

Role of Machine Tools Industry in Economic Development

Pradeep Kumar Saxena¹, Dr. Amit Sharma²

¹Joint General Manager (Design & Sales Engg.), HMT Machine tools Ltd. Ajmer, Research scholar (Marketing Management), Bhagwant University, Sikar Road, Ajmer (Rajasthan), India - 305004

²Assistant Professor, Department of Management Studies, Govt. Engineering College (Rajasthan Technical University) Badalya Circle, NH8, Near Nareli Jan Teerth, Ajmer (Rajasthan), India - 305003

Abstract: Machine tools are the main driving force of industrialization of a country or a region. They are the corner stone of economic development and sustained growth of manufacturing sector. The objective is to ensure sustained growth of 15-20% which will not be feasible unless proper thrust is given to Machine tools manufacturing sector. The need of the hour is to strengthen and realise the critical role of Machine tools industry to cater to the rising expectations and requirement of automobile, Railways, Defence, Aerospace and other engineering industries to give required boost to manufacturing sector. Being an integral sector, growth of machine tools industry has an immense bearing on the entire economy, especially India's manufacturing industry. It is even more crucial for development of country's strategic segments such as Defence, Railways, Space and Atomic energy and generation of large scale employment.

Key Words: CNC, PIP, R&D, SMEs, FDI, GDP, FTAs, PTAs.

INTRODUCTION

Economic developments in India during the past one year have been volatile and full of uncertainties and did not spare any of the sectors especially the manufacturing sector. We have to learn many lessons from the recent economic downturn. It has also been discovered that manufacturing sector is the core of the economy which creates real economic and societal value. The financial system of western economies, which was designed to serve the manufacturers, grew far larger than the real economy taking the shape of balloon that exploded in one night with devastating consequences on their economies, especially on their manufacturing industries which had an adverse impact on almost entire society. As the golden years of financial services industry are over, the manufacturing industry is back on the rise in Europe and other western countries. In present circumstances only manufacturing sector can offer full potential to reboot the economy and to create new jobs which can't be vanished over night. Therefore, it needs to be developed as culture. Best manufacturing practices and Productivity Improvement Programmes (PIP) are needed in present economic scenario when rupee is slumping and manufacturing economy dwindling. It will not be feasible without the active role of machine tools industry which is a back bone of manufacturing sector for sustained economic development and generation of large scale employment. Machine tools have a strategic place within the industry as they enable the production of all other industrial machinery and equipments which are in the area of mechanical engineering.

STRATEGIC IMPORTANCE OF MACHINE TOOLS INDUSTRY

Machine tools are important and critical equipments used in manufacturing sector for basic and precision engineering/processing work. These are characterized by long operating life, high unit price, high technology and involving assembly of number of components and critical parts. Machine tools are catering to automobile, tractors, bearings, railways, power, defence and general engineering industries and contributing significantly in the development of manufacturing sector. It is an integral part of manufacturing sector, which directly affects the economy of the nation. Machine tools are known as mother machines and they enable production of all other machines including themselves. Machine tools were the catalyst for the industrial revolution, which broke out in Britain in 18th century. Developing a strong machine tools industry

allows a Nation to take control of its economic development, which plays a significant role in determining the status of a Nation whether it is a developing or developed Nation. World over too, industrially advanced and developed countries have created market niche on the back of a well developed and supported machine tool Sector. Let us look around us and count one by one which objects we see in our environment: Computers, mobile phones, buses, trains, cars, aircrafts etc. Then think of the objects which we don't see in our daily life but that make our life easy and comfortable: wind turbines and solar panels that generate carbon free energy, medical implants which improve the quality of life for people with health problems, satellite that enables us to communicate faster and cheaper, construction machinery used to make road, buildings, bridges, and skyscrapers etc. If we wonder how these objects are made, they are made by the immense contribution of **Machine Tools**.

GLOBAL SCENARIO OF MACHINE TOOLS

Global machine tools estimated production amounted to USD (United State Dollar) 93.2 billion during 2012, a slight decline of 1% from USD 94.3 billion during 2011. Global consumption of machine tools amounted USD 85.4 billion during 2012 had decreased by 3% from USD 87.6 billion during 2011. Key high lights of Global performance were continued by Chinese dominance. China for years has been the largest machine tools consuming countries. In 2009 it became the largest manufacturing nation as well and this leadership continued and still today China is dominant player in the field of machine tools, holding 30% share of global output. Japan bounced back smartly despite all odds by retaining second position (20% market share) in global ranking of leading machine tool players. The gap between China and Japan is substantially large making an arduous task for the latter to catch even the next few years. The third largest machine tools manufacturing country- Germany (15% market share) fared equally well with a positive growth despite unfavourable conditions in European Union. 2010, 2011 and 2012 were years of delight for other Asian performers like Korea & Taiwan and these countries grew at over 60% and secured leading position of fourth and sixth respectively in overall production ranking. Top three countries account for 64% of global output. Sluggish market conditions in Europe led to slip in fortunes of most of the European machine tools manufacturing countries during this period. Italy, Switzerland, Spain, France, Austria, Czech Republic and UK either had flat growth or witnessed decline in production of Machine Tools. USA also witnessed similar business scenario during this period and dropped to 7th position.

ASIAN SCENARIO OF MACHINE TOOLS

Asia is now being seen as the future destination for global machine tool market and it is expected that next few years will be the years of resurgence for all leading Asian machine tool players. Share of Asian countries in global production increased to more than 60% in 2012 and is well on course to achieving a two-third share within next year. If machine tools are the basic building blocks of manufacturing based economies, then the rate at which a country installs new ones ought to say something about its pace of industrialization and economic development. For the past decade China has dominated the world in overall consumption of machine tools. All in all, 2011 was remarkable year with high growth for most of the machine tools manufacturing countries of the world. Asian belt will continue to be the global attraction vis-à-vis the machine tool industry with expectations of better performance by all its manufacturing countries in next few years. Most major producers had relatively small percentage changes in their output during 2012. Japan continued its dominance over the export front, followed closely by Germany and Italy. Together with Italy, the three countries accounted for more than half of the global machine tool exports in 2012. There was good news on import front too with a 38% growth on total imports worth USD 38 billion in 2011 and USD 40 billion in 2012. The world's largest importer happened to be China with more than one-third share; followed by USA, Germany and India.

INDIAN SCENARIO OF MACHINE TOOLS

Machine tools industry in India comprises about 475 manufacturers with 150 units in organized sector. Almost 80 percent of production is contributed by ten to fifteen major companies of this industry. The industry has an installed capacity of over USD 850 million and employs a work force of about 45,000 skilled and unskilled personnel. Machine Tool industry in India is scattered all over the country. The hub of manufacturing activities, however is concentrated in places like Mumbai and Pune in Maharashtra; Batala and Ludhiana in Punjab; Ahmedabad, Baroda, Jamnagar, Rajkot and Surendranagar in Gujarat; Coimbatore and Chennai in Tamil Nadu; some part in east India; Bangalore in Karnataka. Bangalore is considered as the hub for the Indian Machine Tool industry. The city, for instance, houses renowned names such as HMT Machine Tools Ltd, Ace Group, BFW and Kenna Metals etc. At present India stands 13th in production and produced USD 720 million worth of machine tools in year 2012-13, having share of 0.8% in global production. India ranks 6th in consumption and consumed USD 2286 million holding share of about 3% in global consumption. Machine Tool consumption is more than three times the production which justifies the immense growth potential in Machine Tools industry and all out efforts

should be made to reverse this trend, which will be major step towards achieving sustained economic development and generation of large scale employment.

MACHINE TOOL INDUSTRY IS A KEY ENABLNG SECTOR.

The Machine tools industry is a critical subsector of mechanical engineering industry. Machine tools have a strategic place within the industry as they enable the production of all industrial equipments and machinery which are in the area of mechanical engineering. Machine tools are the origin of almost every manufacturing process which includes metal. Most of the objects that we see in our daily life from cars to planes, from wind turbines to satellite and from watches to computers and to mobile phones are made by machine tools. The machine tool industry as such, is fundamental to the productivity and one of the key parameter of competitiveness of entire manufacturing base of the country. It plays significant role in the industrialization of the country and transfers production expertise to other manufacturing segments. Machine tool companies join hands with their customers to work on developing new solutions for better production practices in line with the requirement of market. Therefore presence of strong Machine tool industry is key to triggering innovation in production technologies which enhances industry's ability to develop and produce new products and services.

There is no progress without this enabling technology. Machine tools also enable to transfer the latest technology in information and communication technologies or material sciences into production systems, which increase the efficiency of production process and to machine new materials which are later used in new fields and applications. Technological advancements in machine tools industry and related production processes will have an impact on Nation's ability to live up to mega challenges of 21st century such as resource efficiency, environment protection, ageing population, sustainable mobility and employment generation. Advancement in Machine Tools technology helps customer industries achieve greater resource efficiency and significant gains in material, energy consumption and overall productivity.

Machine Tools can play a significant role in enabling India to build up the cutting edge infrastructure required for transition to low carbon energy sources in line with European and other western countries. Solar, wind, thermal and hydraulic energy industries rely entirely on components produced by machine tools to build safe and robust power plants. We need faster and safer transport solutions with minimum impact on environment. Automobile, Railways, Aviation, defence and Aerospace industries will need to improve their environmental performance significantly to live up to the challenges of sustainable mobility in 21st century and machine tools will be key contributor to this issue as they are used on almost every stages of the manufacturing process of means of transportation, from the production of simplest parts to increasingly sophisticated and high precision components, which have significant impact on energy saving potential of transport vehicles. Railway vehicles, ship building, aerospace and automobile industries have achieved tremendous progress in weight reduction by inventing new materials which are light and robust. They rely entirely on processing technologies provided by the machine tools to process new materials and use them in new products and applications. Medical aids and equipments are also produced due to extra ordinary advancement in machine tools and ultra precision machining technologies, which plays vital role in ensuring better quality of life for citizens and raising standard of living of people by lowering health care cost. Cognitive capabilities, improved human- machine interaction and augmented automation will play a key role in meeting future challenges.

BUSINESS PROSPECTS

The domestic production of machine tool Industry is around 30% of country's consumption and expected to grow substantially in next five years. There is a huge gap between production and consumption which offers several opportunities for investment and adding capacities in order to yield long term benefits. The government is giving thrust to manufacturing sector at the right time when the world is looking at India as a manufacturing hub for global requirement. Current scenario of Indian Economy has thrown up more challenges than opportunity in the way of galloping growth phenomenon. We quite clearly enjoy vast demographic advantage of 50% population below 25years of age. There is a tremendous convergence of knowledge workers and above all an exceptional spread of mass in rural area. All these transform into a huge volume of consumer demand- a fact being increasingly realized and acted by external market forces. Looking beyond India is all set to enter a new phase- bench marking for itself a much higher growth rate than before over the next five years. There is a vision for manufacturing – one of achieving 25% share in overall GDP by the year 2025 from the present 16% by having concerted focus on R & D, Innovation and Technology development in Machine Tool sector which can generate 100 million jobs in manufacturing sector. The growing automobile sector provides very encouraging picture ahead. There is equally a subtle shift in demand in infrastructure, energy, construction, material handling, and health care besides defence, aerospace and medical engineering sector. These industries are also looking for more challenging manufacturing solutions- some currently out of reach of Indian Machine Tools suppliers.

KEY ISSUES AND CHALLENGES

Technology Driven and Knowledge Intensive: Machine Tool industry is capital, technology and knowledge intensive field with high R & D intensity. R & D intensity is the ratio of R & D investment to net sales. It requires deep understanding and knowledge of mechanical engineering, hydraulics, process engineering, software engineering, kinematics and other disciplines. The machine tool knowledge base is built on multidisciplinary scientific legacy and engineering expertise which cannot be easily acquired or copied. Those who master the engineering expertise in production technology also benefit from first mover advantages in the development of future products and services. R & D and Innovation have always been a neglected aspect of Indian industry and due to this reason our industry is not competitive in global arena. We need to develop R & D and innovation as culture in our organizations to build competitive edge.

Excessive Dependence on Import: Indian Machine Tools sector have excessive dependence on imports on two- counts. Firstly, direct import of machine tools which is 65% - 75% of the total demand. The domestic production is already declining in percentage of total demand. This is because the demand of high technology machine tools is increasing over a time. The Indian companies are not able to keep pace with the technology advancements elsewhere. Secondly, the import content in the domestic product is also increasing, again on account of technology advancement. The impacts are losing share of manufacturing and consequently income and employment. The Industrial Licensing and FDI (Foreign Direct Investment) policies for the sector were liberalized in 1991 reforms. Still FDI is marginal in Machine Tool sector. It was mainly for service centers / representative offices for imported machine tools and not for core manufacturing technologies. FDI failed to spur the sector with advance technology and management practices, as compared to other sectors like Telecom services, automobiles and soft ware etc. This brings out the fact that present policy set is not serving the industry growth needs.

Technology Denial: Developed nations are not willing to share the knowledge acquired by them. It is well known that certain advanced manufacturing technologies like Japan and Germany are not allowing export of high technology machine tools to India on the basis that these are “dual use” technologies. The denials were usually applied to certain “entities” in India engaged in the defence, aerospace and nuclear manufacturing activities, and also applied to other manufacturers supplying to these establishments. Several cases of supply of high end CNC (Computer Numerical Control) systems being denied to Indian machine tool companies are on record, which have affected the production of hi-tech machine tools. These instances bring out the vital importance of developing these competencies and advance technology within the country and reduce dependence on imported machines. A large investment is needed for R & D and technology development.

High Interest Rate Makes Industry Non-Competitive: The prevailing interest rates of 14% and more makes the industry non-competitive due to the long gestation period and high capital investment required to set up machine tool units. Given the fragmented nature of the industry, the SMEs (Small and Medium Enterprises) find it difficult to invest money in technology because of limited availability of funds to these industries. While there have been new investments in Machine Tools sector in the last ten years, these are not on a scale required to meet rapidly increasing domestic demand, or make India a significant global player.

Reducing/Zero Duty Imports Under FTAs/PTAs: During recent years a number of FTAs (Foreign Trade Agreements) and PTAs (Preferential Trade agreements) have been signed with different countries whereby the import duty on machine tools imported from these countries is gradually reduced to zero. This places domestic producers at a disadvantage due to high input costs, high interest rate and the incidence of 7.5% custom duty on imported parts. This in fact leads to a situation of inverted duty structure detrimental to the competitiveness of domestic manufacturers. Also, despite stipulations of local value addition in the partner countries to qualify under FTA/PTA, there is likelihood of machines manufactured in other countries being diverted via these countries to take advantage of the lower duty. Free import never encourages transfer of technology, local manufacturing and value addition. This impedes the growth and development of the industry.

Cyclic Business: Machine tools purely produce investment goods. All the fluctuations and uncertainties in general economy are immediately reflected in this sector with increased magnitude. Customers tend to defer investment decisions during economic down turns and they increase their spending on production machinery during upturn. The machine tool industry is usually the first to be affected by economic recession as the first reaction of the customers is to cut the budget on capital expenditure. “The Machine Tools industry is often the first to be affected by economic recession and last one to recover.”

Technology Gaps: Although India is one of the major consumers of Machine tools, the indigenous machine tool industry holds only around 30% of market share. The most obvious reason is that user industries depend on imports for several types of technologically advanced and high ends Machine tools. Even though industry has good design and manufacturing competence for a wide range of products, the product range and the manufacturing capabilities in India have a substantial gap with the present levels abroad. Current global trend requires:

- Highly reliable and productive CNC machines with zero down time.
- Linear motor technology for high rapid speed and high acceleration.
- Large size machine tools for Power, Steel, Railways and Defence sector.
- High speed machining with intelligent collision protection.
- CNC profilers for Aerospace industry.
- Intelligent machines with remote diagnose to avoid dependence on after sales service.
- Machines with plug & play feature to reduce installation time.
- Multi tasking machines to reduce per piece cost.
- Compact machines with minimum foot print to save costly floor area.
- Ultra precision machines with sub micron accuracy (for Defence & Aerospace).
- High degree of automation to increase productivity.
- Extensive use of Robotics for automation and material handling activities.

CONCLUSION

Machine Tool industry is a key enabling sector and back bone of any manufacturing sector which acts as a key differentiator to build competitive edge. It also boosts any nation's ability to produce new products and services. Machine tool being technology and knowledge intensive sector, it relies on a strong supply chain, a sound research base and education system which is able to provide highly skilled workforce. Machine tools industry in India is currently not attracting investment in this sector and needs support. A huge demand supply gap more than USD 4500 million is expected to develop in this sector if proper thrust is not given towards technology development and capacity creation. It is high time to recognize the strategic and economic importance of machine tools industry. We must learn from the success story of China who understood the critical role of machine tools sector in the growth and economic development and became world leader in less than ten years. China, Germany, Italy, Japan, Taiwan and other leading machine tool players developed synchronized policies, institutional framework, purchase preference procedures, imports strategically tied to technology transfer for the growth and development of domestic manufacturing sector. The financing support for R&D and technology development was increased manifold, which led to the significant growth in domestic production, exports and employment generation. Technology development of machine tools sector in these countries resulted in long term benefit in enhancing global competitiveness of domestic manufacturing industry and economic development.

Where does it all place the Indian Machine Tool industry? Is it at cross roads again? In terms of preparedness, what needs to be its new vision, mission, strategy and specific goals to be able to cope up with the emerging realities? Since 1991 Indian Machine tools industry has tirelessly worked on improving its products through better design, quality, productivity and aesthetics. Now there is need to focus how to realize the big picture and leapfrog into the larger orbit of becoming global player- from seventh to 3rd largest Machine Tool market and from 13th to 5th machine tool manufacturing nation, which will be a major step forward towards making India a manufacturing hub and a developed nation.

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