifizierung) akkreditiert, im jeweiligen Land die CCC-Zertifizierung durchführen zu dürfen. Zu der Zertifizierung gehört ebenfalls ein Auditing, das von chinesischen Prüfern in der jeweiligen Herstellerfirma nach Überprüfung der Unterlagen und den notwendigen Produkttests durchgeführt wird.

Seit dem 01.08.2003 ist es nach heutigem Sachstand nicht mehr möglich, Produkte aus dem CCC-Katalog ohne CCC-Zertifizierung nach China zu exportieren bzw. diese in China in Verkehr zu bringen.

Die Hersteller von Maschinen und Anlagen finden in der Regel ihre (Gesamt-)Produkte nicht in dem Produktkatalog zur CCC-Zertifizierung. Allerdings haben die chinesischen Behörden z. B. Produkte aus dem „low voltage“ - Bereich (Schalter, Sensoren etc.) sowie Elektromotoren neu aufgelistet. Diese Komponenten finden sich natürlich in Maschinen, Anlagen bzw. Aggregaten. Somit ist der Großteil der Mitgliedsfirmen indirekt betroffen. Daher hatte der VDMA seine Mitgliedsunternehmen gebeten, möglichst rasch mit ihren Lieferanten aus den betroffenen Bereichen Rücksprache zu nehmen, damit unter anderem das Ersatzteilgeschäft keinen Schaden nimmt.

Der VDMA hat auf die offenen Punkte zur China Compulsory Certification schon im späten Frühjahr 2002 und bei vielen nachfolgenden Gelegenheiten (z.B. zur Kanzlerreise Ende Dezember 2002 und der „Joint EU-China WTO-conference on CCC“ im September 2003 in Beijing) hingewiesen bzw. in die Agenda der Wirtschaftsgespräche eingebracht. Darüber hinaus wurden sämtliche wichtige Stellen (BMWA, EU-Kommission in Brüssel und Beijing, Deutsche Botschaft Beijing etc.) mehrmals informiert. Auch in direkten Gesprächen mit der zuständigen Behörde auf ministerialer Ebene (AQSIQ) wurden Gespräche geführt (letztmalig November 2003) und um Antwort insbesondere auf praktische Fragen zur Durchführung gebeten.

Neben den relevanten Unterlagen (Produktkatalog, Durchführungsbestimmungen, Erlass zum Thema Ausnahmeregelung inkl. Kommentierung durch den VDMA etc.) verfügt der VDMA auch über eine Übersetzung der relevanten Zolltarifnummern in englischer Sprache. Mit dieser Unterlage können sich die Mitgliedsunternehmen anhand der genannten Zolltarifnummern informieren, ob Ihre Produkte gelistet sind bzw. in welchem Maße Ihre Firma z.B. im Zulieferbereich indirekt betroffen ist. Bitte beachten Sie, dass die chinesischen Zolltarifnummern in der Regel in der 7. und 8. Stelle von den von Ihnen verwendeten statistischen Warennummern der EG abweichen.

Die Abteilung Außenwirtschaft verweist ebenfalls auf die Original-Liste (aufbereitet als verwendbare pdf-Datei, verwendbar auch ohne Leseprogramm für chinesische Zeichen), die von der CNCA in chinesischer Sprache veröffentlicht wurde. Hier können Sie sich nochmals anhand der Zolltarifnummern orientieren bzw. diese Unterlage an z.B. Ihren Vertreter/Repräsentanten/Tochterfirma zur Überprüfung weiterleiten. Zu dieser Liste gelangt man auch unter: www.cnca.gov.cn/board/bianmabiao.htm.

Darüber hinaus möchten wir Ihnen noch die Internet-Adresse mitteilen, unter der Sie als Betroffene die sogenannten "Implementation Rules" für die jeweiligen zu zertifizierenden Warengruppen aufrufen können: www.cnca.gov.cn/download/english.html.

Des weiteren hat die Abteilung Außenwirtschaft zu diesem Thema einen E-mail Verteiler angelegt, damit die Mitgliedsfirmen neue Informationen zeitnah erhalten können.

Alle Unterlagen sind in Abteilung Außenwirtschaft in elektronischer Form erhältlich.

Ansprechpartner in der Abteilung Außenwirtschaft:

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und

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11.7 Machine tool Questionnaire

MACHINE TOOLS

Company Name: _____

Number of Staff (Total): ☐

Number of Staff in: Manufacturing: ☐ R&D: ☐
Engineering: ☐ Sales: ☐

Total turnover (USD) :
2002 ☐
2003 ☐
2004 ☐ expectation

Sales in China (USD): ☐
Sales in Export (USD): ☐

Destinations: _____

	Number	Value
Total number and value of machine tools sold:	☐	☐
Total number and value of **standard/universal** machine tools sold:	☐	☐
Total number and value of **special purpose/customized** machine tools sold:	☐	☐

Industries to which the products are sold:

Automotive/Automotive components ☐
Engineering/General Machinery ☐ (incl. machine sector itself, stamping tools/mould making)
Metal working - ferrous/none-ferrous/sheet metal ☐ (incl. construction, body in white, metal parts - pressed, punched, tubes/profiles)

Electrotechnic application/electronics ☐
Shipbuilding ☐
Aerospace ☐

Kind of produced machine tools

Metal Cutting Machine Tools
- machining centres ☐
- transfer lines, special purpose machines ☐
- drilling and boring machines ☐
- lathes ☐
- milling machines ☐
- grinding machines ☐
- gear cutting machines ☐
- other .....

Metal Forming Machine Tools
- forging machnies ☐
- sheet metal working machines (including laser technology) ☐
- presses ☐
- other .....

Cooperation Agreement with Chinese partner (name and scope of agreement):

_____

_____

_____

Cooperation Agreement with Foreign partner (name and scope of agreement):

_____

_____

_____

Existing licence agreements (company, scope, duration)

_____

_____

_____

Individually: ***please fill in for each kind of machine tools being part of your product line:***

machining centre, transferline, special purpose machine, drilling and boring machine, lathe, milling machine, grinding machine, gear cutting machines

forging machines, hammers, sheet metal working machines (including laser technology), presses

Export
by Countries _____ ☐

	from	up to	
Spindle speed:			(referring to type/model)
Torque			(referring to type/model)
Number of axis (simultaneous controllable):			(referring to type/model)
Positioning accuracy:			(referring to type/model)
Repositioning accuracy			(referring to type/model)

Engineering done in-house? ☐
Engineering in cooperation with Chinese firm (name): ☐

Engineering done in cooperation with Foreign firm (name): ☐

Research & Development done in-house? ☐
R&D done in cooperation with Chinese Research Institute (name): ☐

R&D done in cooperation with Foreign Institute (name): ☐

After sales service done in-house? ☐
After sales service done by partners, agents (name) ☐

CNC-controll/-software: ☐

Capability of software (5- or more axis control): ☐

Customisation of software/programming done in-house: ☐
Customisation/programming done by external partner (name): ☐

Successor model planned? What improvements? When will it be ready?

In your own opinion, which of the models presently in production, has reached World-class level?

Chapter 11: APPENDIX A

11.8 Precision tools questionnaire

PRECISION TOOLS (1)

Company Name: _____

Number of Staff (Total):

Number of Staff in: **Manufacturing:** **R&D:** **Others:**
Engineering: **Sales:**

Total turnover (USD): 2002 2003 2004

	Global SALES 2003 HSS (High Speed Steel)		**Global SALES 2003 Cemented Carbide or other hard materials**	
	Quantity	Value (USD)	Quantity	Value (USD)
Drills (Bohrer)				
Taps (Gewindehohrer)				
Reamers (Reibwerkzeuge)				
Milling cutters and end mills (Fraser)				
Turning Tools (Drehwerkzeuge)				
Indexable Inserts (Wendeschneidplatten)				
Metal Cutting Tools, Total (Zerspanungswerkzeuge, gesamt)				

	Global SALES 2003	
	Quantity	Value (USD)
Work and Tool Holders (Spannzeuge)		
Length measuring instruments and machines (Messmaschinen, Lange)		
Manual length measuring instruments (Handmessmittel, Lange)		

	EXPORTS 2003 HSS (High Speed Steel)		**EXPORTS 2003 Cemented Carbide or othe hard materials**	
	Value (USD)	Main Countries	Value (USD)	Main Countries
Drills (Bohrer)				
Taps (Gewindehohrer)				
Reamers (Reibwerkzeuge)				
Milling cutters and end mills (Fraser)				
Turning Tools (Drehwerkzeuge)				
Indexable Inserts (Wendeschneidplatten)				
Metal Cutting Tools, Total (Zerspanungswerkzeuge, gesamt)				

	EXPORTS 2003	
	Value (USD)	Main Countries
Work and Tool Holders (Spannzeuge)		
Length measuring instruments and machines (Messmaschinen, Lange)		
Manual length measuring instruments (Handmessmittel, Lange)		

Industries to which the products are sold: Yes / No

Automotive:
Electric/Electronics:
Machinery:
Metal Working
Ship
Areospace

Cooperation Agreement with **Chinese partner** (name and scope of agreement):

_____

_____

_____

Cooperation Agreement with **Foreign partner** (name and scope):

_____

_____

_____

Existing licence agreements (company, scope, duration):

_____

PRECISION TOOLS (2)

Production of High Speed Cutting (HSC) Tools (Percentage of total)	Yes / No
Production of Cutting Tools for "dry machining" (dry machining = Trockenbearbeitung bzw. Minimalmengenschmierung) (Percentage of total)	Yes / No
Engineering **done in-house**? Engineering in **cooperation with Chinese** firm (name):	
Engineering done in cooperation with Foreign firm (name):	
Research & Development done in-house? R&D done in cooperation with **Chinese Research Institute** (name):	
R&D done in **cooperation with Foreign Institute** (name):	
After sales service done in-house? **After sales service** done by partners, agents? (name)	
Simultaneous engineering done in house? **Simultaneous engineering** done by partners, agents? (name)	
Resharpening of cutting tools done in house? **Resharpening of cutting tools** done by partners, agents (name)	
Determine the right tool for a specific application done in house **Determine the right tool for a specific application** done by partners, agents (name)	
Tool management done in house **Tool management** done by partners, agents (name)	

Other services:

Application support provided by in-house specialists: **Customisation/programming** done by external partner (name):	

New precision tools in planning stage? What improvements, what specs?

When will the new product come to market?

In your own opinion, which of the precision tools presently in production, has reached World-class level?

TU Darmstadt

Mr. Alexander Bitzer
Mr. Wu Sun

VDMA

Mr. Oliver Wack

Droege & Comp. Asia

Beijing

Mr. Larry Wang
Mr. Juey Tan

Shanghai

Mr. Jason Chang
Mr. Guido Koch

Singapore

Ms. Florentine Ketteler

Mr. Nico Baumgarten