

INDIAN MACHINE TOOLS INDUSTRY

BACKGROUND & HISTORICAL TRENDS

The Machine Tools industry in India dates back to the Second World War. Due to non-availability of imported machine tools, a few British owned general engineering firms took up their manufacture in India. This was followed by the start of industrialization in a series of five-year plans. The process of planning in the economy resulted in a second phase of machine tools manufacturing with public sector investment in machine tools (HMT Ltd. 1953). These two initial phases of development of the Indian machine tools industry saw the production of general purpose machine tools most of which were produced under technical assistance from foreign Collaborators (Oerlikon, Louden, Ward, Herbert, Jones & Shipman, etc.).

The 1960s marked the third phase of the machine tools industry. During this phase, the range of products witnessed rapid growth and various types of machine tools including SPMs were manufactured. (Multi spindle Automats, Gear Cutting Machines, SPMs, Broaching Machines, Presses, etc.).

The Fourth Phase began in the mid 1980s which saw the entry of Japanese machine tools makers in the Indian market through licensing arrangements (Mori-Seiki, Mitsubishi, Hitachi-seiki, NachiFuji-Koshi, Murata, etc.). At this point of time, the Indian machine tools industry had the following characteristics :

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| ➤ Blanket Import Substitution (“Self Sufficiency”) | The policy regime compelled broad range import substitution regardless of costs |
| ➤ Encourage Transfer of Product Technology | Firms were in a hurry to replace imported machine tools and imported technology regardless of market size. The technology of simpler machines were copied by the smaller domestic firms. |
| ➤ Over Diversification | As a result, the industry produced a broad range of machine tools on a small scale |
| ➤ Market Structure | A small number of bigger firms imported technology employed for design and production; excessive in-house production, poor subcontracting, poor domestic transfer of technology. |
| ➤ Limited use of Engineering Talent | Indian engineers were acknowledged to be good, but were mostly used for |

import substitution and product development, not to build overall competitiveness

➤ Internationally Uncompetitive

Poor domestic technology development and transfer meant good machines built at a high cost and poor quality machines, built at a low cost. Neither were exportable to the discerning, competitive markets of the West.

Several of these characteristics continue to affect the industry even today.

The fifth and current phase began in the early nineties after the liberalization of the Indian economy. With market share of the bigger companies expanding and the public sector giants shrinking and those of the smaller companies rising, in-house design capability, entrepreneurial spirit, greater technology friendliness, operational flexibility and lean management, combined to give a greater competitive edge to the smaller companies set up by technocrats, resulting in a significant shift in machine tools production to these medium sized companies. However, these companies produce sophisticated machines and machines of higher capacity either singly, or in small numbers.

International Trends

Given the buoyant trends in calendar year 2004, the previous worldwide slump in the global machine tools industry appeared to be a thing of a past. The top 31 machine tools manufacturing countries recorded a turnover of US\$ 45.3 billion in 2004 – representing a promising 23 percent growth by value over the previous year.

Predictably, some rebounds were more resilient than others, resulting in few surprises. While Japan increased its lead over Germany, Taiwan edged past the United States to be among the top five machine tools manufacturing countries. Italy and China remained in the second and third slot in the last calendar year.

Japan expanded its margin yet again to become the undisputed leader in the global machine tools industry. Given the swelling backlog orders for its metal-cutting machine tools, the Japanese machine tools industry is expected to retain its leadership position. Germany likewise gained a respectable eight per cent output, while Italy grew by a marginal two percent in 2004.

At the same time Taiwan decisively came out of a slump with a one-third gain in output, China witnessed a robust 34 percent boost in its output. In growth terms, India was also not far behind.

The Asian manufacturers inched their way up to a 42 percent share in the total turnover, while the Europeans, led with a 45 percent share. However, this is still three percent lower than 2003.

The surge in global machine tools exports could not have been more pronounced than in 2004, with only two countries recording a decline among 31 nations.

Germany followed by Japan, led in the area of exports, shipping more than US\$ 5 billion worth of machine tools to other countries. This was followed by Italy, Taiwan and Switzerland in the range of US\$ 2.0 to 2.3 billion worth of exports. The United States and Korea came next.

Swiss machine tools manufacturers lived up to their reputation as the most export-oriented suppliers as their industry export ratio again exceeded 85 percent.

On the import side, China led with US\$ 5.8 billion worth of machine tools imports in 2004, representing a huge 40 percent growth over the previous year. While the United States was in the second place, Taiwan took the third place and more than doubled their imports during the last calendar year.

Thailand is among the top ten importing countries in 2004. Thailand imports 100 percent of its requirement of machine tools because of its negligible manufacturing of machine tools.

China held the record of having the largest deficit in the machine tools trade, which increased to US\$ 5.3 billion. Over one-fifth of machine tools consumed worldwide were in China, with consumption worth US\$ 9.3 billion.

Taiwan also witnessed doubling of its consumption, and moved up to the seventh place among the top ten. In between were Japan, Germany, the United States, Italy and South Korea. Japan's one-third-again increase in consumption and the United States one-quarter-again boost has been keeping machine tools production lines busy.

Taiwan led in per capita consumption, spending US\$ 111 for new machine tools for every person. Switzerland which had been leading on this front over the past several years, came second with per capita consumption of US\$ 101.

Rank	Country	Global Machine Tools Production						Change in US Dollars
		2004 (Value in US \$ million)			2003 (Value in US \$ million)			
		Total	Cutting	Forming	Total	Cutting	Forming	
<u>Forming</u>								
1.	Japan	10,521.0	88 %	12 %	7,885.9	87 %	13 %	33 %
2.	Germany	9,216.2	73 %	28 %	7,737.7	73 %	27 %	19 %
3.	Italy	4,639.2	55 %	45 %	4,154.1	55 %	45 %	12 %
4.	People's Republic of China	4,000.0	77 %	23 %	2,980	77 %	23 %	34 %
5.	Taiwan (ROC)	2,892.2	75 %	25 %	2,110.8	73 %	27 %	37 %
6.	United States	2,814.2	80 %	20 %	2,274.0	77 %	23 %	24 %
7.	Switzerland	2,360.0	85 %	15 %	1,879.4	85 %	15 %	26 %

FINAL REPORT ON THE INDIAN CAPITAL GOODS INDUSTRY

8.	Republic of Korea	2,298.9	66 %	34 %	2,087.7	63 %	37 %	10 %
9.	Spain	1,023.5	65 %	35 %	926.1	65 %	35 %	11 %
10.	United Kingdom	877.2	81 %	19 %	664.2	81 %	19 %	32 %
11.	France	766.4	70 %	30 %	733.0	69 %	31 %	5 %
12.	Canada	742.2	60 %	40 %	689.6	60 %	40 %	8 %
13.	Brazil	463.8	81 %	19 %	371.4	81 %	19 %	25 %
14.	Turkey	322.9	31 %	69 %	248.2	31 %	69 %	30 %
15.	Czech Republic	278.1	94 %	6 %	220.4	94 %	6 %	26 %
16.	Austria	254.6	60 %	40 %	220.2	60 %	40 %	16 %
17.	Sweden	254.6	40 %	60 %	219.1	40 %	60 %	16 %
18.	The Netherlands	254.6	20 %	80 %	228.1	20 %	80 %	12 %
19.	India	220.6	87 %	13 %	145.3	87 %	13 %	52 %
20.	Finland	198.7	12 %	88 %	169.4	12 %	88 %	17 %
21.	Belgium	193.8	10 %	90 %	186.4	10 %	90 %	4 %
22.	Russia	161.4	77 %	23 %	156.4	77 %	23 %	3 %
23.	Australia	136.0	71 %	29 %	128.2	72 %	28 %	6 %
24.	Thailand	121.9	80 %	20 %	118.1	80 %	20 %	3 %
25.	Denmark	84.5	40 %	60 %	72.3	40 %	60 %	17 %
26.	Croatia	67.0	100 %	0 %	63.0	100 %	0 %	6 %
27.	Romania	59.3	56 %	44 %	53.1	59 %	41 %	12 %
28.	Portugal	42.2	10 %	90 %	37.3	10 %	90 %	13 %
29.	Argentina	15.2	69 %	30 %	14.5	68 %	32 %	5 %
30.	Hungary	9.9	65 %	36 %	9.0	65 %	35 %	11 %
31.	South Africa	5.3	29 %	71 %	4.5	29 %	71 %	17 %
Total		45,295.6			36,787.4			23 %

Region-wise

West Europe (CECIMO)	20,766.7	17,758.9	17 %
Asia (including Australia)	20,190.6	15,456.0	31 %
America	4,035.4	3,349.5	20 %

Credit & Source : Gardner Publications, Inc.

Global Machine Tools Consumption

Rank	Country	2004	2003	Change in	Per Capita	
Consumption		(Value in US \$million)			US Dollars	
Consumption/Cap				US \$ / capita		Rank
1.	People's Republic of China	9,260.0	6,760.0	37 %	7.13	24
2.	Japan	5,923.8	4,118.7	44 %	46.52	7
3.	Germany	5,353.4	4,646.5	15 %	64.95	3

4.	United States	4,932.1	3,907.9	26 %	16.83	16
5.	Italy	3,316.4	3,116.1	6 %	57.12	5
6.	Republic of Korea	2,928.9	2,839.8	3 %	60.27	4
7.	Taiwan (ROC)	2,530.7	1,297.0	95 %	111.24	1
8.	France	1,203.6	1,045.9	15 %	19.92	15
9.	Canada	1,124.1	1,046.5	7 %	34.58	9
10.	Spain	1,022.2	882.1	16 %	25.38	13
11.	United Kingdom	862.6	644.5	34 %	14.31	18
12.	Thailand	812.9	787.6	3 %	12.53	20
13.	Switzerland	757.7	611.0	24 %	101.69	2
14.	Brazil	694.8	581.4	19 %	3.77	26
15.	Turkey	639.7	525.9	22 %	9.28	23
16.	India	474.2	280.2	69 %	0.45	31
17.	Czech Republic	444.0	346.4	28 %	43.33	8
18.	Austria	383.8	272.7	41 %	46.95	6
19.	Russia	381.2	366.4	4 %	2.65	27
20.	Sweden	268.3	221.4	21 %	29.86	10
21.	The Netherlands	229.8	203.3	13 %	14.08	19
22.	Australia	220.0	208.7	5 %	11.05	21
23.	Belgium	170.2	195.4	-13 %	16.44	17
24.	Denmark	160.2	141.2	13 %	29.60	11
25.	Romania	154.6	136.6	13 %	6.92	25
26.	Finland	149.0	126.5	18 %	28.58	12
27.	Portugal	100.6	87.0	16 %	9.56	22
28.	Argentina	96.4	50.5	91 %	2.46	28
29.	Croatia	94.0	115.7	-19 %	20.90	14
30.	South Africa	82.1	70.0	17 %	1.92	29
31.	Hungary	8.9	8.1	11 %	0.89	30

Apparent Consumption = Country's Production *less* Exports *plus* Imports.

Credit & Source : Gardner Publications, Inc.

Current Status in India

The Indian machine tools industry manufactures almost the complete range of metal-cutting and metal-forming machine tools. Customised in nature, the products from the Indian basket comprise conventional machine tools as well as computer numerically controlled (CNC) machines. There are other variants offered by Indian manufacturers too, including special purpose machines, robotics, handling systems, and TPM-friendly machines.

Efforts within the industry are now underway to improve the features of CNC machines, and provide further value additions at lower costs, to meet specific requirements of users. In keeping with the current trends, and emerging demand, the CNC segment could be the driver of growth for the machine tools industry in India.

The slowdown in the Indian economy since mid 1999 had its impact on the prospects of Indian machine tools manufacturers. Output by domestic metalworking machine tools manufacturers in 2001 calendar year declined to the lowest of just Rs.5,175 million marking the fourth year of decline since 1997, for the Indian machine tools industry. Much of this fall was due to subdued investment in 2002 by all the major user segments of machine tools, except the defence industry, primarily because of a higher capital expenditure outlay. However, in the last two calendar years, output of the industry registered significant growth and the industry has achieved a high growth in the past two years.

While the decrease in domestic production was lower in the case of conventional metal-working machine tools, computer numerically controlled (CNC) machine tools manufacturers too suffered, although marginally. Lathes, machining centres, special purpose machines, and grinding machines were categories of machine tools that sustained much of the order inflow even during 2001 although these segments registered a decline, in comparison with the previous year.

An industry, which has undergone a radical paradigm shift in its thinking, the Indian machine tools industry is now recognized as a provider of low-cost high quality lean manufacturing solutions. The industry resiliently supports all its users to enhance productivity as well as improve competitiveness for the betterment of the final customer. It is a well known and often repeated fact that the machine tools industry forms the pillar for the competitiveness of the entire manufacturing sector since machine tools produce capital goods which in turn produce the manufactured goods.

Hence being an integral sector, growth of the machine tools industry has an immense bearing on the entire manufacturing industry which is crucial for the country's strategic requirement such as defence, railways, space, and atomic energy.

World over too, industrially developed countries have created market niches on the back of a well-developed and supportive machine tools sector.

In India, indigenous machine tools have the highest impact on capital output ratios. Machine tools consumption of Rs.2,500 crore truly supports the advancement of the country's engineering sector output which is estimated to be worth over Rs.1,50,000 crore.

In India there are about 450 manufacturers manufacturing complete machines, or their components. There are 150 units in the organized sector. Almost 73 percent of the total machine tools production in India is contributed by 10 major companies in this industry. The industry has an installed capacity of over Rs.10 billion and employs a workforce directly or indirectly totaling 65,000 skilled and unskilled persons.

The hub of manufacturing activities is concentrated in Mumbai and Pune in Maharashtra, Jalandhar and Ludhiana in Punjab, Ahmedabad, Baroda, Jamnagar,

and Rajkot in Gujarat, Coimbatore and Chennai in Tamil Nadu, Bangalore and Mysore in Karnataka, and some parts of eastern India.

All the global leaders namely Makino, DMG, Yamazaki, Haas, Trumpf, Daewoo, Agia Charmilles, Schuler etc. are present in India either through their marketing agents, technical centers, service centers or assembly centers.

There are a number of issues of critical importance to the industry. These are:

- The competitiveness and quality of machine tools manufacturers depend on the competitiveness and quality of its subcontractors
- Attracting and retaining talented manpower is an issue since the industry can grow only with knowledge accumulation
- High fragmentation is leading to low economies of scale
- Indian educational curriculum in the ITI's, or engineering colleges is not geared to impart the all round technical knowledge required by the engineers and operators in this sector. For example, a service engineer in the sector needs knowledge in hydraulics, mechanical, electronics and electrical.

The market share and total market size of the product range covered by the study as per CMIE data is given below. These include companies who manufacture components as well as complete equipment.

Major Products	Companies	Market Share (%)
Machine Tools	Total No. of companies : 210	
	Kennametal Widia India	6.00
	HMT Machine Tools	2.11
	Motor Industries Co.	1.41
	P M T Machine tools Automatics	1.22
	Kabra Extrusiontechnik	1.22
	Lakshmi Machine Works	1.20
	Sandvik Asia	1.13
	Forbes Gokak	0.69
	Wendt (India)	0.58
	I F B Industries	0.57
	Dagger-Forst Tools	0.55
	Premier Automobiles	0.51
	Akar Tools	0.48
	Electronica Machine Tools	0.47
Batliboi	0.44	
Saraswati Industrial Syndicate	0.41	
S R P Tools	0.36	
I T L Industries	0.29	
D G P Windsor India	0.24	

	Miven Machine Tools	0.23
	Guindy Machine Tools	0.23
	Birla Kennametal	0.19
	Ema India	0.18
	Bemco Hydraulics	0.16
	Methodex Systems	0.14
	Praga Tools	0.14
	Rajasthan Udyog & Tools	0.11
	Austin Engineering Co.	0.10
	Lakshmi Precisions Tools	0.10
	Ucal Machine Tools	0.09
	Total market size : Rs.5211.5 Cr.	

- Source: CMIE, Industry Market Size and Shares, February 2005
- Total Market Size of all the sectors comprises of Rs. 5212 crores

While the above market shares are indicative, the top players in the various product categories are as below:

CNC Lathes	Machining Centres	Presses	Grinding machines	SPM
ACE Designers	BFW	ISGEC	Parishudd Machines	Widia
LMW	ACE Manufacturing	Electro - pneumatics & Hydraulics Ltd.	Micromatic Grinding	BFW
HMT	HMT	Hindustan hydraulics	HMT	HMT
Jyoti	LMW	Bemco Hydraulics	PMT Machine Tools	MICO
Askar Microns	Jyoti			Lokesh Machines

Surface Grinders	Vertical Turning Boring	Bending Machine	Gear cutting
Praga Tools	HMT	Electro Pnuematics	Premier Automobiles Ltd.
Alex Machine Tools	Premier Automobiles Ltd.	Hindustan Hydraulics	HMT
HMT		ISGEC	

Structure of the Sector

The companies surveyed comprised of 43 percent private limited companies, 16 percent partnership firms, 10 percent proprietary firms, and 31 percent public limited and 10 percent closely held public limited companies. As is evident, the industry is highly segmented in terms of value and ownership pattern. This is mainly because of low technology barriers in some segments of the machine tools industry.

The turnover of 72 percent of the companies was below Rs.50 crores and hence we can derive that the majority of players in this sector are in the small and medium category. 52 percent of the total companies surveyed had a turnover less than Rs.10 crores. The percentage of companies in the SSI category is the highest in this sector OF the capital goods industry.

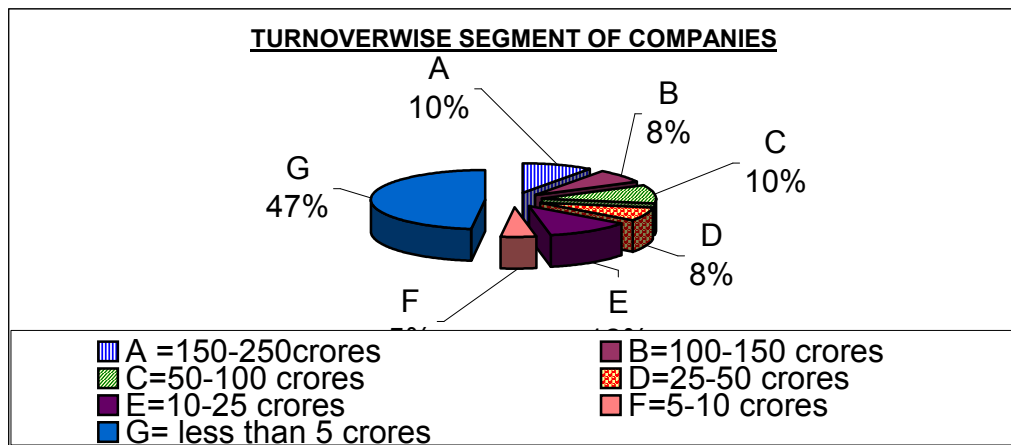


Chart 1

Hence the manufacturing competitiveness of the smaller companies and their subcontractors producing the components have a major bearing on the industry's quality and cost competitiveness.

This sector is dominated by companies who are owned either by entrepreneurs or individuals and it is evident that induction of professional managers at the top are low.

When the companies were asked about their opinion on the future structure of the sector, 19 percent of the companies had no opinion or vision about the future. 31 percent felt that there would be entry of either new players, or foreign players leading to fragmentation. However, 50 percent of the companies felt that the smaller companies will not be able to survive the onslaught of second hand machines being imported into India and the technological changes taking place i.e. from conventional to CNC and hence the market will witness consolidation in the future with the smaller ones unlikely to survive with their present level of competitiveness.

51 percent of the companies catered to the whole range of activities like design and engineering, manufacturing and installation. 7 percent of the companies are into marketing and servicing of domestic as well as imported machines.

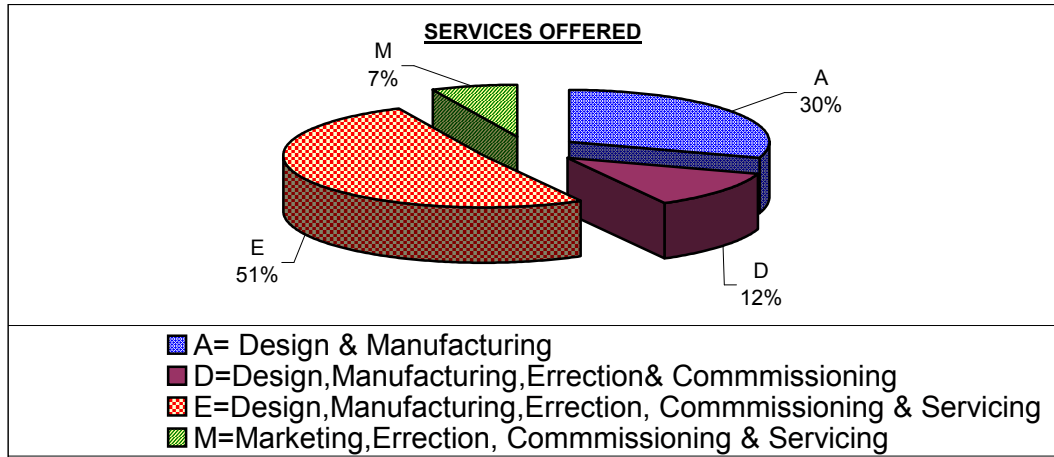


Chart 2

Technology

The machine tools industry can be divided into metal cutting and metal forming sectors. The metal cutting sector can be further classified into conventional and computer numerically controlled (CNC) machines, while the metal forming sector can be segregated into conventional and numerically controlled (NC) machines.

Some commonly used metal cutting machines include electrical discharge machining systems (EDMS), machining centers, lathes and automats, boring, milling, drilling, grinding, honing and polishing machines, total NC machines and so on. Metal forming machines include bending, folding, straightening, flattening machines, punching and/or shearing machines, die casting machines and others.

The NC machines developed in the 1950s and 1960s did not possess CPU's. The CNC machine tools are essentially NC machines with microprocessors as the CPU. The first American machine tools with a CNC system was developed in 1972 and the first Japanese machine tools with a CNC system was developed in 1976.

CNC systems made it possible for microprocessors and programmable logic controllers to work in parallel. This allowed simultaneous servo position and velocity control of several axes of a machine, monitoring of the controller and machine tools performance, and monitoring of the cutting process. For a basic three axes milling machine, with the CNC systems, there could be coordination of feeding velocity and position control of all the three axes. The spindle speed could also be controlled simultaneously. These features enhanced the versatility of a traditional milling machine. Moreover, by employing multiple CPU's, the versatility of the machine tools was increased manifold.

The users of machine tools felt the benefit of market fusion of several product functions. This enabled them to modify their manufacturing processes in order to become more productive. CNC machine tools enabled users to increase their productivity by eliminating the time lost in transferring the job from one machine to

another. These machines also help the users to frequently change the design of their products.

The Indian industry manufactured its early products through technical collaborations from world-renowned manufacturers. From the mid eighties onwards the industry has relied entirely on its own R&D efforts to develop and market a contemporary range of CNC machine tools. The present turnover of the industry is totally from products developed by the industry in the last decade.

A brief review of the technology status in the major product categories is detailed below:

CNC turning centers:

The Indian machine tools industry produces a range of turning centers in all sizes, from the small to the very large, and for special applications. However, the dominant market is for machines in the size range from 100 mm to 250 mm turning diameters. The Indian machine tools cover this range, but only in standard, basic designs. The current trend internationally is to have turn-mill and mill-turn machines, which are capable of performing more than just the turning operations on a component. Also, spindles with integrated motors and speeds of 6000 rpm and slide traverse rates of 60+ metres per minute (mpm) are common internationally, but these are yet to be offered from Indian machine manufacturers on a regular basis as standard products.

Indian machines are adequate to meet basic turning applications but have to be technologically developed further to come abreast with international standards of multi function CNC turning machines.

CNC machining centers:

As with CNC turning centers, the Indian machine tools industry produces a range of CNC machining centers covering small to very large sizes. These machines are technologically more complex than turning machines. Typically, a CNC machining center has 3 linear movements, one rotary movement, apart from features such as tool changers, pallet changers etc. Indian machine tools meet the basic requirement of machining center operations, and a number of models are produced with both horizontal and vertical spindle configurations. Machines with spindle speeds of upto 10000 rpm, traverse rates of upto 60 mpm are produced by the Indian industry.

The current trend in machining centers is to have additional axes of movements to take on complex machining requirements (sometimes as many as 6 or 7), high traverse rates of 100 to 120 mpm, spindle speeds of 10000 to 50000 rpm, some turning and even grinding capabilities on the machining center. Internationally, machining centers are mostly built with at least 5 axes. Modern machines incorporate linear motors for high traverse rates, and integral motor spindles are universally used. At the simpler end of the product spectrum, machines are

configured to occupy very small floor space suitable for line integration for mass production of auto components.

The Indian machines are yet to be developed to offer the higher capabilities, which are increasingly required by all industries in India. Against special requirements, very sophisticated machines have been built by the Indian machine tools industry, pointing to the fact that the basic capability to develop advanced technology machines is available with it.

CNC grinding machines:

Here again, the industry produces a range of machines in small to large sizes, but the more advanced technology features are not yet available on Indian machines except on special machines built to order for specific applications. The main emphasis in grinding machines is on accuracy, surface finish and high process capability. Being a finishing process, grinding machines are built with great care for vibration damping, thermal control and similar other factors which have a bearing on the final component accuracies and finish. World renowned manufacturers of grinding machines have put in a lot of R&D efforts to develop machines with these capabilities. As an example, modern grinding machine beds are made not from cast iron but a proprietary material called Graniton, which is a mix of granite in an epoxy resin in controlled proportion. These beds are claimed to have high damping, good thermal resistance and thereby to deliver superior performance. In surface grinding, features like creep-feed grinding are commonly offered from international manufacturers, whereas these capabilities are not available on Indian machines. Such machines are required by the tool and die making industries, which are on a growth path in India at present.

Indian manufacturers of grinding machines have to develop and offer some of the advanced features on their machines to catch up with their international counterparts.

Special purpose machines:

The Indian machine tools industry has been successful in developing the ability to design and produce special purpose machines for customers in almost all industry segments. This is a very encouraging feature of the industry in that these machines represent high value machines and are more knowledge based in their design and execution. Apart from the large industries, there are a number of machine tools builders in the small and medium category, which have developed this capability over the years, and cater to the requirements of the automobile, consumer and defence sectors. In fact these machines are very price competitive compared to imported equivalents. The special purpose machines manufactured in India often incorporate the most advanced features of technology from all over the world, which are effectively engineered to deliver the required functional capabilities to the customer. This segment of Indian machine tools can be a niche for exports, in view of the cost competitiveness of Indian designs and manufacturing capabilities for these machines. Defence, railways and aerospace are frequent users of special

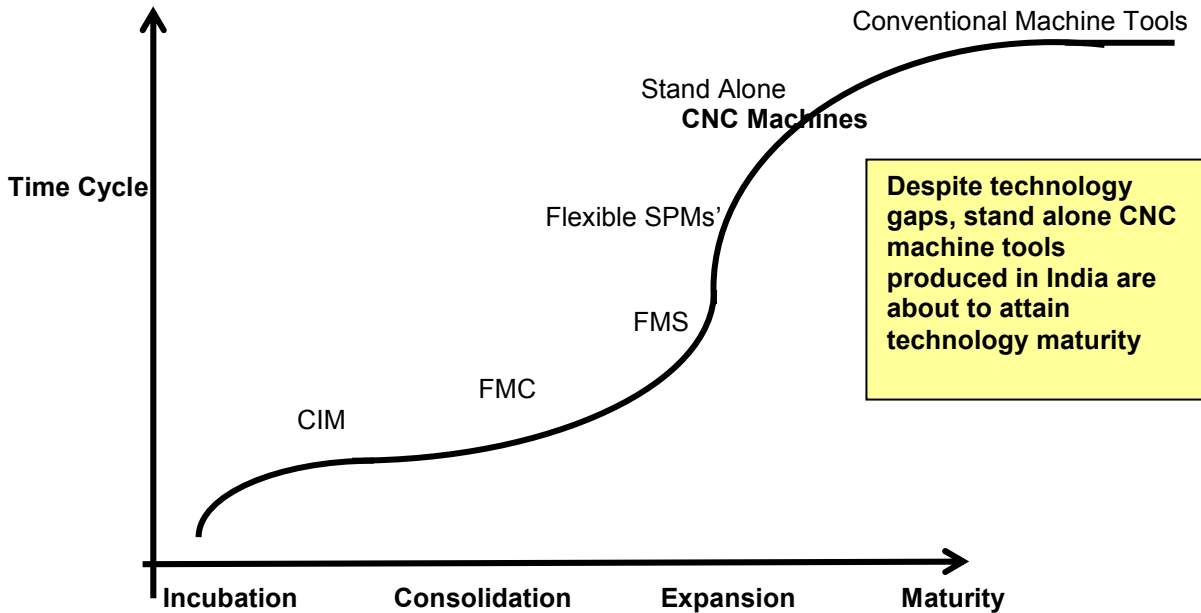
purpose machines from the Indian machine tools industry apart from the auto component sector.

Metal forming presses:

Metal forming presses for sheet metal working form one of the most important class of machines required by the industry. With the explosive growth of the consumer durables, electronics and auto industries, these machines represent the core-manufacturing requirement for these sectors. The development of metal forming machines has lagged behind the other types, and the technology gaps are somewhat more visible. Indian machine builders manufacture basic machines such as presses and press brakes but these are not equivalent to their foreign counterparts. The technology of presses has advanced to offer higher stroking rates, inbuilt safety devices, full electronic control, quick change over facilities, automatic parts transfer and other features designed to make them more productive, safer and user friendly. The most spectacular development has been the turret and laser punch press, which has the ability to produce sheet metal components of complex design, automatically in extremely short time periods. These machines are not produced in India, and the user industries depend solely on imports.

The technology absorption of the Indian machine tools industry can be summarized by the following graph:

Technology absorption in Indian Machine Tools Industry



Source: IMTMA

Key gaps required to be filled are: multi tasking, high speed machining, dry / MQL machining, dieless forming, precision machines for die and mould industry, linear motion drives, near net shape forming, application of lasers, combi machines, gear working range etc.

The metal forming sector will witness technology shifts and high growth in the next 5 years with the small and unorganized sector importing second hand equipment and large / OEM buyers opting for new technologies such as near net shape forming, hydro forming, laser cutting, three point bending and folding etc.

Design & Engineering

India’s core competitiveness exists in its availability of reasonably priced engineering skills and the ability to prepare detailed design & engineering drawings and the abundant software skills (CAD).

Efforts to build indigenous technological capability have often missed out the need to build indigenous design capability. By design capability we mean ability to conceptualize a product to achieve certain design performance characteristics, both aesthetic (form) and performance (function). Design tends to be market driven rather than technology driven, with technology providing the capability to meet new market needs.

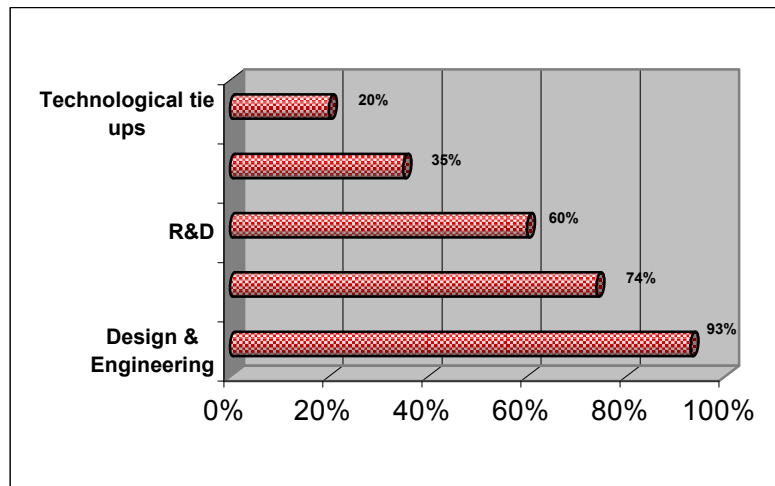


Chart 3

In the survey it was observed that 93 percent of the companies have their own design and engineering set up which is a significantly high percentage compared to the other sectors. The companies, who do not have their own design and engineering set up, get the design and engineering outsourced. Many of the companies who have design and engineering capabilities are also booking orders from others as a diversification strategy and as per the survey, an amount of Rs.6 crores worth of orders were received by these companies in 2003-04. In fact, the Indian machine tools industry can position itself as the “design lab of the world” with

detailed designs being outsourced from India as a diversification strategy by the industry as a whole.

Research & Development

The Indian machine tools is a highly innovative industry. Most of the products manufactured are through transfer of technology from a technology leader. Usually after absorption of technology transfer, there always exists a gap where the receiver always ends up with less technology than the supplier has.

Further, the technology leader goes on upgrading their products and hence Indian companies need to be highly innovative, firstly, to bridge the gap during the technology transfer and then adapting it to local conditions, tackling problems thrown up by local materials, labour, market and environment.

The role of R&D in India is slightly different from that in a technology driven country. Its role is to solve problems that arise in manufacturing since they cannot be solved on the shop floor and that requires special skills embodied in the R&D department.

Today in India R&D work done by the industry is in isolation. Except for the automotive component industry, R&D is not generally done in consultation with user sector. This needs to be changed and more interaction is necessary with the users to bring about innovative changes and add value to the products.

The CII survey has revealed that 60 percent of the companies have R&D departments and earmark a percentage of their sales towards R&D. The industry spends on an average 1.9 percent of its sales on R&D, ranging from 0.2 percent to 10 percent in some cases, which is quite satisfactory when compared to the other sectors of the capital goods industry. However, this is still not enough and more needs to be done, specially when it comes to high speed flexible machines requiring higher capabilities. The industry has developed very sophisticated machines thereby proving that the domestic companies do possess the technical ability and manufacturing capability but lacks the financial power to pursue these.

Only 20 percent of the companies have technological tie-ups. Most of the lower end machine tools manufacturers develop their own products through in-house innovation and product development. The product development capabilities of this sector are therefore fairly high. It is also evident that more and more manufacturers are converting their products from conventional machines to CNC.

The industry should spend more on R&D for the CNC systems and develop indigenous PC based or dedicated CNC systems so that dependence on foreign sources for supply or servicing can be reduced.

Management Efficiencies

The machine tools industry is a very fragmented sector and the marketing abilities of the industry are far from what it is in the other sectors of the capital goods

industry. Larger companies are also handicapped either due to bureaucratic norms or due to lack of capability. This is probably the reason why in this sector, a few manufacturers have formed a consortium which outsources the marketing and after-sales services. This may be a feasible model for the general purpose machines or low technology products. However, with the entry into the high-end solutions or for SPM's, the industry needs to catch up with global marketing strategies and practices.

The survey showed that the smaller players comprising of 67 percent of the respondents had no formal strategic planning in terms of growth plans or were barely aware of strategic planning. Only 26 percent of the companies have reported that they have established procedures of strategic planning and a meagre 7 percent did in depth strategic planning.

When asked what should be a company's strategy to enhance market share, 38 percent said they followed no strategy at all. Out of the 62 percent the majority felt that the topmost priority in enhancing market share was by achieving higher quality and service. The second priority was felt to be aggressive marketing. Third was to increase the product range and lastly reduction in costs because the Indian companies are quite cost competitive compared to their international counterparts and with the import duties coming down, their cost will further be reduced because components and bought-outs like servo drives, bearings, controls etc. are imported and would be cheaper.

An aggressive marketing strategy was followed only by 10 percent of the companies. 65 percent do not even collect competitors' information.

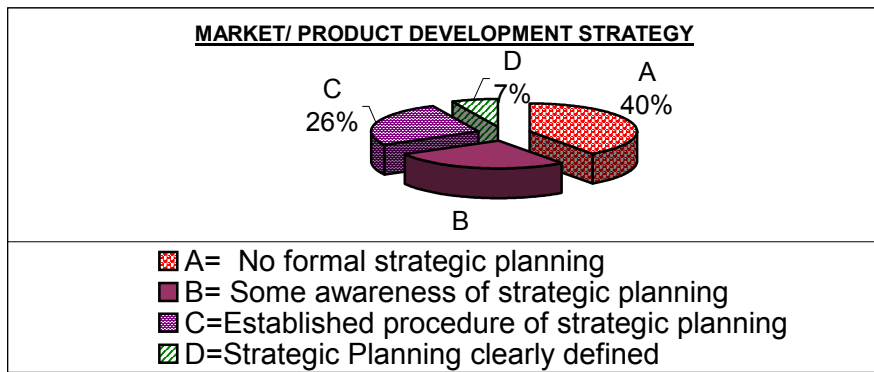


Chart 4

When asked whether the companies were interested to form strategic alliances either for technology, marketing or services to enhance their market share, only 19 percent of them considered this as an option. In fact a handful of 10-15 companies are already into strategic alliances with global players and are reaping the benefits.



Chart 5

It is quite evident that the sector lacks the managerial efficiencies and capabilities with mostly the market leaders having a strategic planning process in place. Most of the players in the SSI category are not willing to come out of the category even though there are opportunities because of the financial constraints faced by them to invest in further capacity building.

The ones who are beyond the SSI limit are not in an investment mode because they are apprehensive about the growth prospects and some are already bearing the brunt of the reduction in customs duties and import of second hand machines.

Except for the top 15 percent companies, the rest are driven by demand led growth. No efforts are forthcoming from their end to explore export markets, or diversify to other products because of lack of technological edge, or cost competitiveness.

One fourth of the companies were interested to enhance their market share through mergers and acquisitions and that included the PSU's.

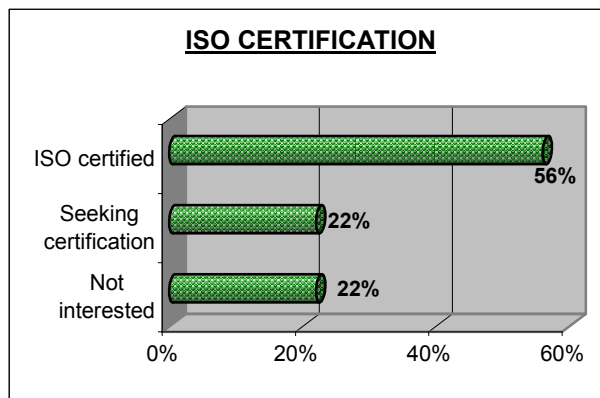


Chart 6

Quality consciousnesses of the sector is average with only 56 percent of the companies having reported to be ISO certified or are in the process of certification.

There are a handful of companies who also manufacture CE certified machines. The problems of quality are higher in this sector probably because the industry depends more on outsourced products where quality standards may be difficult to enforce. Many a times due to cost considerations, the companies cannot afford to procure the high quality reputed imported/indigenous components due to which the performance and accuracy of the machines suffer.

However, the machine tools industry is believed to have improved its quality in the recent past as compared to what it was 3-5 years back. The industry needs to improve its quality further since the user segment has also rated the quality aspects lower than the imported machines.

The ISO certified companies have a market share of 85 percent. However, it is important that all the companies are quality conscious since specifically the smaller companies are supplying machine tools to the component manufacturers whose quality in turn determines the quality of the equipment.

Due to the fragmented nature of the industry and the small size of the players, most of them have not implemented any of the latest soft technologies like Six Sigma, Kaizen, Lean Manufacturing, TPM etc. and in fact many of them are unaware of the benefits provided by these.

Except for the top 20 companies, many of the smaller companies are not even aware of these soft technologies. An effort is underway with UNIDO approaching the smaller manufacturers in a cluster form and helping them to achieve higher productivity and quality standards through these soft technologies.

33 percent of the companies surveyed have undergone a business process reengineering in the past three years to make themselves more competitive in the face of increasing international competition. 26 percent of the companies underwent downsizing to enhance cost competitiveness.

The level of computerization is very poor in this sector with minimum investment by the companies. Only 0.5 percent of sales on an average is spent on procurement of hardware and software required for either automation in manufacturing or in information technology. A few companies having realized the benefits of IT are planning to invest more but this according to them would depend on their understanding of the future prospects of the sector. The highest expenditure in IT by an individual company is Rs.1.5 crores in 2003-04. The total expenditure by the companies under survey was Rs.6 – 7 crores in 2003-04.

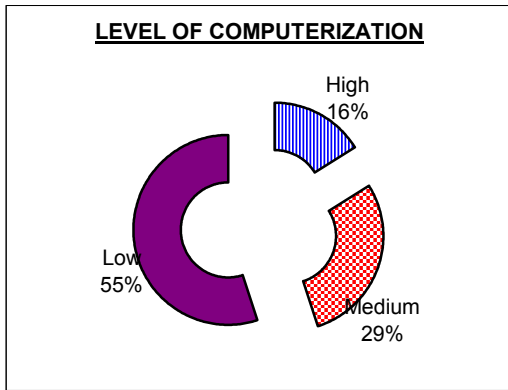


Chart 7

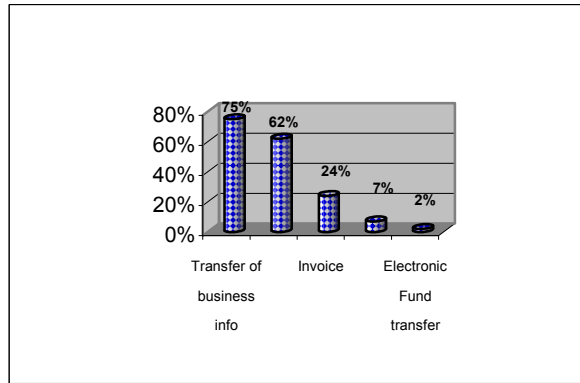


Chart 8

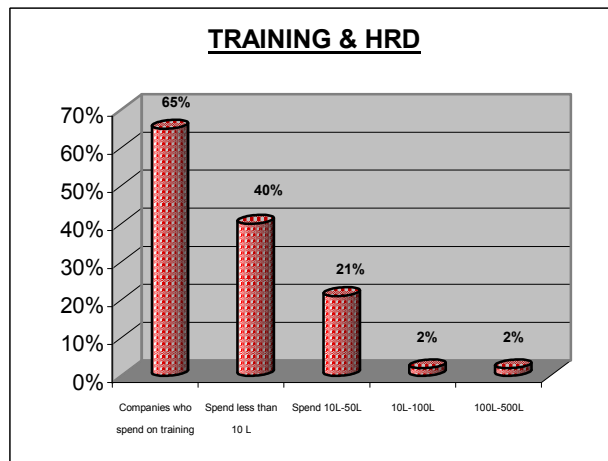


Chart 9

When it comes to training and spending on HRD, surprisingly only 65 percent of the companies spent on training and HRD when the training aspect is very important for this sector. Companies who have facilities to train user companies' operators and maintenance personnel will be able to increase their market share in this highly competitive product segment. Most of the companies have agents who undertake the after-sales service on behalf of the companies. However, training to improve employee motivation, productivity and efficiency should be looked into since the sector perse does not pay high rates of remuneration to its employees.

On an average, companies have reported that 60 percent of the orders are delivered on or before time and another 25 percent within one month of the delivery due date. Though some of them have attributed the reasons for delay in deliveries to delays in receiving customer clearances, the majority of the companies have attributed it to non-availability of material and manufacturing. Since a substantial portion of the bought outs are imported and due to lack of proper infrastructure and lack of supply chain management, this is an issue which needs proper attention.

Three fourths of the companies have reported that they have outsourced some of the core functions of their organization like manufacturing, design, marketing, HR, IT and other support services.

The sector needs to upgrade its manufacturing technology and business processes to improve its productivity and also educate itself on the planning process to tackle the delays in delivery either by subcontractors, or by the companies themselves. The companies who manufacture the components for this sector are the bottleneck due to their lack of capacity and availability of infrastructure. They too need to be educated to improve cost competitiveness and delivery.

Due to the sudden increase of investments in the automobile, defence and engineering sector in the last one year or two, the industry is just out of the recessionary phase and has been unable to cope up with the demand surge since no additional capacity had been added.

Benchmarking with International Companies

Some broad indications in terms of benchmarking of the industry on the basis of financial parameters have been done against a few global players, this is provided in **Annexure VII**.

The international companies against which Indian companies have been benchmarked are Schuler, DMG and Makino.

Operational Efficiencies

Financial Parameters

The last two years have been excellent in terms of growth in sales for the machine tools sector with an average sales growth rate of 45 percent with some of the member companies showing sales growth rate as high as 80-95 percent .

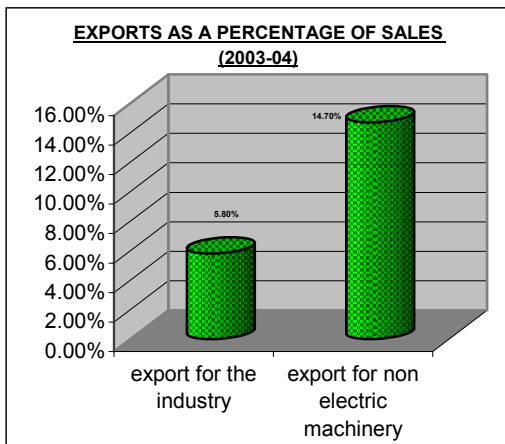


Chart 10

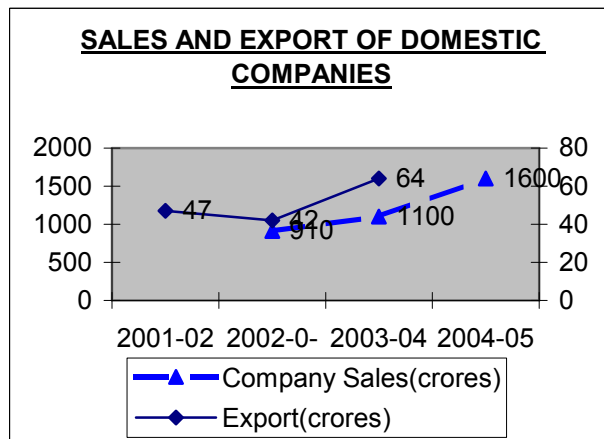


Chart 11

As is evident, the cost of raw materials as a percentage of net sales has been increasing as a result of the rise in steel prices and increase in bought-outs.

The percentage of raw materials to sales for international companies is in the range of 44-53 percent. For the machine tools industry, the CMIE Industrial Financial Aggregates and Ratios indicate that the percentage has increased from 45.9 percent to 47.85 percent in 2003-04.

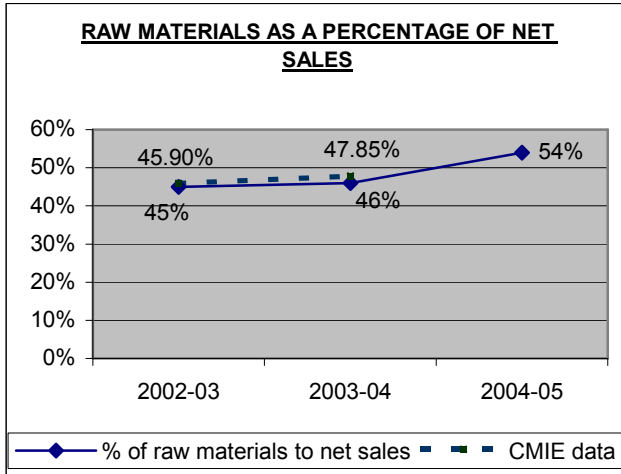


Chart 12

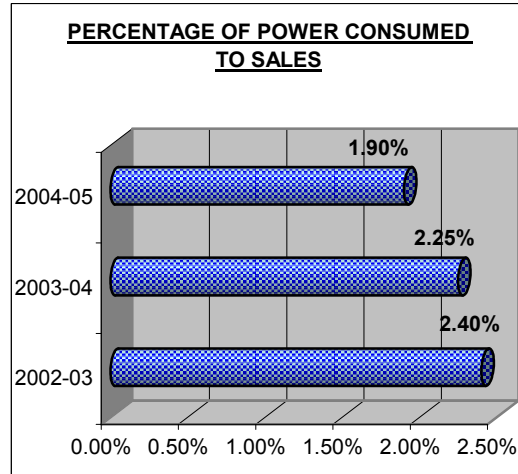


Chart 13

The power consumed to sales as evident in the other sectors has been showing a steady decline over the years.

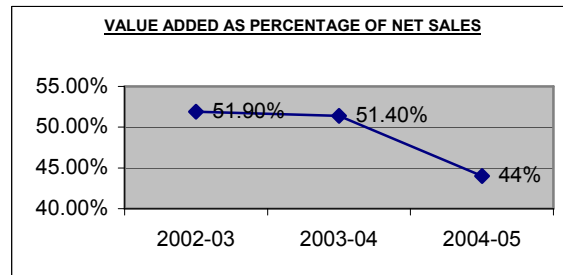


Chart 14

Value added for an industry is the difference between the value of the output and the value of the input namely raw materials & bought outs. In other words, we can attribute this difference to the value added to the product by the company.

The value added as a percentage of net sales has shown a sharp decline in 2004-05. However it has been specifically noticed that the value added for the companies manufacturing SPMs were much higher than those companies manufacturing standard products.

The reasons for the decrease in value addition may be attributed to :

- Increase in cost of raw materials
- With the increase in sophistication of the machine, the percentage of bought out imported components has increased.
- The manufacturers have not been able to increase their prices due to competition from second hand imports and imported machines.
- Due to the small size of the industry the input costs cannot be negotiated to its advantage

Inventory on an average was found to be 23.7 percent of the net sales or in other words, the inventory turnover was 4.2. However, if we do not consider the figures of the PSU's, the inventories as a percentage of net sales falls to 19.4 percent in 2004-05 increasing the turnover to 5.15. It has been noted that most of the companies manufacturing special purpose machines have very low inventory to net sales. Only companies manufacturing standard products has a higher inventory to net sales.

The international companies have an inventory turnover in the range of 3.4 to 4.4.

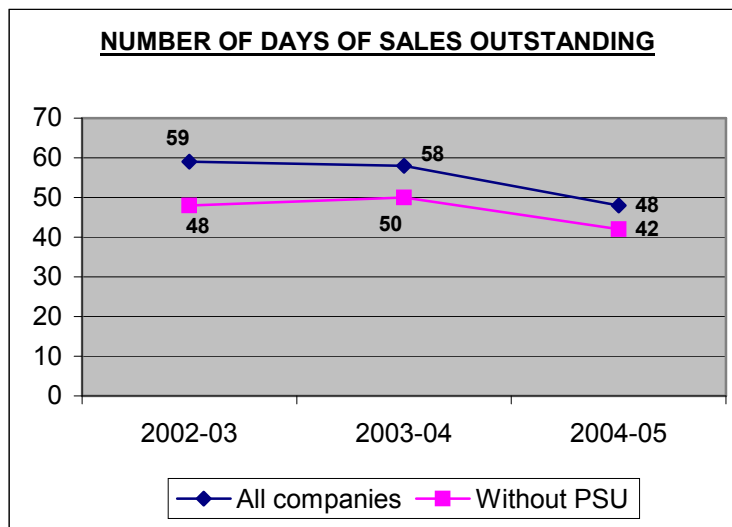


Chart 15

As is evident from chart 15, the working capital management of the sector has improved over the years in view of the mounting competition. However, without the PSU's the average days of receivables is quite low at 42 days when compared to others in the capital goods industry. This is because the sector comprises of small players who operate with advance and payment prior to despatch whereby their receivables are comparatively low.

International companies have a higher number of days sales of outstanding between 39 days to 138 days. The comparison may not be on an equal basis

since some of the companies have diversified products and the segment figures are not available in the public domain.

On an average, the working capital as a percentage of gross sales was found to be 22.5 percent in 2003-04 and all the companies had a positive working capital. In this figure, the working capital of the PSU's has not been considered because all of them have negative working capital. The percentage of working capital to gross sales has shown drastic decline between 2003-04 and 2004-05.

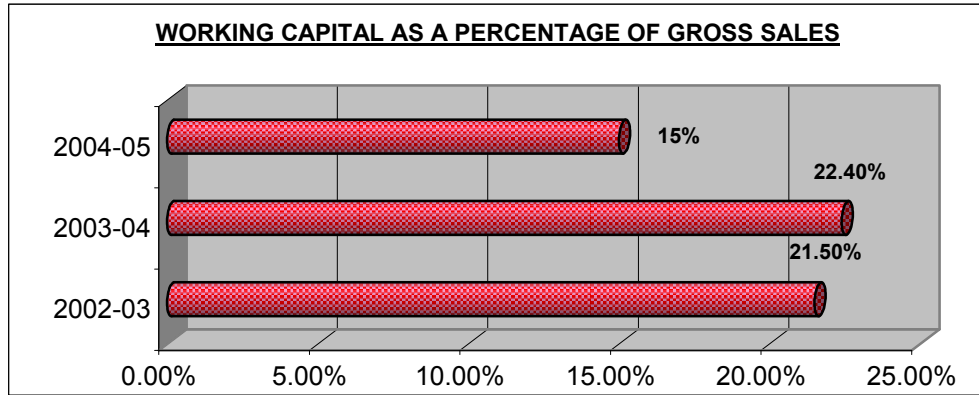


Chart 16

The average cost of wages to gross sales for the industry was found to be 16.5 percent in 2003-04.

The range varied from a low of 4 percent to a high of 54 percent. Without considering the PSUs the average wages to gross sales fall to 11.8 percent.

The average wages per employee was found to be Rs.2 lakhs and it varied from Rs.0.3 lakh to a high of Rs.2.88 lakhs.

International trends indicate that the cost of wages to sales is very high especially in the European countries at 27-30 percent.

This industry has a problem of attracting the right kind of talent because of low wages. Moreover the curriculum followed by the engineering colleges do not meet the needs of the industry. Retaining of good engineers has been difficult due to the boom in the IT industry. Even in the skilled and unskilled level, the availability of workmen from the vocational training institutions is not sufficient. IMTMA is doing some work but obviously it is not enough to cater to the entire industry.

The average sales per employee in 2003-04 were found to be Rs.13.75 lakhs and it ranged from Rs.1.98 lakhs to Rs.61 lakhs.

IMTMA benchmarking shows sales per employee at Rs.30 lakhs. The employee productivity is very low in comparison with **international companies where sales per employee ranged from Rs.81 lakhs to Rs.146 lakhs.**

The average value added per employee was found to be Rs. 7.5 lakhs.

Profitability

The profitability of the sector has shown an increase in 2004-05 over 2003-04. The PAT of the companies who have reported their latest figures has shown an increase of 52 percent in 2004-05 over 2003-04. The average return on capital employed has shown a dramatic improvement in 2004-05 over 2003-04. The EBIT to sales inclusive of losses by some of the PSU's is in the range of 8 percent and it increases to 11 percent without the PSU's. The profitability of the domestic sector is much better compared to the international companies where EBIT/sales ranged between 2-6 percent.

It was noticed that in general, 36 percent of the companies in this sector had a debt to equity ratio less than one. The debt to equity ratio of the PSUs were higher than 2:1 and very few of the smaller companies had a debt to equity ratio more than 2:1.

Capital Investment

In spite of the good profitability seen by the machine tools industry, only 30% of the companies surveyed have a capital expenditure plan and the amount is Rs.350 crores for the next 2-3 years.

Productivity Parameters

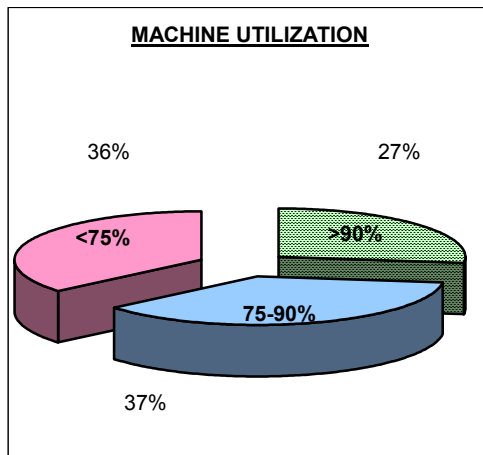


Chart 17

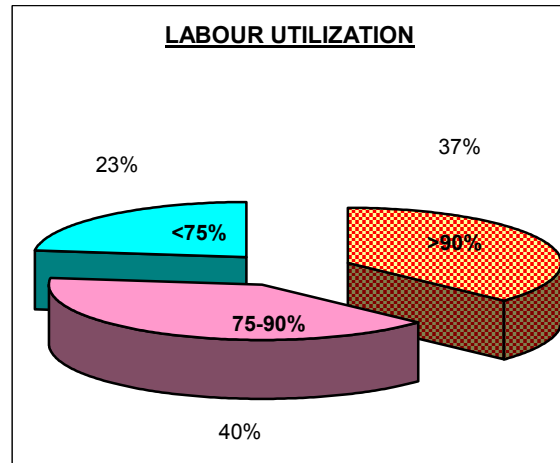


Chart 18

Machine downtime ranged from 1 percent to as high as 20 percent in some cases.

Labour efficiency ranged between 60 percent to 95 percent. Lower labour efficiency and labour utilization has manifested in lower employee productivity. Labour utilization has been lower as compared to other sectors because of surplus labour since only 26 percent of the companies have undergone downsizing and lack of awareness of productivity methodologies.

Only 65 percent of the companies used CNC or NC machines because most of the smaller players get almost 95 percent of their products outsourced and they only do assembling. In fact, as high as 17 percent of the companies get 100 percent of the manufacturing activities subcontracted. However, on an average 75 percent of the companies subcontracted some amount of their manufacturing. The subcontracting was mainly done due to capacity constraints followed by cost considerations. Expediting of delivery at times also necessitated sub-contracting.

Procurement lead-time ranged between 2 weeks to 4 months for imported components and less than 6-8 weeks for indigenous items.

User Sector Feedback

From the responses received from some of the major users of machine tools namely automobiles, engineering, defence and railways, it was noticed that the percentage of imported equipment being bought by companies has increased in 2004-05 as compared to the earlier years and this is attributed to the lowering of customs duty over the years and also due to the fact that as a result of the sudden surge in the demand, domestic companies were unable to deliver equipment as per customers' requirements.

There has been no purchase in the last two years in most of the Government sector manufacturing companies except the defence sector resulting in lack of modernization of manufacturing facilities. This lack of investment was one of the reasons for the industry undergoing a recessionary phase in the past.

When the indigenously available machines are benchmarked with the imported machines the users felt that cost-wise indigenously manufactured machines were very competitive when compared to similar machines from Taiwan and Korea. However, their products have an edge over the Indian ones in terms of quality and accuracy. Chinese products are the cheapest but technologically not superior to the Indian products.

The spare parts availability and servicing of the machines were better than the imported machines except for imported spare parts. However in terms of delivery, the indigenous manufacturers were found to be poor. When it came to technology, performance/productivity, machine accuracy, reliability, downtime and safety as well as eco-friendliness, the indigenously manufactured machines were rated 20-40 percent lower than the imported machines.

Grinding machines and presses as per the user feedback are an area where the Indian machine tools industry is found wanting. More work needs to be done on presses and high accuracy machines for grinding and other processes like greater automation of loading and unloading and to incorporate the latest technology at low cost or provide value for money. Further the high technology and higher capacity machines are also not manufactured because of lack of demand. The users have desired that it would be helpful if the industry could deliver machines along with

automatic gauging systems. Also they feel that the industry should produce more lighter and smaller footprint machines to save on space.

The reasons for higher imports were machines not being available at the high technology end required specifically by the automobile manufacturers or the defence sector. Higher imports were noticed in the drilling and tap centers primarily due to poor delivery and capacity constraints of the indigenous manufacturers, in the SPM's and presses due to non-availability of technology.

The poor rating on the performance and accuracy of machines have been attributed to lower quality components being used by the industry to be cost competitive. Users have found that even among the imported machines the quality/accuracy or performance of machines from Japan/Korea or Taiwan is not consistent and tend to fall after a passage of time. However, machines from Switzerland or Germany though expensive, tend to be more reliable. Ironically some of the manufacturers too voiced these concerns viz. that the price pressures tend to make them sacrifice quality.

When asked if the bigger players in the private sector or public sector had procured second hand machines in the past, very few had imported second hand machines and have also reported having had the following problems:

- Manuals & circuit diagrams were not available leading to problems in operation and servicing
- Machines cannot be used directly, need total refurbishing, which negates the reasons for buying cheaper second hand machines
- Machine electronics are outdated and needed total replacement with the latest version

According to the operations and maintenance personnel of the user sector the priority that they give while rating a machine was of the following order:

- Accuracy and reliability
- Ease of maintenance
- Less downtime
- Availability of spares parts and servicing
- Power consumption
- Safety features & eco-friendliness of the machine

As the above criteria are considered to be the important factors, Indian manufacturers are constantly behind in the first three parameters.

It was noted that most of the customers at present place their orders on the basis of supply and installation. However they have also expressed that in the future, servicing will also be incorporated as a part of the purchase order as long as the equipment suppliers accept a penalty clause for poor performance during AMC.

The competitive edge that the domestic manufacturers at present have in the face of the growing international competition is in the area of servicing. However, when

it comes to servicing of CNC systems, the major suppliers i.e. FANUC or Siemens have not trained any Indian agency, or manufacturer to service or even diagnose the faults in the card. This at times becomes a constraint faced by the users.

When asked about their feedback on the response time of the domestic manufacturers as compared to the imported suppliers, the rating for response to breakdown/service was good and faster than the overseas supplier. Also this was much cheaper. Many a times the foreign suppliers expressed their inability to service their machines which were a major problem faced by the users.

Market Situation and Demand

The sales turnover of the companies in this particular sector having reported for the study is given below:

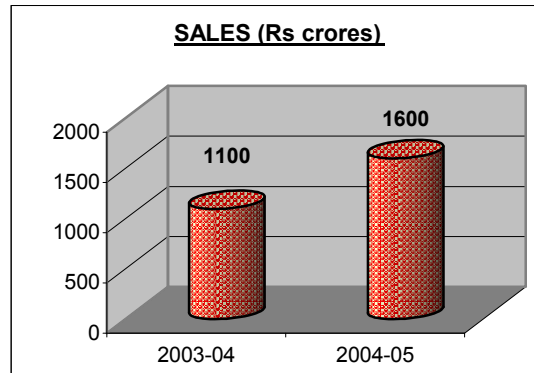


Chart 19

The industry has seen a phenomenal growth rate of 45% in 2004-05 due to the sudden surge in the domestic demand.

Out of the companies covered by the survey, only 62 percent of them exported their products and on an average the exports as a percentage of sales was only 6 percent .

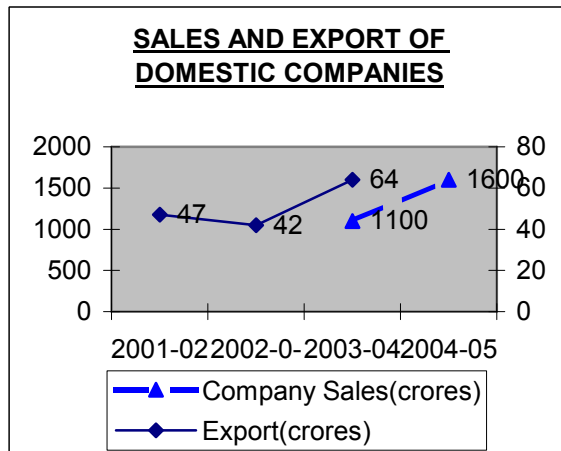


Chart 20

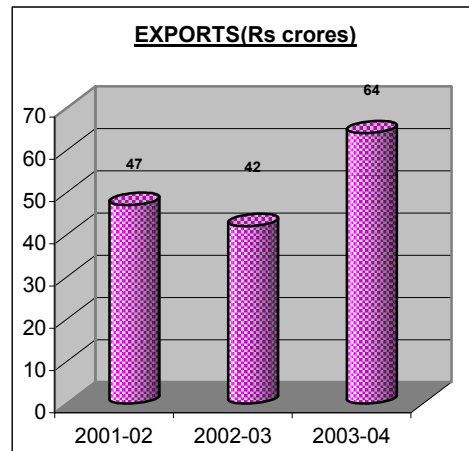


Chart 21

After a downturn in 2002-03, 2003-04 and 2004-05 has seen a surge in exports because of high demand in some of the SAARC countries, Iran & UAE followed by a better image of brand 'India'.

The order backlog as on 31.03.2005 was Rs.960 crores which is almost 60% of the 2004-05 sales and the growth projections for 2005-06 as reported by the industry is very optimistic at Rs.2,800 crores, an increase of 75% over 2004-05.

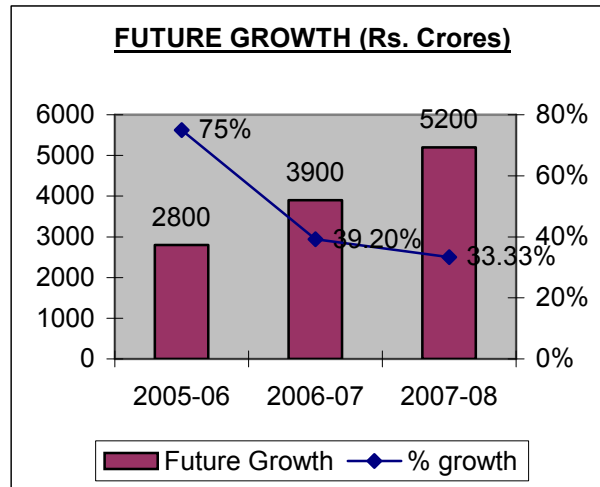


Chart 22

In view of an imminent slowdown in the Indian economy, most Indian machine tools manufacturers focused on potential overseas markets for business opportunities. Sustenance on Indian market alone did not look feasible enough.

Further, off late there has been a perceptible change in the image of the “Made in India” brand in overseas markets particularly true for Indian-built machine tools. Enhanced features, competitive pricing and marketing focus has increased demand for Indian-made machine tools in overseas markets, particularly in Europe, United States, and the East-Asian region. This is what Indian machine tools manufacturers are hoping to leverage so as to post an optimistic export turnover in the next few years.

Indian-made machine tools are currently exported to over 50 countries; the major ones being the United States, Italy, Germany, the SAARC countries and the Middle East. **(Refer Annexure VIII)** Lathes and automats, electro-discharge machines, drilling, machines, and machining centres formed the bulk of export orders for Indian manufacturers. These machines from India are generally favoured in overseas markets primarily due to their cost competitiveness, as compared to those available elsewhere.

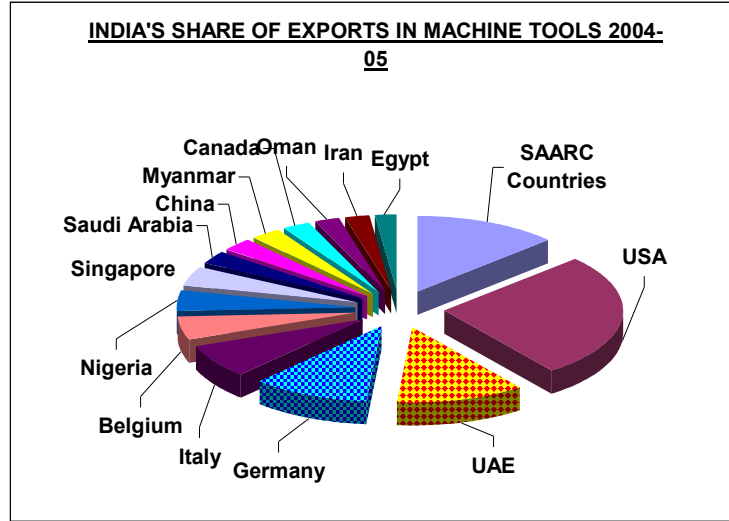


Chart 23

The vision of the Indian machine tools industry is now to step out aggressively and establish a presence in other potential markets. World-over, market leaders have been those who have looked to increase their market presence beyond their national frontiers.

As is evident from the above graph, the majority of imports are from countries like Japan, Germany, USA, Italy, China and Taiwan. China and Taiwan are known to be the most cost competitive countries in machine tools and the USA, Germany and Japan are countries who have manufacturers known for their technology, brand image and quality. Most of the companies barring a few are present in India through their subsidiaries.

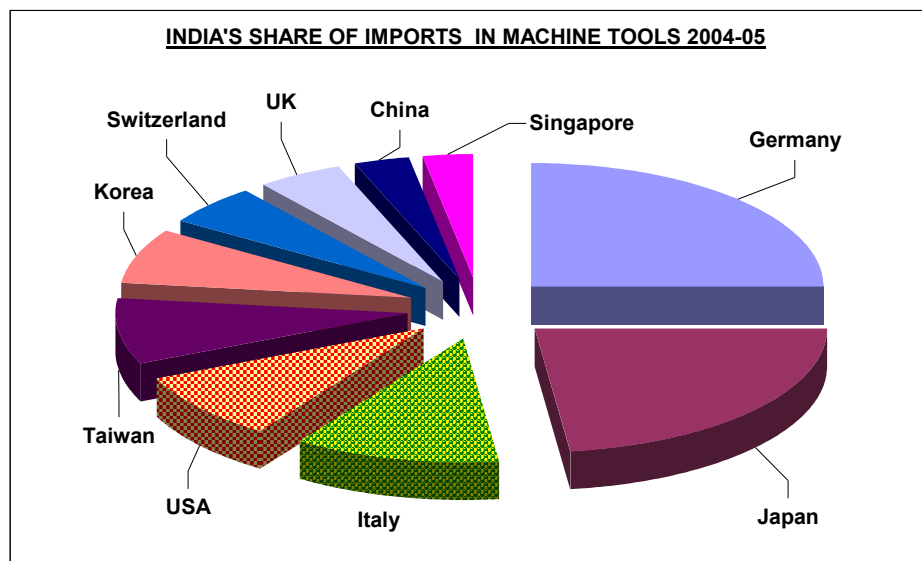


Chart 24

The growth in the Indian machine tools industry is demand driven which is coming from the automobile, engineering, defence, space and textile machinery industry all of which are at their peak.

It is foreseen that the good times for the industry has just begun and a phenomenal growth is projected in 2005-06 and beyond with the kind of investment projected. However, it needs to be noted that approximately 70% of the demand is currently being met through imports.

In India the vehicle industry is estimated to invest Rs.25,000 to 30,000 crores in the next 4-5 years in capacity building.

The auto component industry is believed to invest Rs.2000 crores yearly since auto component exports is expected to grow to US\$ 20 to 22 billion by 2015, a growth rate of 33.45 % CAGR. Cost pressures on OEMs will drive more and more companies to outsource the majority of the components from low cost countries like India thereby encouraging additions in terms of manufacturing facilities.

The engineering industry are projected to invest a total of Rs.2,500 crores in the next two years due to the investment boom in the construction, mining, power, steel and refining sectors.

Ordnance Factories are another major user of machine tools. Defence production is highly specialized, complex and poses unique challenges. Products have to be reliable and consistent in quality and hence the machines producing them need to be of very high technology and accuracy. The technologies and machines being planned for procurement are mostly flexible so as to cater to a wide range of products. During the remaining 10th Plan period, an investment of Rs.560 crores is envisaged for the modernization plan of the Ordnance Factories.

The aviation industry in India is growing at a very high rate with the new entrants coming in with purchase of one aircraft per month. These aircrafts will require maintenance subsequently and the aircraft maintenance industry would witness a boom in the years to come requiring the machine tools industry to position itself for their requirements.

The international scenario is also equally optimistic.

In China it is estimated that the demand for CNC lathes and CNC systems will reach 20,000 machines in 2006. By 2010 the market demand for machine tools will reach US\$ 7.23 billion. The market increase will be concentrated on tools such as sophisticated CNC lathes. Foreign manufactured leading edge technology CNC lathes will account for a significant percentage of the projected sales growth.

A report by the State Council Development Research Centre, China predicts that annual vehicle demand in China will grow to 9.4 million units in 2010, 13.5 million in 2015 and 18.9 million in 2020 from 5.6 million this year. It has been reported that there will be 3.5 million cars in Beijing by 2008 when the city hosts the Olympic

Games up from more than 2 million units at present. Car demand will reach 5.9 million units in 2010, 10.3 million in 2015 and 17.27 million in 2020, up from 2.94 million this year.

Germany's Volkswagen, the biggest carmaker in China, says the market will grow by 10 to 15% a year within the next two decades if the nation achieves an annual GDP growth of 7 to 8%. Volkswagen, running two car joint ventures in China, says the nation's car market will grow to 7.9 million units a year by 2013.

Last June, GM revived a plan to spend over US\$ 3 billion with its Chinese partner the Shanghai Automotive Industry Corp. (SAIC) to double its annual production capacity in China to 1.3 million units by 2007.

Executives from Volkswagen say it plans to invest 60 billion Yuan (US\$ 7.2 billion) in China.

At the beginning of last year, AUX unveiled a plan to invest 8 billion Yuan (US\$ 966 million) to produce cars and build an annual capacity of 450,000 units by 2008.

In the recently approved master plan for the automobile industry by the Vietnamese Government, the automobile industry forecasts a total output of 239000 automobiles in 2010 and 398000 in 2020 from the existing number of vehicles of 120000 being produced in 2005.

For this the industry needs 16000 – 18000 VND (US\$ 1 – 1.1 bn.) in the period 2001-10 and 3500 – 40000 VND (US\$ 2.2 – 2.5 bn.) in the period 2010-20*.

The Vietnamese Government's master plan report also states that the supporting industries for the automobile industry are undeveloped in Vietnam. Currently, there are about 2000 automobile part suppliers in Thailand (Tiasing 2002) while the corresponding number in Vietnam is only 60 (Quach 2004). Hence there exists a tremendous opportunity for the growth of the automobile component industry and indirectly a vast opportunity for the Indian machine tools industry which has already gained enough experience by supplying to the domestic automobile component manufacturers.

The Hungarian market for automotive parts for OEMs is maturing. Asian imports and domestic production dominate sales to manufacturers but according to industry sources, the market is not yet saturated and offers potential for more facilities to be set up thereby encouraging the Indian machine tools industry to explore the opportunities.

The demand from Thailand is being reviewed by all the US and European carmakers in terms of adding new production lines. This will mean demand for machine tools and also from the auto component industry. The manufacturing sector in Thailand is expected to grow at 17% in 2006 thereby giving rise to demand for machine tools by the engineering industry.

*Source : Decision No. 1277/2004/QP-TTG approved the Master Plan for Developing Vietnamese Automobile Industry, October 2004

In addition, during the past two years upto 72,000 entrepreneurs have entered the manufacturing market, which indicates a growing Thai industrial sector and a future potential market for high quality machinery.

Presently, there is a demand for moulds and dies in Thailand. Despite a relatively high number of moulds and dies produced in Thailand, there is a high reliance on imports. Investments in moulds and die manufacturing is essential to further develop and expand certain sectors like automotives and electronics.

With the buoyant domestic and international demand and the efforts on the part of the Indian machine tools industry to improve technology, quality and performance and at the same time reduce cost, there is no doubt that with a little effort this sector can emerge as one of the front runners in increasing value addition in the country since the value addition by this industry is currently one of the highest in the capital goods industry.

ROADMAP

The Indian machine tools industry has reinvented itself in terms of its product range in the last one and a half decades. Further, the emphasis was on standard machines whereas today there is a greater focus on NC and CNC machines. Technology and enhanced quality as well as cost competitiveness have therefore improved significantly. On the other hand, imports became easier thereby critical components required for machine tools manufacturing could be easily imported and at lower prices.

Customers' expectations have also increased in terms of technology as well as better product quality, delivery and service.

With the customs duty going down every year, manufacturers of machine tools are facing threats from imports from Taiwan and China, which are the most cost competitive countries in machine tools. Domestic manufacturers are facing fierce competition in the high-end technology machines both from the new, as well as second hand machines.

SPM manufacturers however feel that they face little threat since they manufacture specialized machines and they operate in a niche market with a high competitive advantage due to the intimate customer relationship. However with increasing customer preference for flexible machines the SPM manufacturers need to realign their product range and strategies. There are still a few SPM's, which are not manufactured in India, like the ones catering to explosives manufacturing.

The following fiscal measures may be taken to reduce input costs to make machines more affordable especially to the SSI and SME sectors and hence spur demand growth for the sector:

- To encourage value addition and to help the industry to be more cost competitive, GOI should reduce customs duty to 5% on the following items

not manufactured in India at present and which constitute nearly 35-40% of the input cost of modern CNC machines:

- CNC systems and its parts
- Servo Drives/Motors covered under tariff head 85.01 or 85.04.
- Precision spindles covered under tariff head 846693
- Ball screws covered under tariff head 8583
- Linear Guide ways covered under tariff head 848280
- Precision bearings covered under tariff head 8482
- Precision gauging and balancing systems covered under tariff head 903180 or 9016.

Indian companies with financial resources and risk appetite should try to get into the manufacturing of the above items, which will help the machine tools industry immensely.

- The current rate of Excise Duty on machine tools is 16%. Users of machine tools in medium and large-scale industries are in a position to claim Modvat on the Excise Duty paid on the machine tools. However, small-scale manufacturers and job shops that account for around 50% of the market share for machine tools do not pay Excise Duty on their end products and are therefore not in a position to Modvat Excise Duty paid on machine tools. As a result, small scale manufacturers and job shops are required to pay a price higher by 16% for the same machine compared to the medium and large scale manufacturers. This discourages new entrepreneurs and modernization of manufacturing facilities in the small-scale sector.

In order to encourage investment in the small-scale sector, it is suggested that small-scale manufacturers and job shops, which do not pay Excise Duty on their output products, may be exempted from payment of Excise Duty on machine tools purchased by them.

The constant threat from imports has compelled the domestic companies to look internally and made them improve their products, quality, services and delivery.

With the signing of FTAs and RTAs/PTAs, domestic manufacturers feel that they need to upgrade their technology through technology transfer or in-house R&D and reduce costs through innovation and productivity improvement. Companies also need to enhance their production capacities to meet the delivery requirements of the customers and focus more on improving further quality and after-sales service. Some companies are gearing up to face the threat of ever-increasing imports by operating in a very narrow technology band and niche market and reducing their product reliability gap.

These FTA/PTA agreements will also open up the export market for companies who have products with competitive advantage in the export market. International manufacturers are already keen to use India as their outsourcing destination.

The country imports nearly twice what the domestic machine tools industry produces, to meet the requirement of machine tools for industry in all segments. The share of the Indian machine tools industry in total consumption is around 36%, pointing to an obvious need for the industry to further develop its products and volume to meet the requirements of the Indian user sectors. A substantial part of the imports is in specialized machines of high technology, very large machines and machine types, which are not manufactured in India.

Customers are increasingly seeking flexible machine tools that can fabricate a diverse range of specific moulds and dies.

A common trend in the market reveals that a machine tools user today can get his job done with less expensive mix of machines. There is a new breed of machines called 'just enough' machines. They are designed such that the machine is just right for a particular job (minus sophisticated features that are hardly used) at a reasonable cost. This is achieved only through higher interaction of the user industry with the machine builders.

The industry needs to expand its range of high precision machines and respond to demands for shorter mold lead times via the introduction of automated production systems. They also need to concentrate on technologies for machine tools required for the growing industries like automotive, defence, aeronautics, space, steel, metals and the engineering industry since these industries will have greater investment in the near future both in Asia and beyond.

The main focus should be on optimizing the process chain of the customers by shortening the manufacturing time. Industry should invest more on customer driven and market oriented research and development. The primary objective should be to tailor products and services to the specific needs of the customers. These USPs will distinguish market leaders from the rest.

New generation machine tools play a significant role in tightening inventory control. Inventories of goods-in-process benefit from technologies that shortens manufacturing time. Such shortening reflects a combination of a faster machining process, and a reduction in set up time and time consumed by material handling. The increase in the flexibility of machines to produce a variety of products and product mixes eliminate the need to stock a variety of products on the shelf. More importantly, the ability of CNC machines to combine operations has resulted in a major change in work-in-process and wait time. New generation machine tools are smaller and more compact. For instance, machines with multiple types of machining rarely take up as much space as all the machines they have replaced. Machine tools manufacturers should be more focused on making machines with small footprints.

The problem with Indian machine tools manufacturers is that when the business is good, they are too busy to spend time on innovation and when the business is bad, they cannot afford to do anything. This is especially the case with the small and

medium sized units. This attitude needs to be changed to be successful in the longer run and for that the industry needs to have a vision and strategy.

The future trends in this sector are for faster but flexible machines with TPM concepts and use of Internet / Ethernet to facilitate operations and maintenance of machines.

The industry now needs to offer the more advanced technological features on its standard products. For this the investments on R&D need to be increased with an environment where innovation can take place.

The quality aspects of the machines are its performance or aesthetics and delivery will be crucial in the future as customers can access products from all over the world. For continuous improvement, soft technologies like quality circles, Kaizen or 5S should be introduced.

The industry suffers from low productivity because the manufacturing model is more labor intensive. With companies trying to be cost competitive, they need to look into the production methodologies, managing the supply chain, with greater outsourcing required to reduce costs. For standard products enhancing volume is a must to raise cost competitiveness.

Customers are increasingly demanding higher productivity from their machines and hence companies need to look at the ways and means to reduce the down time of their machines and give better after-sales service for customized manufacturing solutions.

There is a huge market for retrofitting of conventional and NC machines to CNC machines and this market will evolve only when customers perceive that they can get the products and services at a lower cost.

The public sector machine tools companies have huge investments and possess the requisite manufacturing capabilities as well as human resources. They need to adapt themselves to the expectations of customer by being nimble footed and responding faster to their needs and problems. Productivity and financial management also require further improvement.

The US machine tool industry, 1980s and beyond:

There is a similarity between the Indian machine tools industry of today and the US machine tools industry in the 1970s.

The U.S. industry had remained buoyant throughout most of the 1970s, and in 1980 the U.S. machine tools shipments peaked at more than \$5.6 billion (in 1982 dollars). But by 1983 output had plummeted to just over \$2 billion. This precipitous fall was reflective of the U.S. manufacturing competitiveness crisis in general, as many corporations slashed capital spending to lower their own costs and sent proportionally larger shares of their parts production to lower cost vendors abroad.

Meanwhile, import penetration of the U.S. machine tools market was growing at an alarming rate. Machine tools imports grew from about 34 percent of the U.S. consumption in 1983 to nearly 50 percent in 1986. By 1988, the U.S. share of world machine tools production had slipped to just 7.4 percent on output of nearly \$2.8 billion, and America fell to fourth place among the world's leading machine tools producing nations, behind Japan, Germany and Italy.

While the causes of the American industry's fall are too complex to fully chronicle here, one important factor was a significant domestic market shift toward standard CNC machines, which clearly favored the emerging Japanese suppliers. American builders were accustomed to making machine tools to order, and incorporating many options of the customer's choosing. Then the Japanese came into the market selling machines from inventory. While that prevented Japanese suppliers from offering much customization, the Japanese machines were manufactured in relatively large quantities and sold at a fraction of the price of the American competition. Moreover, the Japanese machines proved to be highly reliable by American standards. Soon Japanese suppliers were thoroughly dominating the large U.S. market for machining centers and CNC turning machines.

The factors due to which the industry failed to rebound quickly was:

- **Not enough large firms and little cooperation among small companies.** Competing successfully on a global basis requires major investments in capital goods, training, export marketing, and other areas. Compared with its major competitors, the U.S. industry lacked both a sufficient quantity of large firms that could build these capabilities in house and strong mechanisms for creating cooperation among smaller firms.
- **Difficulty in obtaining capital.** The U.S. machine-tool makers, like many small manufacturers, have had difficulty obtaining capital to purchase new machinery and finance export sales. The sources of this problem included high transaction costs, lack of long-term relationships with banks, and the overcapacity and low profitability of this sector following the crises in the early 1980s. The U.S. firms were at a further disadvantage in that their foreign competitors benefited from sustained government incentives to invest in advanced industrial equipment. Although the U.S. government has at different times offered temporary tax incentives that have stimulated demand for machine tools, these have not increased capital investment over the long term.
- **Inadequate supply of skills and disincentives to invest in training.** The skill levels of the industry's labor force as compared with those of foreign counterparts were inadequate. This skill gap was apparent from the poor basic qualifications of many existing workers, the collapse of the apprenticeship system that was the main source of skilled labor, and the lack of graduate engineers in this sector. In addition, the structure of labor markets and poor track records of government training programmes had

discouraged the U.S. firms from making major investments in worker training that were being made in Japan and Germany.

- **Poor performance in translating technological research into market advantage.** Despite its recognized lead in many areas of basic technological research related to machine tools, the United States was less successful than its rivals in translating research success into commercially viable technologies. Among the reasons for the failure of the technology transfer process was the generally weak links between universities and machine-tool firms; the focus of government research on the most sophisticated applications, which often had limited market potential; and the weak cooperation between machine-tool users and their customers.
- **Unsophisticated domestic demand.** Domestic users had generally been slow to demand the latest technologies. The major exception to this was in specialized tools for the defence industry, a market in which the U.S. machine-tool industry always remained very competitive.
- **Weak export capacity and infrastructure.** There was a dramatic increase in worldwide demand for machine tools in the latter half of the 1980s, which the U.S. firms failed to capitalize on. Because of the lack of a strong export orientation, the U.S. firms could barely penetrate the world's largest machine-tool markets. Firms' ability to export were hampered by a time consuming export licensing regime, tight government enforcement of export regulations from the 1950s governing defence-related technologies, and an absence of export supports (e.g., subsidized trade fairs, low-interest loans) similar to those that aid firms in other countries.

The resurgence started in 1990 when a number of American machine tools builders, in part aided by temporary U.S Government import limits on Japanese and Taiwanese CNC machines, joined in the effort to make cost competitive standard machines, launching an era of aggressive product development that has continued unabated since. Of all these American builders, the one that has achieved the most spectacular success is Haas Automation.

Haas continues to introduce new machine models at a remarkable pace, all of which follow the company's low cost, high volume model. Today the company offers a wide range of vertical machining centers, horizontal machining centers, CNC lathes and rotary products.

The Indian machine tools industry:

The Indian machine tools industry is also going through a similar situation at present.

- Except for HMT, there are not enough large firms and there is little cooperation among small and medium players though a few of the medium sized companies have made efforts to come under a unified umbrella to build

their own niche market and share the marketing and after-sales service. However, since they each of them operate in a niche market, there is less competition.

Indian companies also lack adequate capabilities in terms of export marketing.

The survey showed that the industry was very weak in its marketing abilities and depended on separate marketing organizations for sales. HMT though big and able to market its own products, was handicapped in providing an aggressive export thrust due to the legacy of Ministry approvals and other red tapeism for travel abroad unlike the flexibility that the private sector enjoys.

The Indian machine tools industry needs to be more innovative, bold and aggressive in marketing itself.

- Indian machine tools manufacturers are also facing difficulties in obtaining capital to finance export sales. They need distributors to hold inventory of standard products abroad to make inroads into the export market and this requires huge capital.
- Indian firms also lack the ability to do high-tech R&D and translate such technological research into market advantage. Though India has the competitive advantage of engineering skills and low man-hour cost of research assistants, yet this advantage cannot be capitalized due to partly lack of finance and partly lack of synergy between the user sector and the machine tools industry on one side and the academic and research institutes on the other.
- The Indian domestic demand arising from the small component manufacturers who are the sub-suppliers to the engineering, automobile and defence sector has not, so far, been very demanding with respect to the latest technologies due to cost considerations. However, this segment will create the highest demand for machine tools considering the fact that India is today becoming a manufacturing outsourcing hub for all the major industries worldwide. These component manufacturers would need to invest in more sophisticated and flexible machines for better productivity and quality of products to meet stringent international standards.
- The Indian machine tools industry on an average exports 6% of its sales and the biggest player viz. HMT exports only 10% of its sales. This low export performance by the industry is due to, reasons as mentioned below:
 - Lack of export marketing capabilities
 - Lack of financial resources to sustain inventory levels necessary to be kept
 - Lack of subsidized participation in trade fairs and trade missions

It is evident that for the Indian machine tools which also lays the foundation for generating employment both in the organized sector and in the entrepreneur-driven SME sector of manufacturing, to be prosperous in the long run needs to:

- Build large capacities of cost competitive standard products
- Build a marketing network in the domestic and international market to make its presence felt
- To look at its operational efficiencies and build companies with financial power to spend on marketing and R&D

The U.S. Government imposed import limits on Japanese and Taiwanese CNC machines to help their domestic machine tools industry, GOI should curb the imports of second hand machines and the following measures should be adopted:

- Second hand machine tools having “CE Mark” should only be allowed for import under OGL
- Second hand machines of CIF value more than Rs.1 crore only should be allowed for import under OGL
- Restrict the port of entry to one or two for effective monitoring of second hand imports machines.

Realizing the need to energize itself to take the maximum advantage of the booming Indian economy the Indian machine tools industry has set important twin objectives for itself:

- To expand capacities and develop technologically to win back a market share of at least 60% in India;
- To develop its product competitiveness both in technology and price to become a significant international player with an export level of at least 35% of production

The industry envisions an annual growth rate of around 25%, which is the least required to support a manufacturing industry growth rate of 12-15%. It is estimated that the industry’s annual turnover level would be around Rs. 6000 crores by 2012.

Measures to support the growth and development of the machine tools industry by spurring the demand:

- Government may consider introducing interest – free loans or 5% interest subsidy to SSIs for the purchase of CNC machines to encourage investments in modern CNC machine tools. (A similar measure called the ‘Sabatini Act’ spurred large growth of SMEs in Italy). This will have two-pronged effect of spurring machine tools demand and also help the SSI’s in modernizing themselves.
- Set up a technology up gradation fund for the machine tool industry to expand and modernize.

Machine Tool Park:

For engineering industries the availability of an efficient, cost competitive supply chain is absolutely essential. The machine tool industry is no exception. The Indian machine tool industry has shifted to the production of CNC machines, which require a whole range of high-technology elements as inputs for their manufacture.

Some of these are:

Linear guide ways, ball screws, spindle and axes support bearings, feedback and measuring systems, CNC systems, motors and drive controllers – there are no domestic manufacturers, and the machine tool companies import their entire requirement of these items which form nearly 40% of the input cost.

Other inputs which are only partially sourced from domestic suppliers are index and rotary tables, tool changers, tools and tool-holders, chucking systems, fixtures, chip conveyors, high pressure coolant systems etc. besides a host of attachments and accessories.

The industry also depends on suppliers for its castings, fabricated structures, sheet metal items, machined components etc.

Apart from these, machine tool companies also use services such as heat treatment, painting, sub-assembly etc. In future, there is likely to be a greater dependency on out-sourced services in design, application engineering, after sales service etc. from small firms specializing in these disciplines.

At present the machine tool industry's supply chain is composed of small firms located in dispersed cities and locations, with the result that there is no concerted development of these units to provide high quality products and services to definite time schedules and at internationally competitive prices. For some critical items mentioned above, in fact, there are no domestic manufacturers.

To enable the machine tools industry to make a quantum jump in its production to Rs.6000 crores, there is a need to create a facility that will assist the development of a whole set of SMEs in close proximity to the main machine tool firms. Such a facility requires the **creation of a Machine Tool Park**, where entrepreneurs can set up new machine tool related SMEs and expand existing ones to higher technology and volume levels. The machine tool companies will benefit by having a reliable supply chain on which to base their own expansion and growth plans. This model is highly successful in Taiwan and Korea, which have flourishing machine tool industries much larger than India's.

At present, the Indian machine tool industry is constrained by high cost, below – average quality/reliability and inability to deliver to committed schedules. The machine tool park can overcome these shortcomings, thereby making Indian machines not only export-worthy but also reverse the trend seen in the ratio of imports to domestic production.

The Machine Tool Park will require an infrastructure spread over 200 acres, factory buildings, roads, services and utilities costing totally around Rs. 200 crores. The

Government should consider establishing this infrastructure near Bangalore, since majority of the large machine tools industry are situated there.

Such a Machine Tool park could host around 400 units with an investment of around Rs.800 crores in plant and machinery brought in by machine tool companies, entrepreneurs and technocrats setting up SMEs and service firms. The expected turnover from all these units when fully functional would be approximately around Rs. 2000 crores per year, which will help propel the machine tool industry to Rs. 6000 crores. turnover. It can create employment for around 10000 persons and yield tax revenues about Rs.280 crores / year.

Machine Tool Research Centre (MTRC) – to spur machine tool and manufacturing technology research and development:

The machine tool industry has built up an enviable competence in being able to design and develop products for the automotive, consumer durable and industrial machinery sectors over the last 20 years. The industry has also supported the development of the defence, aerospace and nuclear sectors through the development of specialized machinery and equipment as and when required.

Notwithstanding this, there is a shortcoming on the part of the machine tool industry to meet the requirement of advanced and next generation technologies from user industries. It is essential to bridge this technology gap to consolidate its position as an important supplier to industry and to meet increasing competitive threats in the future from imports. The country also has an important stake in helping to strengthen the machine tool industry as a strategic measure.

- To make this possible, it is necessary to establish a Machine Tool Research Centre (MTRC) to give a wholly new orientation and thrust to the development of technologies and products for the manufacturing sector in India. This centre would support the machine tool industry with multi disciplinary skills in the mechanical, electrical, electronic, material and IT sciences.
- The role of the MTRC would be to develop specialized technologies, design, test and evaluate machines, set standards and otherwise support the machine tool industry in its endeavor to provide advanced machines and technologies to its users:
 - a) Research advanced machine tool technology (precision, productivity etc.)
 - b) Conduct research into machining processes (tools, materials etc.)
 - c) Conduct research into metal forming processes
 - d) Establish a machine testing laboratory to international standards
 - e) Establish high precision metrology standards and services
 - f) Develop specialized technology for users along with machine building industry
 - g) Support industry with specialized CAD/CAE, Technical information inputs

The most important requirement for taking up advanced technology development is highly qualified, experienced and knowledgeable staff in the field of machine tools and manufacturing technology. The MTRC should have the mandate to develop such talent by reciprocally involving suitable academic/research staff from the industry as well as with leading institutions abroad on a continuing basis. Some avenues are:

- Visits to the exhibitions and trade shows in machine tools/manufacturing technology
- Work with industries both Indian and if possible foreign on development projects
- Induct senior professors on the boards of machine tool companies
- Academic exchange programmes with universities/R&D institutions abroad,
- Participate at international conferences, present and publish papers
- Enable staff to earn degrees through industry related research work
- Encourage industry professionals to earn degrees through research
- Depute industry professionals to academic institutions for teaching and research

This would enable the development of a pool of research and development experts, to achieve any significant technological development in the machine tool industry.

For meeting the requirement of advanced technologies from the automobile and other user industries, the machine tool industry needs to go beyond just product development to technology research and development. It is estimated that around Rs.500 crores would be needed for both setting up the MTRC and the expenditure on development projects during the first five years.

Hence an allocation of Rs.500 crores may be made in the 11th Plan for setting up the Machine Tool Research Centre to support the technological development of an industry which is vital for manufacturing growth as well as being of strategic importance to the country.

A word in conclusion:

As per the recent speech by the President of FANUC, he visualizes that by 2010, 50% of the world machine tools production will come from India and China.

With this optimism, the Indian machine tools industry should stop thinking of today only and start acting for the future. The industry should address issues relating to capacity enhancement, the working environment, production technologies, managerial capabilities and concentrate seriously on technology and R&D to lead in global markets in the future. The catalyzing role that the Government can play in this is vital. The 11th Plan must see the resurgence of the Indian machine tool industry and its growth to a significant place among leading world machine tool producers.

Annexure-VII

BENCHMARKING - MACHINE TOOLS					
		Indian domestic Company (2004)	Schuler (2004)	DMG (2004)	Makino (2004)
1	Growth in sales (%)	45	16	10	25
2	Exports as a % of sales	6	9	52%	--
3	RM / Sales (%)	54	44.64	52.9%	--
4	Cost of wages / Sales %	16	30	27	--
5	No. of days of sales of outstanding (days)	48	39	98	138
6	EBIT / Sales (%)	8	4	7	--
7	R&D / Sales (%)	0.5	7	--	--
8	Sales / Employee (Rs. Lacs)	Rs.13.75	Rs.81	Rs.107	Rs.146
9	Inventory Turnover	4.2	4.4	3.8	3.4

ANNEXURE-VIII

EXPORTS FOR MACHINE TOOLS SECTOR**PRESSES****Commodity:** 846291 HYDRAULIC PRESSES **Unit:**

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	AFGHANISTAN TIS	194.72			0.12		
2.	ALGERIA	13.21			0.01		
3.	AUSTRALIA	37.40			0.01		
4.	AZERBAIJAN	5.55			0.00		
5.	BAHARAIN IS		10.68			0.00	
6.	BANGLADESH PR	42.38	7.88	-81.41	0.02	0.00	-88.89
7.	BELGIUM		40.58			0.01	
8.	BHUTAN	68.12			0.10		
9.	BOTSWANA	0.89			0.01		
10.	BURUNDI	0.51			0.00		
11.	CANADA		3.70			0.00	
12.	DENMARK		0.85			0.00	
13.	EGYPT A RP	79.57			0.01		
14.	ETHIOPIA		0.98			0.00	
15.	GERMANY	15.48			0.02		
16.	GHANA	7.27	5.70	-21.53	0.00	0.01	150.00
17.	INDONESIA	2.28	19.44	751.68	0.00	0.00	300.00
18.	IRAN		306.40			0.09	
19.	ISRAEL		51.20			0.00	
20.	ITALY	495.38			0.20		
21.	CONTE D'IVORY	8.62			0.00		
22.	JAPAN		0.30			0.00	
23.	JORDAN		12.83			0.03	
24.	KENYA	65.88	1.75	-97.34	0.00	0.00	-50.00

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25.	KOREA DP RP	15.08			0.00		
26.	MADAGASCAR		0.23			0.00	
27.	MALAWI		0.13			0.00	
28.	MALAYSIA	33.04	48.47	46.70	0.00	0.01	400.00
29.	MAURITIUS	6.50			0.00		
30.	MYANMAR		32.78			0.01	
31.	NEPAL	6.98	14.24	104.15	0.05	0.01	-90.91
32.	NIGERIA	70.44	113.10	60.56	0.01	0.00	-75.00
33.	NORWAY	2.57			0.03		
34.	OMAN	8.51	1.81	-78.75	0.00	0.00	-50.00
35.	PERU		0.34			0.00	
36.	PHILIPPINES	0.52	13.30	2,443.37	0.00	0.00	0.00
37.	POLAND	4.70			0.00		
38.	QATAR		8.84			0.00	
39.	SAUDI ARAB	506.33	0.86	-99.83	0.14	0.00	-99.30
40.	SINGAPORE	73.35	714.82	874.50	0.01	1.01	6,646.67
41.	SOUTH AFRICA	5.68	75.63	1,231.28	0.01	0.01	57.14
42.	SRI LANKA DSR	12.88	88.99	590.76	0.01	0.03	271.43
43.	SWEDEN	0.57			0.00		
44.	SYRIA	94.82	2.01	-97.88	0.00	0.00	-20.00
45.	TANZANIA REP	1.14	10.37	807.70	0.00	0.00	0.00
46.	THAILAND	28.46	4.44	-84.39	0.09	0.00	-97.80
47.	TOGO		11.77			0.01	
48.	TURKEY		100.90			0.02	
49.	UGANDA	1.93			0.00		
50.	U ARAB EMTS	227.60	251.96	10.70	0.19	0.05	-73.26
51.	U K		33.10			0.00	
52.	UKRAINE	30.13			0.00		
53.	U S A	50.78	61.62	21.35	0.02	0.02	18.75
54.	YEMEN REPubLC		38.23			0.03	
55.	ZAMBIA	1.29			0.00		
56.	ZIMBABWE	17.86			0.00		
	Total	2,238.42	2,090.22	-6.62			

Commodity: 84629914 VERTICAL STRAIGHT PRESSES Unit: NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	ANGOLA	1.89			0.00		
2.	BANGLADESH PR	8.19			0.00		
3.	BELGIUM	9.08			0.00		
4.	BRAZIL		0.26			0.00	
5.	DJIBOUTI	0.32			0.00		
6.	KENYA	1.30			0.00		
7.	NEPAL	20.78	0.21	-99.00	0.00	0.00	0.00
8.	PHILIPPINES		13.56			0.00	
9.	SAUDI ARAB	6.78			0.01		
10.	SINGAPORE	21.87	57.07	160.91	0.01	0.01	114.29
11.	SRI LANKA DSR	17.33	30.26	74.57	0.01	0.01	100.00
12.	TANZANIA REP		38.91			0.01	
13.	U ARAB EMTS	19.65	14.47	-26.35	0.01	0.01	85.71
	Total	107.20	154.75	44.35			

Commodity: 84629920 DIEING/LOBBING MACHINE PRESSES Unit: NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	BAHARAIN IS		0.20			0.00	
2.	BANGLADESH PR	54.06			0.23		
3.	GHANA	1.96			0.01		
4.	U ARAB EMTS	2.66			0.00		
	Total	58.68	0.20	-99.66			

Commodity: 84629930 TRANSFER & MULTIPLE PRESSES Unit: NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	SINGAPORE		0.60			0.00	
	Total		0.60				

Commodity: 84629990 OTHR PRESSES (MCHNCL & MANUAL) **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	AFGHANISTAN TIS	15.71			0.00		
2.	ARGENTINA	5.09	19.26	278.30	0.00	0.00	0.00
3.	AUSTRALIA	5.02	2.07	-58.74	0.01	0.00	-83.33
4.	BAHARAIN IS	12.07			0.00		
5.	BANGLADESH PR	40.65	2.88	-92.91	0.01	0.00	-76.92
6.	BRAZIL		19.79			0.00	
7.	CANADA		50.21			0.12	
8.	CHINA P RP	327.10			0.00		
9.	COLOMBIA		4.72			0.01	
10.	DOMINIC REP	0.81			0.00		
11.	EGYPT A RP		5.37			0.01	
12.	ETHIOPIA	35.83	1.44	-95.99	0.00	0.00	-60.00
13.	FRANCE		7.47			0.05	
14.	GERMANY	188.58	123.15	-34.70	0.17	0.03	-80.72
15.	GHANA	5.27			0.00		
16.	HONG KONG	0.85			0.00		
17.	HUNGARY		14.43			0.00	
18.	IRAN		11.04			0.00	
19.	ISRAEL	5.76			0.00		
20.	ITALY	207.11	0.61	-99.70	0.03	0.00	-96.88
21.	JAPAN		1.88			0.00	
22.	JORDAN		7.44			0.00	
23.	KENYA	14.79	73.17	394.82	0.00	0.02	2,300.00
24.	KOREA RP		7.62			0.00	
25.	KUWAIT		19.31			0.01	
26.	LEBANON		3.53			0.00	
27.	MADAGASCAR		18.07			0.00	
28.	MALAYSIA	128.11	7.99	-93.77	0.00	0.00	200.00

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29.	MYANMAR		260.95			0.08	
30.	MEXICO	5.30			0.00		
31.	MOZAMBIQUE		4.72			0.01	
32.	NEPAL	7.79	6.81	-12.67	0.01	0.01	27.27
33.	NETHERLAND	3.90			0.04		
34.	NIGERIA	123.16			0.01		
35.	OMAN	12.05	1.42	-88.22	0.00	0.00	0.00
36.	PAKISTAN IR	1.59			0.00		
37.	QATAR		4.41			0.00	
38.	ROMANIA	7.00			0.00		
39.	RUSSIA		0.94			0.00	
40.	SAUDI ARAB	13.42	36.03	168.50	0.03	0.03	3.85
41.	SINGAPORE	76.35			0.01		
42.	SOUTH AFRICA	82.15	0.30	-99.64	0.01	0.00	-80.00
43.	SPAIN		0.15			0.00	
44.	SRI LANKA DSR	17.15	110.09	541.80	0.01	0.06	353.85
45.	SUDAN		1.27			0.02	
46.	SWEDEN		6.74			0.00	
47.	TANZANIA REP		24.48			0.01	
48.	THAILAND	42.25	43.65	3.31	0.01	0.00	-50.00
49.	UGANDA	6.55			0.00		
50.	U ARAB EMTS	56.58	101.79	79.89	0.05	0.02	-56.52
51.	U K	8.02	1.62	-79.86	0.02	0.00	-95.65
52.	U S A	42.96	21.81	-49.24	0.03	0.04	27.27
53.	YEMEN REPUBLC		0.65			0.00	
54.	ZAMBIA		2.68			0.00	
	Total	1,499.00	1,031.95	-31.16			

GRINDERS**Commodity:** 84602930 CENTRELESS GRINDERS **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	INDONESIA		1.51			0.00	
2.	KUWAIT	15.46			0.00		
3.	TURKEY	3.93			0.00		
4.	U ARAB EMTS	8.86	6.30	-28.91	0.02	0.00	-88.24
5.	U S A	11.53	13.45	16.61	0.00	0.00	50.00
6.	VIETNAM SOC REP		29.95			0.01	
	Total	39.78	51.20	28.72			

Commodity: 84602940 PROFILE GRINDERS **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	INDONESIA		3.53			0.00	
2.	IRAQ		1.04			0.00	
3.	SAUDI ARAB	4.99			0.01		
4.	U ARAB EMTS	1.21			0.00		
	Total	6.20	4.56	-26.43			

DRILLING MACHINES**Commodity:** 82051000 DRILLING THREADING OR TAPING TOOLS **Unit:** KGS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	AFGHANISTAN TIS	35.78	15.22	-57.46	20.00	22.59	12.95
2.	ARGENTINA	9.16	9.38	2.36	0.41	3.02	640.20
3.	AUSTRALIA	7.92	4.70	-40.60	4.58	3.16	-30.90
4.	AUSTRIA	2.69	0.65	-75.86	0.17	0.29	68.60
5.	BAHARAIN IS	0.14	80.08	56,956.04	0.12	44.45	37,569.49

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6.	BANGLADESH PR	20.22	18.15	-10.21	15.17	4.70	-69.04
7.	BHUTAN		14.94			5.00	
8.	BRAZIL	12.48	55.21	342.52	12.54	13.88	10.61
9.	CANADA	12.07	18.40	52.47	2.27	3.64	60.04
10.	CHILE	34.82	44.79	28.62	6.08	8.30	36.36
11.	TAIWAN		6.59			4.32	
12.	CHINA P RP	6.03	17.26	186.32	1.06	4.13	289.52
13.	COLOMBIA	0.07	19.14	26,841.55	0.02	17.50	87,400.00
14.	CYPRUS	2.98	8.28	178.10	0.45	1.19	164.44
15.	CZECH REPUBLIC	4.53	6.80	50.17	4.00	0.85	-78.72
16.	DENMARK		3.49			0.51	
17.	DJIBOUTI	3.53	5.48	55.41	0.85	3.50	311.76
18.	ECUADOR	2.82			1.00		
19.	EGYPT A RP	22.01	22.01	0.01	9.20	4.18	-54.57
20.	EL SALVADOR	0.81			0.60		
21.	FINLAND	17.98			17.12		
22.	FRANCE	12.67	3.44	-72.84	1.77	0.46	-73.98
23.	GERMANY	167.35	251.15	50.08	37.61	31.77	-15.53
24.	GHANA		26.60			26.60	
25.	GREECE	4.35	15.38	253.72	4.31	1.38	-67.87
26.	GUATEMALA		5.64			0.57	
27.	GUINEA		0.86			0.13	
28.	HONG KONG	12.01	39.54	229.21	2.31	17.44	655.68
29.	HUNGARY	2.33			3.56		
30.	INDONESIA	8.66	31.35	262.03	1.77	28.49	1,505.07
31.	IRAN	1.80	6.62	267.37	0.53	2.50	369.92
32.	IRAQ	5.40			0.80		
33.	IRELAND	0.28			0.05		
34.	ISRAEL	5.77			1.30		
35.	ITALY	13.80	66.57	382.23	5.45	50.35	824.14
36.	JAPAN	25.34	27.70	9.30	17.80	11.92	-33.04
37.	JORDAN	3.03	2.68	-11.58	0.40	0.24	-39.90
38.	KAZAKHSTAN		0.46			0.16	

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39.	KENYA	5.24	6.76	28.96	1.82	4.65	156.22
40.	KOREA DP RP		0.02			0.00	
41.	KOREA RP		0.25			0.45	
42.	KUWAIT	6.28	16.30	159.53	11.38	6.86	-39.70
43.	LUXEMBOURG		0.25			0.01	
44.	MADAGASCAR	2.77			3.10		
45.	MALAWI		6.04			1.00	
46.	MALAYSIA	105.88	81.17	-23.34	34.34	10.58	-69.20
47.	MALDIVES	0.05			0.08		
48.	MYANMAR	0.43	0.79	85.38	0.23	1.65	632.30
49.	MEXICO	35.97	22.46	-37.54	9.92	17.00	71.37
50.	MOZAMBIQUE		0.08			0.01	
51.	NEPAL	3.69	2.00	-45.77	2.32	3.72	60.22
52.	NETHERLAND	0.21	33.08	15,650.80	1.20	9.27	670.80
53.	NEW CALEDONIA	0.11			0.10		
54.	NEW ZEALAND	3.86	6.59	70.90	2.69	2.35	-12.51
55.	NIGERIA	4.03	8.65	114.54	7.08	2.20	-68.87
56.	OMAN		7.91			3.10	
57.	PAKISTAN IR		0.70			0.03	
58.	PANAMA REPUBLIC	11.24	24.33	116.49	2.02	3.33	64.85
59.	PAPUA N GNA		0.63			0.18	
60.	PARAGUAY	0.11			0.01		
61.	PERU	3.89	4.24	9.19	11.00	2.00	-81.82
62.	PHILIPPINES	6.33			1.19		
63.	POLAND	0.60	7.05	1,074.04	0.75	1.40	86.67
64.	PORTUGAL	0.16	1.46	826.80	0.13	0.77	516.00
65.	QATAR	1.99	4.08	104.74	0.25	0.36	44.00
66.	ROMANIA	0.39			0.01		
67.	RUSSIA	4.47	28.28	532.79	7.88	7.42	-5.80
68.	SAUDI ARAB	31.43	18.97	-39.63	11.67	8.86	-24.10
69.	SEYCHELLES	0.18	0.43	140.13	0.05	0.10	122.22
70.	SLOVAK REP	1.22			2.50		
71.	SINGAPORE	16.26	45.83	181.89	3.84	35.66	828.40

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72.	SOUTH AFRICA	100.59	60.95	-39.41	60.80	14.12	-76.77
73.	SPAIN	5.74	17.43	203.45	2.02	15.07	645.94
74.	SRI LANKA DSR	9.80	19.70	101.04	7.22	5.99	-17.03
75.	SUDAN	1.65			0.32		
76.	SWEDEN	6.07	5.96	-1.69	5.88	0.96	-83.68
77.	SYRIA	0.91			0.52		
78.	TANZANIA REP	0.65	38.54	5,800.47	0.36	4.60	1,177.78
79.	THAILAND	9.89	38.91	293.45	3.31	12.63	282.03
80.	TOGO	15.43			2.00		
81.	TUNISIA		5.42			5.68	
82.	TURKEY	26.35	47.02	78.43	10.80	40.06	270.88
83.	UGANDA	1.10	2.31	109.05	1.06	0.60	-43.21
84.	U ARAB EMTS	100.76	98.90	-1.85	47.16	20.52	-56.48
85.	U K	108.98	261.03	139.51	31.36	31.77	1.30
86.	UKRAINE		0.13			0.02	
87.	U S A	107.37	281.62	162.30	65.13	91.65	40.73
88.	URUGUAY	4.67	4.47	-4.24	0.50	0.50	0.00
89.	VIETNAM SOC REP		0.55			0.10	
90.	ZAMBIA	21.23	20.23	-4.70	4.60	18.00	291.30
91.	ZIMBABWE		0.10			0.01	
	Total	1,226.79	2,060.21	67.93			

Commodity: 84592100 DRILLING MCHNS, NUMERICALLY CONTROLLED **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	ARGENTINA		19.35			0.00	
2.	GERMANY	0.21			0.00		
3.	MOZAMBIQUE	17.09			0.00		
4.	NORWAY		0.18			0.00	
5.	SOUTH AFRICA	3.00			0.00		
6.	U ARAB EMTS		0.68			0.00	

7.	U K		0.52			0.00
	Total	20.30	20.72	2.06		

Commodity: 84592950 MULTI HEAD DRILLING MACHINES Unit: NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	ALGERIA		3.18			0.01	
2.	AUSTRALIA		14.63			0.01	
3.	HONG KONG		8.98			0.01	
4.	NEPAL	0.17	6.10	3,486.47	0.00	0.01	500.00
5.	NIGERIA	1.44			0.00		
6.	SINGAPORE		27.33			0.30	
7.	U ARAB EMTS	8.59	1.67	-80.58	0.01	0.00	-75.00
8.	U K	1.15	1.61	39.96	0.00	0.00	100.00
	Total	11.35	63.49	459.33			

Commodity: 84659500 DRILLING/MORTICING MACHINES Unit: NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	AUSTRALIA	0.25	0.60	137.01	0.00	0.00	100.00
2.	AUSTRIA	105.89			0.01		
3.	BAHARAIN IS	0.09			0.00		
4.	BANGLADESH PR	1.84			0.01		
5.	BHUTAN	1.44			0.00		
6.	CANADA	0.73			0.00		
7.	CHILE		110.56			0.04	
8.	DJIBOUTI	40.22			0.08		
9.	ECUADOR	1.73			0.00		
10.	FINLAND	1.40			0.01		
11.	FRANCE	7.70	6.18	-19.73	0.04	0.03	-21.95
12.	GERMANY	1.24			0.00		
13.	HONG KONG	22.85			0.00		

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14.	IRAQ	95.99			0.05		
15.	ITALY		37.03			0.01	
16.	KENYA	44.65	15.82	-64.58	0.10	0.00	-95.05
17.	KOREA RP	0.18			0.00		
18.	KUWAIT	0.94			0.00		
19.	MALDIVES		0.09			0.00	
20.	MALI		0.45			0.00	
21.	MAURITIUS		1.07			0.01	
22.	MYANMAR		26.95			0.01	
23.	NEPAL	3.66	1.32	-63.76	0.00	0.01	180.00
24.	NETHERLAND	8.66			0.04		
25.	NIGERIA	112.98	24.35	-78.45	0.01	0.01	-11.11
26.	NORWAY	0.12	24.37	20,424.09	0.00	0.01	1,000.00
27.	OMAN	3.28	11.11	239.06	0.00	0.00	0.00
28.	QATAR	0.73			0.00		
29.	SAUDI ARAB	12.63			0.08		
30.	SINGAPORE		2.03			0.00	
31.	SOUTH AFRICA	28.02			0.02		
32.	SRI LANKA DSR	1.55	5.44	252.00	0.00	0.02	300.00
33.	SWITZERLAND		110.56			0.04	
34.	TANZANIA REP		18.42			0.01	
35.	THAILAND		39.45			0.01	
36.	TOGO	0.11	17.85	15,769.63	0.00	0.00	0.00
37.	TUNISIA	18.79			0.11		
38.	TURKEY		138.95			0.01	
39.	UGANDA	55.99	0.80	-98.57	0.11	0.00	-98.13
40.	U ARAB EMTS	109.78	1,449.78	1,220.66	0.05	1.07	2,230.43
41.	U K	10.51	26.30	150.39	0.00	0.01	233.33
42.	UKRAINE		9.10			0.00	
43.	U S A	78.17	62.69	-19.81	0.01	0.03	107.69
44.	YEMEN REPubLC		2.29			0.02	
45.	ZAMBIA	9.57	31.33	227.56	0.01	0.00	-87.50
	Total	781.69	2,174.90	178.23			

MILLING

Commodity: 84593100 BORING-MILLING MCHNS,NUMRCLY CNTRLLED **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	MALAWI	1.90			0.00		
2.	URUGUAY	1.65			0.00		
	Total	3.55					

LATHES

Commodity: 8458 LATHES (INCL TURNG CENTR) FR REMOVNG METL **Unit:**

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	AFGHANISTAN TIS	5.09					
2.	ALGERIA	7.65					
3.	ARGENTINA		0.79				
4.	AUSTRALIA	136.20	54.46	-60.02			
5.	BAHARAIN IS	1.82	31.57	1,637.39			
6.	BANGLADESH PR	757.23	972.20	28.39			
7.	BELGIUM		45.90				
8.	BHUTAN		5.90				
9.	BRAZIL	13.40	88.01	556.87			
10.	BURUNDI	6.73					
11.	CANADA	1.32	25.71	1,843.63			
12.	TAIWAN	76.09	23.99	-68.47			
13.	CHINA P RP		719.54				
14.	CONGO P REP	10.29					
15.	CYPRUS		9.43				
16.	CZECH REPUBLIC		2.63				
17.	DENMARK	13.93	1.15	-91.73			
18.	EGYPT A RP	25.83	25.59	-0.90			
19.	ERITREA		13.66				

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20.	FINLAND		1.36				
21.	FRANCE	82.72					
22.	GEORGIA	13.61	43.55	220.04			
23.	GERMANY	155.57	109.15	-29.84			
24.	GHANA	68.50	14.84	-78.33			
25.	GREECE	2.16	16.48	661.05			
26.	HONG KONG	32.08					
27.	INDONESIA	81.73	52.92	-35.24			
28.	IRAN	54.83	34.70	-36.71			
29.	IRAQ	5.93					
30.	ISRAEL	1.51					
31.	ITALY	187.38	145.30	-22.46			
32.	JAPAN	5.47	21.39	290.96			
33.	JORDAN	14.00					
34.	KENYA	16.28	72.04	342.57			
35.	KOREA DP RP	0.68	6.72	884.26			
36.	KUWAIT	42.52	8.45	-80.12			
37.	MALAWI		30.19				
38.	MALAYSIA	0.32	2.21	579.97			
39.	MALDIVES		1.09				
40.	MAURITIUS	0.81	1.30	60.58			
41.	MYANMAR	5.84	213.69	3,558.42			
42.	MEXICO		48.98				
43.	MOZAMBIQUE	1.04	2.01	94.24			
44.	NEPAL	27.27	39.34	44.27			
45.	NETHERLAND		30.29				
46.	NETHERLANDANTIL	12.48					
47.	NEW ZEALAND		0.31				
48.	NIGERIA	524.56	69.86	-86.68			
49.	OMAN	9.20	83.41	806.79			
50.	PHILIPPINES		64.88				
51.	POLAND	4.65	12.81	175.64			
52.	PORTUGAL	4.88					

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53.	PUERTO RICO		8.33				
54.	QATAR	3.10	13.15	323.59			
55.	ROMANIA		4.91				
56.	RUSSIA	1.29	2.25	73.98			
57.	SAUDI ARAB	110.92	156.47	41.06			
58.	UNION OF SERBIA & MONTENEGRO		1.31				
59.	SEYCHELLES		2.57				
60.	SINGAPORE	166.50	230.90	38.68			
61.	SOUTH AFRICA	8.05	70.98	781.31			
62.	SPAIN	6.44					
63.	SRI LANKA DSR	27.31	42.89	57.02			
64.	SUDAN	36.78	23.56	-35.94			
65.	SYRIA	0.72	76.30	10,556.42			
66.	TANZANIA REP	16.73	12.21	-27.01			
67.	THAILAND	5.85					
68.	UGANDA	15.49					
69.	U ARAB EMTS	166.60	337.50	102.58			
70.	U K	14.10	320.92	2,176.58			
71.	U S A	326.07	568.65	74.39			
72.	VIETNAM SOC REP	5.96	53.49	797.53			
73.	YEMEN REPBLC	18.50					
74.	CONGO D. REP	0.85					
75.	ZAMBIA		3.50				
76.	ZIMBABWE	0.62					
77.	UNSPECIFIED	20.12	1.48	-92.64			
	Total	3,363.57	5,079.21	51.01			

Commodity: 84581100 HORIZONTAL LATHES, NUMERICALLY CONTROLLED
Unit: NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	BANGLADESH PR	44.94	278.87	520.55	0.02	0.15	856.25
2.	GERMANY	3.40			0.00		
3.	GHANA		4.01			0.00	
4.	INDONESIA		27.81			0.01	
5.	IRAN		3.99			0.00	
6.	JAPAN	5.11			0.00		
7.	KUWAIT	14.89			0.00		
8.	MOZAMBIQUE		2.01			0.00	
9.	NEPAL	0.23			0.00		
10.	NETHERLAND		26.62			0.00	
11.	NIGERIA	5.21			0.00		
12.	SAUDI ARAB		1.72			0.00	
13.	SINGAPORE	2.83			0.00		
14.	SOUTH AFRICA		19.97			0.00	
15.	SRI LANKA DSR	0.63			0.00		
16.	U S A		77.13			0.01	
	Total	77.24	442.13	472.44			

Commodity: 84581919 OTHER AUTMTC, SNGL SPNDL HORZNTL LATHES
Unit: NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	BAHARAIN IS		8.91			0.00	
2.	BANGLADESH PR	131.25			0.03		
3.	IRAN		5.75			0.02	
4.	ITALY	18.43	35.93	94.94	0.00	0.00	100.00
5.	KENYA		2.93			0.00	
6.	MEXICO		9.86			0.00	
7.	NEPAL	1.89	0.53	-71.95	0.01	0.00	-80.00

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8.	PORTUGAL	4.88			0.00		
9.	QATAR		13.15			0.00	
10.	SAUDI ARAB	9.01	6.32	-29.91	0.01	0.00	-62.50
11.	SPAIN	3.25			0.00		
12.	SRI LANKA DSR	3.29			0.00		
13.	SUDAN	31.41			0.00		
14.	U ARAB EMTS	3.40	4.66	37.15	0.00	0.00	33.33
15.	U S A	42.51	41.05	-3.43	0.06	0.01	-90.00
	Total	249.33	129.08	-48.23			

Commodity: 84589100 OTHER NUMERICALLY CONTROLLED LATHES **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	AUSTRALIA	7.15			0.01		
2.	BANGLADESH PR		14.46			0.00	
3.	GERMANY	49.53			0.00		
4.	NEPAL	0.40	2.90	624.28	0.00	0.00	0.00
5.	SAUDI ARAB	0.35			0.00		
6.	SINGAPORE	156.82	112.91	-28.00	0.22	0.20	-11.21
7.	U ARAB EMTS		0.78			0.00	
8.	U S A		20.40			0.01	
	Total	214.25	151.45	-29.31			

Commodity: 84589934 COPYING LATHES **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	TAIWAN	5.44			0.00		
2.	NEPAL	0.78			0.00		
	Total	6.22					

Commodity: 84589951 CENTRE LATHES, TOOL-ROOM TYPE **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	BELGIUM		0.44			0.00	
2.	NIGERIA		2.76			0.00	
3.	POLAND		0.47			0.00	
4.	U ARAB EMTS		0.48			0.00	
5.	U K		2.40			0.00	
	Total		6.55				

Commodity: 84589959 CENTRE LATHES,OTHERS **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	BANGLADESH PR	25.08	11.98	-52.22	0.03	0.00	-85.19
2.	CANADA		11.46			0.00	
3.	EGYPT A RP		25.59			0.00	
4.	FRANCE	26.19			0.01		
5.	GERMANY	72.92			0.20		
6.	GHANA	62.56			0.01		
7.	ITALY	58.43			0.01		
8.	KENYA		4.14			0.00	
9.	MALAWI		30.19			0.01	
10.	MYANMAR	4.44			0.00		
11.	NEPAL	0.55	2.33	324.35	0.00	0.00	200.00
12.	NIGERIA	12.45			0.00		
13.	PHILIPPINES		58.71			0.02	
14.	RUSSIA	1.29	2.25	73.98	0.00	0.00	0.00
15.	SAUDI ARAB	10.82	4.56	-57.90	0.00	0.00	-40.00
16.	SINGAPORE		1.02			0.00	
17.	SOUTH AFRICA		35.93			0.00	
18.	SRI LANKA DSR	7.13			0.00		
19.	U ARAB EMTS	11.87	4.16	-64.94	0.01	0.00	-71.43
20.	U K	2.16			0.00		

21.	U S A		192.79			0.10	
	Total	295.89	385.12	30.16			

Commodity: 84589990 ALL OTHER LATHES EXCL CENTRE LATHES **Unit:** NOS

S.No.	Country	Values in Rs. Lacs			Quantity in thousands		
		2003-04	2004-05	%Growth	2003-04	2004-05	%Growth
1.	AFGHANISTAN TIS	5.09			0.00		
2.	ALGERIA	7.65			0.02		
3.	AUSTRALIA	83.21	49.10	-40.99	0.02	0.01	-50.00
4.	BAHARAIN IS		19.77			0.00	
5.	BANGLADESH PR	434.83	662.80	52.43	0.15	0.24	64.38
6.	BELGIUM		45.46			0.19	
7.	BHUTAN		5.90			0.00	
8.	BRAZIL		66.01			0.06	
9.	BURUNDI	1.02			0.00		
10.	CANADA		9.47			0.01	
11.	TAIWAN		16.67			0.01	
12.	CHINA P RP		249.90			0.17	
13.	CONGO P REP	10.29			0.00		
14.	CYPRUS		9.43			0.00	
15.	CZECH REPUBLIC		2.63			0.00	
16.	DENMARK	13.93			0.03		
17.	EGYPT A RP	17.03			0.00		
18.	GEORGIA	13.61			0.00		
19.	GERMANY	5.39	55.14	923.24	0.00	0.06	6,200.00
20.	GHANA	5.94	10.84	82.57	0.00	0.01	140.00
21.	GREECE		10.95			0.01	
22.	INDONESIA	29.97	25.11	-16.19	0.01	0.01	-9.09
23.	IRAN		1.68			0.00	
24.	IRAQ	0.88			0.00		
25.	ISRAEL	1.51			0.00		

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26.	ITALY	100.15			0.04		
27.	JAPAN	0.37	2.80	665.08	0.00	0.00	100.00
28.	JORDAN	14.00			0.00		
29.	KENYA	7.47	61.15	718.74	0.00	0.01	400.00
30.	KUWAIT	21.19	1.67	-92.12	0.06	0.00	-98.28
31.	MAURITIUS	0.81			0.00		
32.	MOZAMBIQUE	1.04			0.00		
33.	NEPAL	21.07	30.66	45.50	0.02	0.01	-18.75
34.	NETHERLAND		2.63			0.00	
35.	NIGERIA		8.94			0.00	
36.	OMAN	7.11	45.88	545.56	0.00	0.01	120.00
37.	PHILIPPINES		0.85			0.00	
38.	POLAND	2.38			0.00		
39.	ROMANIA		4.91			0.00	
40.	SAUDI ARAB	15.20	16.16	6.29	0.02	0.01	-65.22
41.	SINGAPORE		7.17			0.00	
42.	SPAIN	3.19			0.00		
43.	SRI LANKA DSR	8.78	21.80	148.23	0.01	0.01	-36.36
44.	SUDAN	5.38	23.56	338.33	0.01	0.01	14.29
45.	TANZANIA REP	12.74	6.74	-47.07	0.01	0.00	-33.33
46.	UGANDA	1.29			0.00		
47.	U ARAB EMTS	76.78	78.81	2.64	0.03	0.03	0.00
48.	U K		210.96			0.17	
49.	U S A	31.85	4.41	-86.15	0.02	0.00	-87.50
50.	VIETNAM SOC REP	5.96	38.98	553.99	0.00	0.01	275.00
51.	YEMEN REPubLC	11.96			0.00		
52.	CONGO D. REP	0.85			0.00		
53.	ZAMBIA		3.50			0.00	
54.	ZIMBABWE	0.62			0.00		
	Total	980.50	1,812.44	84.85			