

ENGINEERING SECTOR IN INDIA

1. OVERVIEW

The Engineering sector is the largest sector in the overall industrial segments in India. The sector employs over 4 million skilled and semi-skilled workers (direct and indirect). It is a diverse industry with a number of segments, and can be broadly categorised into two segments:

- The Heavy Engineering Segment, and
- The Light Engineering Segment

The sector is relatively less fragmented at the top, as the competencies required are high, while it is highly fragmented at the lower end (e.g. unbranded transformers for the retail segment) and is dominated by smaller players.

Classification of the Engineering Sector in India

Heavy Engineering Sector	
Sub-segments	Number of Organised Players
Cement Machinery	18
Sugar Machinery	27
Rubber Machinery	19
Metallurgical Machinery	39
Machine Tool	125
Material Handling Equipment	50
Mining Machinery	32
Dairy Machinery	16
Light Engineering Sector	
Sub-segments	Number of Organised Players
Welded Steel Pipes & Tubes	123
Process Control Instrument	26
Antifriction Roller Bearing	19
Plain Paper Copier	12

1.1 The Heavy Engineering Segment

The heavy engineering goods accounts for bulk of the engineering goods production in India. Most of the leading players are engaged in the production of heavy engineering goods and mainly produces high-value products using high-end technology. Requirement of high level of capital investment poses as a major entry barrier. Consequently, the small and unorganised firms have a small market presence.

1.2 The Light Engineering Segment

The light engineering goods segment, on the other hand, uses medium to low-end technology. Entry barrier is low on account of the comparatively lower requirement of capital and technology. This segment is characterised by the dominance of small and unorganised players which manufacture low-value added products. However, there are few medium and large scale firms which manufacture high-value added products. This segment is also characterised by small capacities and high level of competition among the players.

The major end-user industries for heavy engineering goods are power, infrastructure, steel, cement, petrochemicals, oil & gas, refineries, fertilisers, mining, railways, automobiles, textiles, etc. Light engineering goods are essentially used as inputs by the heavy engineering industry.

Key Growth Drivers of Indian Engineering Sector

The engineering sector in India has been growing on the back of growth in the user industries and several new projects being undertaken in various core industries such as railways, power, infrastructure, etc. Capacity creation in sectors such as infrastructure, oil & gas, power mining, automobiles, auto components, steel, refinery, consumer durables, etc, is driving growth of the engineering industry.

- Growth of the key user-industries
- Government's thrust on the power and construction industries
- India being preferred by global companies as an outsourcing destination as it enjoys lower labour cost and better designing capabilities

1.3 Engineering Off-shoring Services

India can stretch the off-shoring industry further to tap the \$750 billion-a-year global engineering services industry. The country, which enjoys a strong position in the automotive and high-tech telecom engineering services market with expected earnings of \$25 billion by 2020, can nearly double it, according to a latest industry report. Aerospace offers the greatest potential for expansion, though it is one of the toughest opportunities to tap because of its close association with the defence sector.

Engineering services are a \$40 billion opportunity for India by 2020. The total offshore engineering spend is expected to grow to \$150-\$225 billion by the year 2020, and India with its talent pool and existing experience in engineering services, is well suited to realise 25 per cent of this opportunity. Engineering services offshoring presents a tremendous opportunity. It will not only generate significant revenues but will also place India on the global innovation map, industry experts said in the report. They, however, emphasised the need for training and retaining talent, which is critical to the county maintaining its current advantage.

High-tech and telecom are the dominant and fastest growing sectors, with 30 per cent of the market. And, with traditional engineering powerhouses - USA, Germany and Japan - having a lead in engineering spend, the report also called for greater support from the government to realise this opportunity.

2. HEAVY ENGINEERING SECTOR

The heavy engineering sector can be classified into two broad segments – Electrical and Non-electrical machinery and equipment segments.

Electrical machinery includes various machinery and equipments used in the purpose of power generation, transmission and distribution such as generators and motors, transformers and switchgears.

The Non-electrical machinery includes machines/equipments used in various sectors such as material handling equipments (earth moving machinery, excavators, cranes, etc), etc.

2.1 The Heavy Electrical Industry

The fortunes of the heavy electrical industry have been closely linked to the development of the power sector in India. The heavy electrical industry has under its purview power generation, transmission, distribution and utilisation equipments. These include turbo generators, boilers, turbines, transformers, switchgears and other allied items. These electrical equipments (transformers, switchgears, etc) are used by almost all the sectors. Some of the major areas where these are used include power generation projects, petrochemical complexes, chemical plants, integrated steel plants, non-ferrous metal units, etc.

Trend in Production of Various Categories of Heavy Electrical Machinery

Category/Year	FY03	FY04	Growth (%)	FY05	Growth (%)
Turbines & Generator Sets	12.87	13.20	2.6	13.56	2.7
Boilers	16.23	18.14	11.8	20.14	11.0
Transformers	2.73	3.03	11.0	3.69	21.8
Switchgear & Control Gear	1.30	1.58	21.5	1.89	19.6

Source: Ministry of Heavy Industries, Annual Report FY06; (Rs bn)

The existing installed capacity of the India heavy electrical industry is 4,500 MW of thermal, 1,345 MW of hydro and about 250 MW of gas-based power generation equipment per annum. The industry has the capability to manufacture transmission and distribution equipment upto 400 KV AC and high voltage DC.

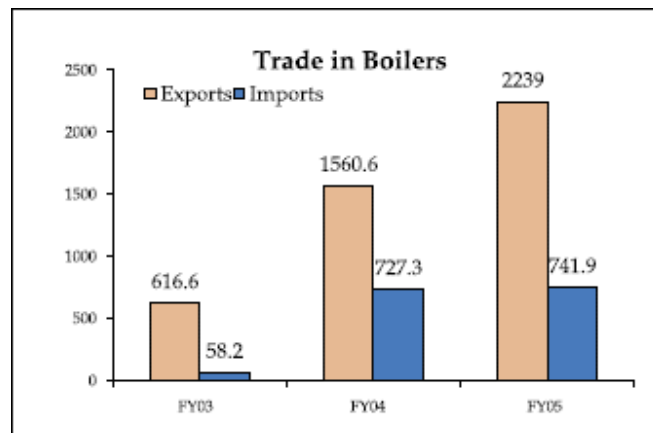
The Heavy Electrical Industry can be classified into the following product categories:

2.1.1 Turbines and Generator Sets

The Indian industry has established a manufacturing capacity of various kinds of turbines of more than 7,000 MW per annum. The Public Sector Enterprise (PSE) Bharat Heavy Electricals Ltd (BHEL) has the largest installed capacity. There are units in the private sector also which manufacture steam and hydro turbines for power generation and industrial use. Domestic manufacturers of AC generators are capable of manufacturing AC generator from 0.5 KVA to 25,000 KVA and above.

2.1.2 Boilers

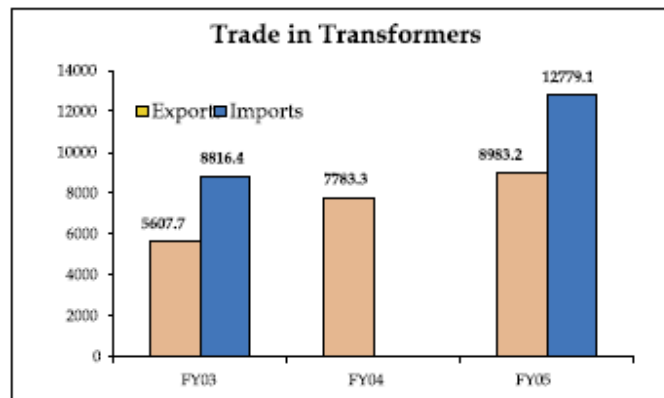
The Indian boilers industry has the capability to manufacture boilers with super critical parameters upto 1,000 MW unit size. BHEL is the largest manufacturer of boilers in the country, with a market share of over 60%. It has the capability to manufacture boilers for super thermal power plants, apart from utility boilers and industrial boilers.



Source: Ministry of Heavy Industries, Annual Report; (Rs mn)

2.1.3 Transformers

The domestic transformer industry has the capability to manufacture the whole range of power and distribution transformers. Special types of transformers required for furnaces, rectifiers, electric tract, etc, and series and shunt reactors as well as HVDC transmission upto 500 KV are also being manufactured in India.

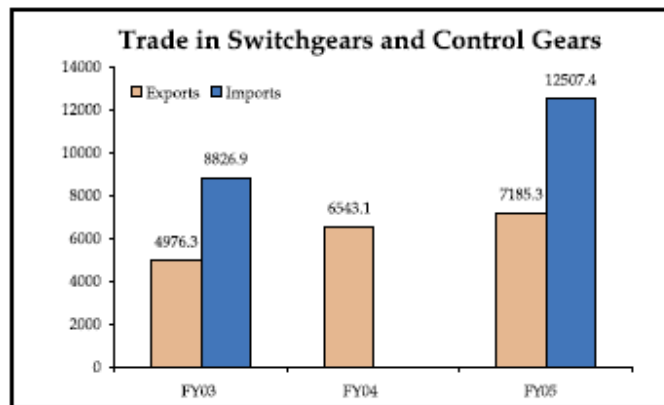


Source: Ministry of Heavy Industries, Annual Report; (Rs mn)

The Indian transformer industry exports to over 50 countries including the US, Europe, South Africa, Cyprus, Syria, Iraq, and Far East countries. During FY05, exports of transformers rose by 15.4% to Rs 8,983 mn, which came on top of the sharp 39% jump in exports during the preceding year.

2.1.4 Switchgear and Control Gear

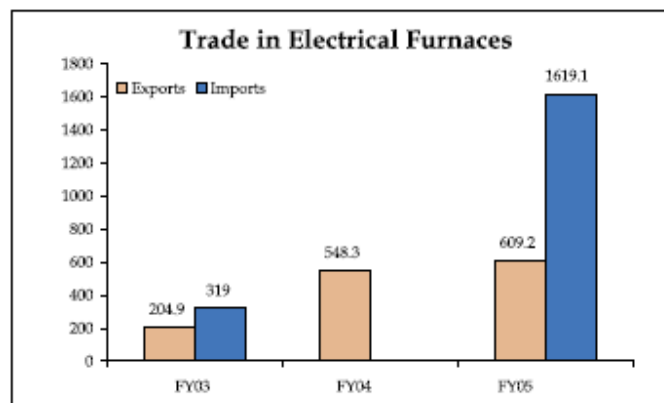
The switchgear and control gear industry in India is a fully developed one, producing and supplying a wide variety of switchgear and control gear items required by the industrial and power sectors. The entire range of circuit breakers from bulk oil, minimum oil, air blast, vacuum to SF₆ are manufactured to standard specification. The range of products produced cover the entire voltage range for 240V to 800KV, switchgear and control gear, MCBs, air circuit breakers, switches, rewirable fuses and HRC fuses with their respective fuse bases, holders and starters.



Source: Ministry of Heavy Industries, Annual Report; (Rs mn)

2.1.5 Electrical Furnaces

Electrical furnaces are used in Metallurgical and engineering industries such as forging and foundry, machine tools, automobiles, etc.



Source: Ministry of Heavy Industries, Annual Report; (Rs mn)

2.1.6 Shunting Locomotives

Shunting locomotives for internal transport facilities are essentially used in railways, steel plants, thermal power plants, etc.

Leading Players in the Heavy Electrical Industry

Categories	Players
Transformers	Crompton Greaves, BHEL, Vijay Electricals, Emco, Bharat Bijlee
Switchgears	ABB, Siemens, L&T, Crompton Greaves, BHEL, Areva T&D India Ltd. (formerly Alstom)
Steam & Hydro Turbines	BHEL, Triveni Engineering & Inds., Bellis India
Generator/Generating Sets	Honda Siel Power Products, Powerica, Kirloskar Electric Co., Cummins India
Boilers	BHEL, Thermax, Saraswati Industrial Syndicate, Sterling Strips
Electric Furnaces	Electrotherm India Ltd.

Source: Prowess; Compiled by D&B Research

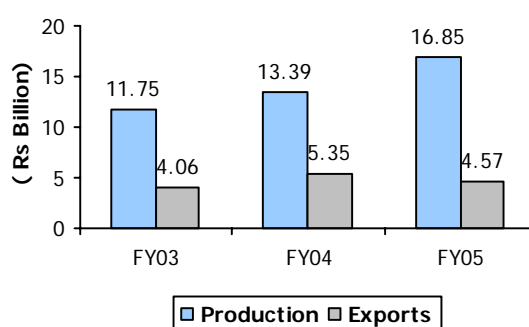
2.2 The Heavy Non-Electrical Industry

2.3.1 Textile Machinery

The textile machinery industry in India manufactures machinery needed for sorting, cording, processing of yarns/ fabrics and weaving, along with the components, spares and accessories. As per the Ministry of Heavy Industries, there are over 600 units engaged in the manufacture of machinery and spares, and out of these, about 100 units are manufacturing complete machinery.

As per the Ministry's estimates, the industry has an installed capacity of Rs 30.5 billion, with a capital investment of Rs 15 billion. The following table depicts the Indian textile machinery industry's performance during FY03-FY05:

Trend in Textile Machinery Production & Exports



Source: Ministry of Heavy Industries Annual Report FY06; (Rs bn)

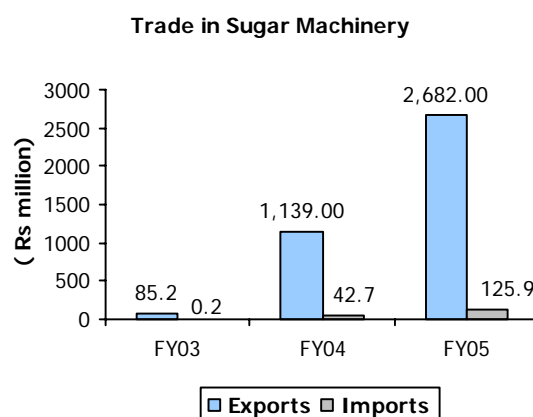
With the buoyant outlook on textile exports, the Indian textile machinery industry is gearing itself to take advantage of the vast opportunities of supplying machines required to cater to export target of garment manufacturers, post the Multi Fibre Arrangement.

2.3.2 Cement Machinery

The Indian cement machinery industry manufactures complete cement plants, based on dry processing and pre-calcination technology, for capacities upto 7500 TPD. The existing installed capacity of the industry is estimated to be Rs 6 billion/annum. According to the Ministry of Heavy Industries, presently there are 18 units in the organized sector for the manufacture of complete cement plant machinery.

2.3.3 Sugar Machinery

As per the estimates of the Ministry of Heavy Industries, there are presently 27 units in the organised sector for the manufacture of complete sugar plants and components. The industry's installed capacity is estimated to be Rs 2 billion. The industry can manufacture sugar plants for a capacity upto 10,000 TCD (tonnes crushing per day). India is a net exporter of sugar machinery. The following table shows the growing exports during FY03-FY05:

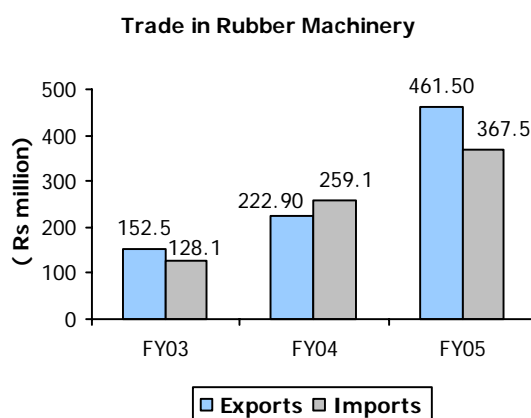


Source: Ministry of Heavy Industries, Annual Report FY06; (Rs mn)

2.3.4 Rubber Machinery

The rubber machinery industry in India manufactures inters-mixer, tyre curing presses, tyre moulds, tyre building machines, turnet servicer, bias cutters, rubber injection moulding machine, bead wires, etc. According to the Ministry of Heavy Industries, currently there are 19 units in the organised sector for the manufacture of rubber machinery mainly required for tyre/tube industry.

The Indian rubber machinery manufacturing industry is a net exporter. The table below shows the trend in India's trade in rubber machinery during FY03-FY05:

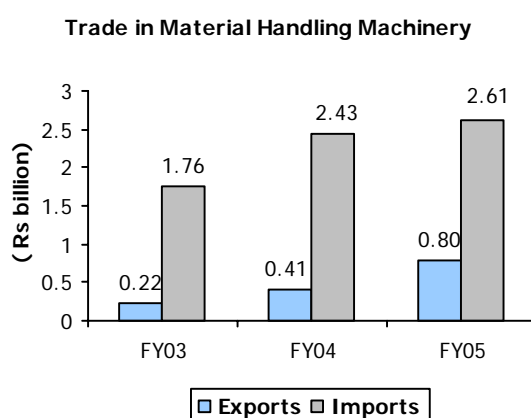


Source: Ministry of Heavy Industries, Annual Report FY06; (Rs mn)

2.3.5 Material Handling Equipment

The Indian material handling equipment industry manufactures a range of equipments including crushing and screening plants, coal/ore/ash handling plant and associated equipment such as stackers, reclaimers, ship loaders/unloaders, wagon tippers, feeders, etc. The industry caters to the requirement of a host of core industries such as coal, cement, power, port, mining, fertilizers and steel plants. The Ministry of Heavy Industries estimates the presence of 50 units in the organized sector for the manufacture of material handling equipments. Apart from the organized players, there are a number of units present in the small scale sector.

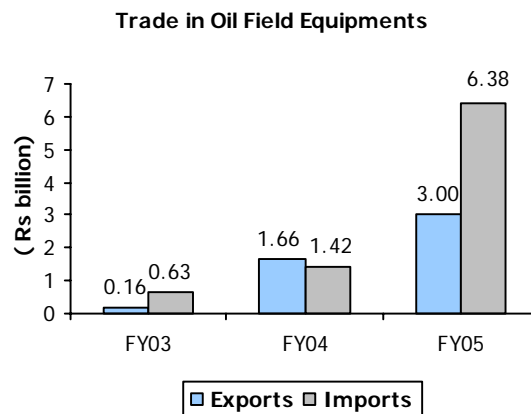
Imports of material handling equipments exceed their exports. Though comparatively much smaller than imports, exports have recorded buoyant growth in the recent years. The following table depicts the trend in trade in material handling equipments:



Source: Ministry of Heavy Industries, Annual Report FY06; (Rs bn)

2.3.6 Oil Field Equipment

The oil field equipment manufacturing industry manufactures drilling rigs for on-shore drilling. Offshore drilling equipments like jack-up rigs, etc are not manufactured indigenously. The industry however manufactures offshore platforms and certain other technological structures domestically. Bharat Heavy Electricals, Hindustan Shipyard, Mazagon Dock and Burn & Co. are some of the leading producers. The recent couple of years have witnessed a surge in exports of oil field equipments. However, the industry remains a net importer, as can be seen from the table below:

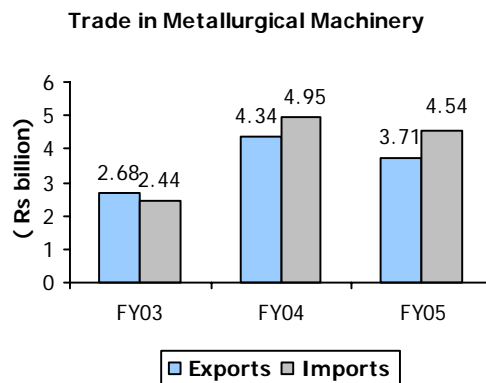


Source: Ministry of Heavy Industries, Annual Report FY06; (Rs bn)

2.3.7 Metallurgical Machinery

According to the Ministry of Heavy Industries, currently there are 39 units in the organised sector which are engaged in the manufacture of metallurgical machinery. Metallurgical machinery includes equipments for mineral beneficiation, ore dressing, size reduction, steel plant equipments, foundry equipments and furnaces.

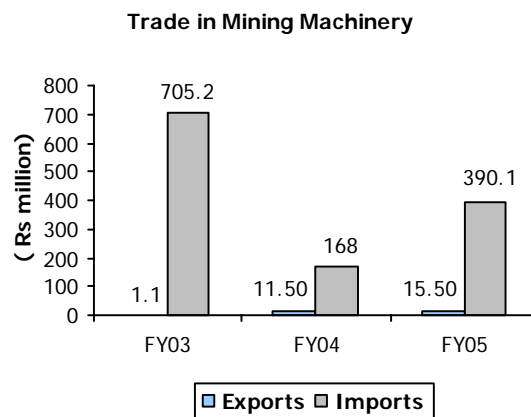
There being a technological gap in the basic design and engineering for plants and equipments in the ferrous and non-ferrous sector, the domestic manufacturers depend on imported technological know-how.



Source: Ministry of Heavy Industries, Annual Report FY06; (Rs bn)

2.3.8 Mining Machinery

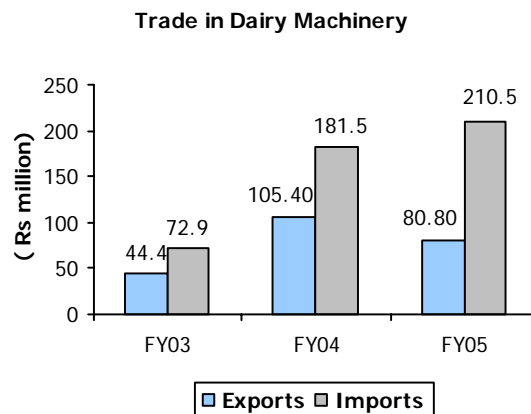
The various type of mining equipments include Longwall mining equipments, road header, side dischargers loader, haulage winder, ventilation fan, load haul dumper, coal cutter, conveyors, battery locos, pumps, friction prop, etc. The Ministry of Heavy Industries estimates the presence of 32 manufacturers of mining machinery both in the public and private sector for underground and surface mining equipments. Out of these, 17 units manufacture underground mining equipments. Exports of mining machinery were observed to be negligible, as compared to their imports.



Source: Ministry of Heavy Industries, Annual Report FY06; (Rs mn)

2.3.9 Dairy Machinery

The Indian dairy machinery manufacturers produce a range of equipments including stainless steel dairy equipments, evaporators, milk refrigerators and storage tanks, milk and cream deodorizers, centrifuges, clarifiers, agitators, homogenisers, spray dryers and heat exchangers (tubular and plate type), etc. As per the Ministry of Heavy Industries, presently there are 16 units manufacturing dairy machinery and equipment in the organised sector, both in private and public sector. India is a net importer of dairy machinery. The chart below indicates the same:



Source: Ministry of Heavy Industries, Annual Report FY06; (Rs mn)

The Indian engineering industry is highly competitive, with several companies having a presence in each of the segments. Several multinational companies of the likes of ABB, Siemens, Honda, Cummins, have entered the industry.

Leading Players in the Heavy Non-Electrical Industry

Categories	Players
Textile Machinery	Lakshmi Machine Works Ltd, Veejay Lakshmi Engg. Works Ltd, Lakshmi Automatic Loom Works Ltd, Batliboi Ltd
Cement Machinery	Larsen & Toubro Ltd, Walchandnagar Industries Ltd
Sugar Machinery	KCP Ltd
Rubber Machinery	Larsen & Toubro Ltd, Alfred Herbert Ltd
Material Handling Equipment	Andhra Pradesh Heavy Machinery & Engg. Ltd, Bharat Earth Movers Ltd, L&T-Komatsu Ltd., TRF Ltd, Telco Construction Equipment Co. Ltd, WMI Cranes Ltd
Oil Field Equipment	Sagar International Ltd
Metallurgical Machinery	Tata Steel Ltd

Source: Prowess; Compiled by D&B Research

2.3.10 Machine Tool

The machine tool industry is regarded as the backbone of the entire industrial engineering industry. The Indian machine tool industry manufactures almost the entire range of metal-cutting and metal-forming machine tools. Apart from conventional machine tools and Computer Numerically Controlled (CNC) machines, the Indian industry also offers other variants such as special purpose machines, robotics, handling systems, and TPM-friendly machines.

The Ministry of Heavy Industries estimates the presence of around 150 machine tool manufacturers in the organised sector and around 300 units in the small ancillary sector. Nearly 73% of the total machine tools production in India is contributed by the leading 10 companies in the industry. The industry has an installed capacity of over Rs 10 billion and employs a workforce (direct/indirect) of 65,000 skilled and unskilled persons.

The machine tool manufacturers in India produce general purpose machinery of international standards (in terms of quality, precision and reliability). However, they lag behind in terms of design and engineering capability so as to be able to undertake very high precision CNC (Computer Numerically Controlled) machines. Due to the gap in technology for special purpose machines and some categories of CNC machines, import of technology is encouraged to bridge this gap.

Leading Players in Machine Tools Industry

Product Categories	Players				
CNC Lathes	Ace Designers Ltd	Lakshmi Machine Works Ltd	HMT Machine Tools Ltd	Jyoti	Askar Microns Pvt Ltd
Machining Centres	Bharat Fritz Werner Ltd	Ace Manufacturing Systems Ltd	HMT Machine Tools Ltd	Lakshmi Machine Works Ltd	Jyoti

Presses	ISGEC	Electropneumatic & Hydraulic India Pvt Ltd	Hindustan Hydraulics Pvt Ltd	Bemco Hydraulics Ltd	
Grinding Machines	Parishudh Machines Pvt Ltd	Micromatic Grinding technologies Ltd	HMT Machine Tools Ltd	PMT Machine Tools Automatics Ltd	
Special Purpose Machines	Widia India Ltd	Bharat Fritz Werner Ltd	HMT Machine Tools Ltd	Motor Industries Co Ltd	Lokesh Machines Ltd
Surface Grinders	Praga Tools Ltd	Alex Machine Tools Ltd	HMT Machine Tools Ltd		
Vertical Turning Boring	HMT Machine Tools Ltd	Premier Automobiles Ltd			
Bending Machine	Electropneumat ics & Hydraulic India Pvt Ltd	Hindustan Hydraulics Pvt Ltd	ISGEC		
Gear Cutting	Premier Automobiles Ltd	HMT Machine Tools Ltd			

Source: Ministry of Heavy Industries; Compiled by D&B Research

Maharashtra (Mumbai and Pune), Punjab (Jalandhar and Ludhiana), Gujarat (Ahmedabad, Baroda, Jamnagar and Rajkot), Tamil Nadu (Chennai and Coimbatore) and Karnataka (Bangalore and Mysore), and some parts of eastern India are the hub of manufacturing activities in the machine tools industry.

The machine tools industry is a highly fragmented one. The growth in the industry is demand-driven, which comes from various sectors such as automobiles, engineering, defence, textile machinery, aviation, etc. The rising demand for machine tools can be gauged from the sharp increase in production of machine tools. Imports are also growing sharply. Imports data for FY03-FY05 shows a whopping 114.1% jump in imports in FY04 and a further 88.7% increase in FY05. Machine tools manufacturers face the threat of imports from Taiwan and China which are the most cost-competitive countries in machine tools.

Performance of Machine Tool Industry			
Year	Production	Imports	Exports
FY03	5.01	4.51	0.34
FY04	7.97	9.65	0.55
FY05	10.89	18.21	0.53

Source: Ministry of Heavy Industries, Annual Report FY06; (Rs bn)

Over the years, the industry's focus has moved from standard machines to NC and CNC machines. This has also resulted in improvement in technology, enhancement in quality and cost competitiveness.

3. LIGHT ENGINEERING SECTOR

The Indian light engineering industry is highly diversified, comprising of a number of distinctive sectors and sub-sectors. The product range in this industry varies from highly sophisticated microprocessor based process control equipment and diagnostic medical instruments to low-tech items such as castings, forgings, and fasteners, among others. The sector also includes products such as bearings, steel pipes and tubes, etc. Most of the products in the light engineering industry serve as inputs for the capital goods industry. The health of the light engineering industry is therefore dictated by the demand for capital goods.

The major sub-segments within this industry are:

3.1 Medical and Surgical Instruments

The medical and surgical instruments segment includes a wide array of equipments and apparatuses. These include medical and surgical instruments, dental equipment, electro-medical apparatus, orthopaedic appliances, physiotherapy equipments, X-ray machines, among others. These instruments find application in diagnosis, therapy, and patient monitoring and thus play a crucial role in the healthcare delivery system.

Output of the Indian medical and surgical instruments industry, which is around four decades old, was very small until a few years back. In recent years, liberalisation and growing health awareness has accelerated the growth of the domestic industry and also led to a rise in imports of medical and surgical instruments into India. Domestic production comprises of wide range of medical equipment including Electro-Cardiograph (ECG) machines, X-ray machines, electro-surgical instruments, blood chemistry analysers, among others. The domestic industry meets around 40% of the demand for medical equipment, while the rest is met through imports. Demand for sophisticated instruments such as nuclear magnetic resonance (NMR) scanners, multi channel monitors, among others are met through imports. Majority of the end-users prefer to deal with foreign companies, as Indian manufacturers who are concentrated in the small-scale sector are not able to provide after sales service. Exports and imports of medical and surgical instruments were Rs 14.3 billion and Rs 28.7 billion respectively.

Rising income levels, growing health consciousness, and rise of medical tourism are expected to drive the demand for medical and surgical instruments. Government's commitment to improve healthcare facilities and liberalisation of trade and investments laws would also expand the market for medical and surgical instruments.

3.2 Process Control Instruments

Process control instruments and systems are instruments and systems used for measurement and control of process variables. Process variables are physical or chemical parameters, the variations of which can affect the operation of a manufacturing process. These variables include humidity, pressure, temperature, liquid level, flow, vacuum, vibration, specific gravity, and chemical composition including pH, among others. Use of process control instruments and systems is highly significant in large and sophisticated process industries

such as fertilisers, power plant, steel, cement plants, petroleum refineries, and petrochemical industries, among others.

The industry is delicensed and 100% FDI is permitted in this sector. There are 26 units in the organised sector engaged in the manufacture of process control instruments and systems. Seven of these 26 units are capable of implementing the entire instrumentation system including software required by the process industries. The domestic manufacturers meet around two-thirds of India's demand for process control instruments and systems.

Transfer of technology has been the major cornerstone for the development of the domestic process control instruments and system industry. There exists a gap between technology adopted in India and contemporary international technology. Technology presently used in the Indian industry is microprocessor based centralised control system. The Indian industry is capable of handling open control systems and smart control devices; however, latest developments such as total integrated management and control approach, which are currently being adopted in the developed countries, are yet to be adopted in the country.

Demand for these instruments and systems are dependant largely on the progress of implementation of various mega projects in the fields of power, steel, fertilisers, petrochemicals and refineries. Exports in this industry have not recorded significant growth over the years. Technology gap between technology adopted in India and international adopted technology combined with fast obsolescence, lack of standardisation and quality control have all led to lower exports from the country. During FY05, exports and imports of the process control instruments and systems were Rs 5.4 billion and Rs 28.9 billion respectively.

3.3 Antifriction Roller Bearing

Roller bearings are components used to reduce or eliminate friction between moving parts and thus reduce wear & tear of machines. They help improve machine performance and are thus a critical component of any equipment that rotates. It finds varied application, ranging from simple electric fans to complex space rockets. Depending on its usage, a bearing may have to withstand prolonged use, high-speed rotation, varied temperatures, or a corrosive environment. Bearings are available in two distinctive shapes, ball, and roller. There are four different types of roller bearings – cylindrical roller bearings, needle roller bearings, tapered roller bearings and spherical roller bearings.

The Indian bearing industry has recorded good growth in the past few years. The Indian manufacturers are able to meet around 70% of the demand for general purpose bearings. The Indian bearing industry's product range comprises of around 500 types of bearings. Indian manufacturers do not produce special purpose bearings as demand for the same is low and investments required are huge as bearings is a capital intensive industry,. Special purpose bearings are therefore imported.

The bearings industry is highly fragmented. There are around 20 units in the organised sector engaged in the manufacture of ball and roller bearings. The organised sector caters to both the original equipment manufacturers and replacement market. The unorganised sector, which manufactures low quality small bearings caters to the replacement market. The

manufacturing activity of a few small-scale units is restricted to assembly of imported components.

Automobile industry is the major user industry for the bearings industry. Given the growing demand for automobiles in the country, demand for bearings would increase in the coming years. During FY06, production of bearings stood at 327.6 million numbers. Imports and exports of bearings during the same period were Rs 16.8 billion and Rs 8.3 billion respectively.

3.4 Industrial Fasteners

Industrial fasteners cover a wide range of products such as nuts, screws, bolts, studs, rivets, nails, washers, etc. Fasteners can be broadly classified into two groups, high tensile strength fasteners, and mild steel fasteners depending on their tensile strength. Manufacturer of high tensile fasteners requires superior technology and are mainly manufactured in the organised sector, while, manufacturing of mild steel fasteners is concentrated in the unorganised sector. In fact, manufacture of all types of fasteners except high tensile fasteners and special purpose fasteners are reserved for the SSI sector. Fasteners are used in the assembly of engineering systems.

The automobile industry is the largest consumer of fasteners. The other major user-segments are textile machinery, railway locomotives, construction, computer hardware and general engineering. There exists huge export potential for Indian industrial fasteners, however, poor product standardisation, relatively higher raw material costs, and low labour productivity make Indian fasteners less competitive in the global market.

During FY05, exports and imports of industrial fasteners were Rs 7.6 billion and Rs 4.8 billion respectively. Domestic production during the same period was 78,252 tonnes. The Indian fasteners industry is expected to fare well in the medium term driven by demand mainly from the automobile segment and the construction industry.

3.5 Ferrous Castings

Ferrous castings constitute essential intermediates for automobiles, industrial machines, power plants, chemicals & fertiliser plants and cement plants, among others. They are therefore vital for the growth and development of the engineering industry. The domestic industry is well established. Being a highly polluting industry, many of the developed countries are withdrawing from this industry. This gives rise to a huge export potential for Indian manufacturers. To capitalise on this export demand, leading manufacturers have undertaken modernisation and up gradation of their manufacturing facilities to improve productivity and product quality and also economise on production costs. Given the wide spread usage of castings across industries and huge export potential, there exists considerable scope for establishing additional capacity in this area.

3.6 Steel Forgings

The forging industry has emerged as one of the major contributors to the manufacturing sector of the Indian economy. Depending on the scale of operations, the industry can be

categorised as large, medium, small, and tiny. SMEs comprise a major portion of this industry. The industry consists of around 330 odd units, of which there are around 100 units in the medium and small sector, and only around 9-10 units are present in the large scale. There are huge numbers of units functioning in the tiny sector.

Increasing globalisation has led to sharp rise in investments in the sector. This has led to the industry becoming capital intensive from being labour intensive. Total investment in the large and medium sectors of the forging industry is estimated to be around US \$ 600 mn. To expand their markets and have a global reach, the small-scale units are also increasing their capital investments. The small-scale units have upgraded their facilities in terms of technology and quality and a number of them are now suppliers to Original Equipment Manufacturers (OEMs) in the automobile sector. The automotive industry is the major end-user of the forging industry. The other user industries include industrial machines, railways, oil & gas, power plants, and chemical plants, among others.

The Indian forgings industry has made rapid strides and currently not only meets the almost the entire domestic demand, but has also emerged as a large exporter of forgings. The industry has been able to expand its presence in the global markets, which is reflected in the almost 30% growth in exports during FY05 to US \$ 250 million. The major export markets are USA, Europe, and China. The outlook for the industry looks promising, backed by the robust demand from the domestic automotive sector and from the global markets.

3.7 Seamless Steel Pipes & Tubes

Seamless steel pipes & tubes find widespread usage in the hydrocarbon industries, processing & general engineering industries. Boiler pipes, as the name suggests are used in boilers, heat exchangers, super heaters, among others, while casing & tubing are used for drilling of oil and gas. Seamless pipes find application in industries where strength, resistance to corrosion and long shelf life are critical. The industry is delicensed and 100% FDI is permitted in the sector under the automatic route.

The oil sector is the major end-user segment of seamless pipes & tubes. The other user segments include boilers, ball bearings, automobiles, chemical plants, fertilisers, petrochemical plants, industrial machinery, among others. The oil sector accounts for around 60% of total demand, while, the bearings, automobiles, and boiler sector account for around 30% of total demand. There could be a significant shift in the demand pattern for seamless pipes and tubes due to the robust growth expected in the power and automobile sectors.

3.8 Electrical Resistance Welded (ERW) Steel Pipes & Tubes

ERW steel pipes & tubes find widespread usage across industries and fields. In addition to various engineering industries, they are used for water, oil and gas distribution, line pipes, fencing, scaffolding, etc. They are also used for agricultural purposes, drinking water supply, thermal power, for hand pumps for deep boring wells and also as protection for cables (telecom), among others. Depending on the requirement of the end user industry, ERW steel pipes & tubes are available in various wall thicknesses, diameters, and qualities. The different types include line precision pipes, tubular poles, electric poles, lightweight galvanised pipes

for sprinkler irrigation, among others. The industry has sufficient capacity to manufacture the different types of pipes & tubes. High performance ERW steel pipes & tubes possess high strength, toughness and are corrosion resistant.

In the manufacturing process of ERW steel pipes & tubes, the edges to be welded are mechanically pressed together and electric resistance or electric induction is used to generate the heat required for welding. With the adoption of better welding technology, ERW pipes & tubes are now widely used in the oil & gas sector. A number of ERW steel pipes & tubes production units are in the SSI sector. Higher demand from the oil & gas industry, infrastructure, and automobile industries has led to a healthy increase in production of ERW steel pipes.

3.9 Submerged-Arc Welded (SAW) Pipes

SAW pipes are mainly used for oil & gas transportation and water distribution. SAW pipes are of two major types, longitudinal and helical welded SAW pipes. The later are used for low-pressure application, while longitudinal SAW pipes are preferred for high-pressure application such as gas pipes. Longitudinal SAW pipes are more than 25 mm in thickness. In terms of production costs, it costs less to manufacture helical SAW pipes as compared to longitudinal SAW pipes. In the manufacturing process of submerged-arc welded pipes, the heat necessary to melt the edges of metal to be joined together is generated with the help of a concealed arc with no pressure between the two sides of the weld.

India has an installed SAW pipes capacity of 650 Thousand tonnes, with four major players. These are Jindal Saw Limited, Well Spun Gujarat Limited, PSL Limited, and Man Industries. A huge export potential exists for SAW pipes. Exports and imports during FY05 were Rs 11.9 billion and Rs 0.6 billion respectively.

3.10 Typewriters

Computers have largely replaced typewriters. In line with the falling demand, production of typewriters has declined in the last few years. The manufacturers in the organised sector are capable of manufacturing the entire range of typewriters including electronic typewriters. Domestic producers are able to meet the demand for typewriters in the country. There exists a huge potential for exports of typewriters to the developing countries. During FY05, imports and exports of typewriters stood at Rs 3.2 million and Rs 77 million respectively.

3.11 Bicycle Industry

The Indian bicycle industry can be categorised into two segments, those manufacturing bicycle parts, and those manufacturing complete bicycles. Majority of bicycle parts and components are manufactured in the small-scale sector, since most of the components other than free wheels and single piece hubs are reserved for the small-scale sector. Large units are permitted to manufacture bicycle frames, chains, rims, and that too only for captive consumption. Complete bicycles are manufactured in the organised sector. Four companies account for over 90% of total bicycle production in the country.

The Indian bicycle industry conforms to well-accepted quality standards in the international market. The industry is taking efforts to increase exports.

3.12 Sewing Machines

In India, the manufacture of conventional hand operated sewing machines is reserved for the small-scale sector. Domestic demand for these is fully met by the Indian manufacturers. There exists a huge potential for exports of sewing machines to developing countries. During FY05, exports and imports of sewing machines were Rs 0.6 billion and Rs 4.8 billion respectively.

3.13 Plain Paper Copier

Plain paper copier, a device used for reproducing copies of documents, typescripts, photographs, among others has become a very important office automation device. At present, there are only 12 units in the country manufacturing this device and most of them have technical collaboration with foreign companies. The introduction of the low priced personal copier has altered the demand pattern for plain paper copiers. The personal copiers are more user friendly and come with customer replaceable toner cartridge and plate receptor drums. Exports and imports of plain paper copiers during FY05 were an approximate Rs 159 million and Rs 1.6 billion respectively.

4. GOVERNMENT POLICIES AND INITIATIVES

Government of India reviews its Foreign Direct Investment (FDI) policy regularly, in a bid to attract more investment. Recently, the government permitted 100 per cent FDI in construction and development projects. India has opened up to private sector participation and FDI in infrastructure projects for power, roads, ports, mining sector, and pharmaceutical sector.

Around 36 per cent of the total FDI is directed towards engineering industry through an automatic route, but subject to a limit of US\$ 2 million of lump sum payments. Royalty payment is restricted to 5 per cent and 8 per cent on domestic and exports respectively. Depreciation on general plant and machinery is proposed to be around 15 per cent.

These initiatives of the government serve as a catalyst to further raise the demand for engineering goods and machinery.

Some specific initiatives by the government, which positively impact the engineering sector are:

- Removal of tariff protection on capital goods.
- Delicensing of heavy electrical industry and allowance of 100 per cent FDI.
- Various initiatives focused on infrastructure development and construction.
- Initiatives to increase power generation and improve quality of power supply.
- The reduction of custom duties on various equipments.

These above initiatives are aimed at creating a facilitating environment in which the engineering sector can thrive. They have also helped the sector in becoming competitive.

FDI Inflows in the Engineering Sector – Aug 91 to Dec 06		
Sector	FDI (Rs mn)	%age of total inflows
Electrical Equipments*	302,558.2	17.03
Miscellaneous Mechanical & Engineering	21,624.0	1.22
Industrial Machinery	9,423.3	0.53
Machine Tools	8,210.5	0.46
Earth Moving Machinery	3,397.9	0.19
Prime Movers~	1,055.7	0.06
Boilers & Steam generating Plants	332.6	0.02

*Includes Computer Software & Electronics; ~Other than Electrical
 Source: Department of Industrial Policy & Promotion

5. MAJOR PLAYERS IN THE ENGINEERING INDUSTRY

5.1 **Bharat Heavy Electrical Ltd**

BHEL was incorporated in 1971-72 and paying dividends since 1976-77. BHEL is India's largest Engineering and manufacturing enterprise. The company manufactures over 180 products under 30 major product groups and caters to core sectors of the Indian Economy viz., Power Generation & Transmission, Industry, Transportation, Telecommunication, Renewable Energy, etc. The company has 14 manufacturing divisions, four Power Sector regional centres, over 100 project sites, eight service centres and 18 regional offices.

5.2 **Engineers India Ltd**

Engineers India Limited was established in 1965 to provide engineering and related technical services for petroleum refineries and other industrial projects. EIL is a government undertaking (as 90.39 per cent stake is owned by government), under Petroleum & Natural Gas Ministry. The company manufactures highways & Bridges, Airports, Mass Rapid Transport Systems, Ports & Terminals, Power Projects, Non-conventional/Renewable Energy Sources, Specialist Materials and Maintenance Services, Intelligent Buildings, Water and Urban Development projects. Besides its Head Office at New Delhi, EIL has branch office at Mumbai, zonal office at Kolkata, regional offices at Chennai and Vadodara and inspection offices at all major equipment manufacturing locations in India. It also has overseas offices at London, Abu Dhabi, Kuwait, Qatar, Malaysia and Australia.

5.3 **Hindustan Aeronautics Ltd**

Hindustan Aeronautics Ltd is a Public sector enterprise. The company Supplies/services are mainly to Indian Defense Services, Coast Guard and Border Security Force. They supply transport aircraft and helicopters to Airlines as well as State Governments of India. The company's facilities are located throughout India including Nasik, Korwa, Kanpur, Koraput, Lucknow, and Hyderabad.

5.4 **Crompton Greaves**

Crompton Greaves is a part of B.M. Thapar Group and was established in 1899. CG's business operations consist of 22 manufacturing divisions spread across in Gujarat, Maharashtra, Goa, Madhya Pradesh and Karnataka, supported by well knitted marketing and service network through 14 branches in various states under overall management of four regional sales offices located in Delhi, Kolkata, Mumbai and Chennai. The company has a customer base, which includes State Electricity Boards, Government bodies and large companies in private and public sectors.

5.5 **Elgi Equipments**

Established in 1960, Elgi Equipments is one of Asia's renowned manufacturers of air compressors and automobile service station equipment. The company's products have a range of applications in areas ranging from mining, defense, transport, pharmaceuticals,

power, oil, railways, chemicals, textiles, printing to ship building, paper, electronics, telecommunications, medical, food & beverages and plastics. The company has two manufacturing locations in Coimbatore, India, with 22 acres of land and 352,000 sq ft of built up factory area.

5.6 HMT

The Public sector Enterprise HMT was established in 1953 and is into the manufacturing of watches, Tractors, Printing Machinery, Metal Forming Presses, Die Casting & Plastic Processing Machinery, CNC Systems & Bearings. The company comprises six subsidiaries under the ambit of a Holding Company, which also manages the Tractors Business directly and has its manufacturing facilities in Srinagar, Mohali, Hyderabad, Kalamassery and Ajmer.

5.7 Kirloskar Oil Engines Ltd (KOEL)

Kirloskar Oil Engines ltd is a part of the century old Kirloskar group and was incorporated in 1946. The company has two segments of its manufacturing-Engines and Engine bearings & valves and also in business of manufacturing gray iron castings and trading in oil, power generation. The company has its manufacturing facilities in Pune, Nasik, Ahmednagar and Phursungi

5.8 Larsen & Toubro Ltd (L&T)

Larsen & Toubro Limited (L&T) is a part of L&T group. The company is India's largest engineering and construction conglomerate and has four segments namely Engineering and Construction (E&C), Cement, Electrical and Electronics and Diversified business. It also has 19 subsidiaries. The manufacturing facilities of the company are located in Coimbatore in Tamil Nadu, Kurnool District in Andhra Pradesh and Hassan in Karnataka.

5.9 Thermax Ltd

Originally Thermax Ltd was incorporated as Thermo- Dynamics Pvt., Ltd on 30th June, 1980. On 1st July, 1980 Wanson (India) Ltd. along with Thermax India (Pvt) Ltd. was amalgamated with the Company and subsequently the name was hanged to Thermax Pvt. The company has its 6 core businesses - Boilers and Heaters, Absorption Cooling, Water and Waste Solutions, Chemicals for Energy and Environment Applications, Captive Power and Cogeneration systems, Air Pollution and Purification and has five manufacturing facilities, 12 sales and service offices and a widespread franchisee and dealer network.

5.10 Cummins India Ltd

Cummins India Limited is a part of Cummins Inc. one of the world's largest designer and manufacturer of diesel engines. The company was started in India at Pune in 1962 (as Kirloskar Cummins Limited) and deals in Power generation, construction & mining, compressors, locomotives, marine, oilfields, fire pumps & cranes, automotive and special applications. The company has its manufacturing facilities in Nashik, Bardez, Sholapur, Pune, Bharuch.

5.11 Alfa Laval (India) Ltd

Alfa Laval (India) Ltd is a subsidiary of Swedish Multinational engineering company Alfa Laval AB and was incorporated in 1937. The company manufactures and supplies a wide range of key components and systems in Separation, Heat Transfer and Flow Technology. and has its manufacturing facilities in Pune, Sarole and Satara.

5.12 Asea Brown Boveri Ltd (ABB)

Asea Brown Boveri Ltd (ABB) is a Subsidiary of ABB Ltd - Zurich which is a leader in Power and Automation technologies. The Company operates in around 100 countries. ABB India caters to power and industry sectors. The company has its vast installed base, extensive local manufacturing at 8 units and a nationwide marketing and service presence. ABB has also set up a global R&D centre in Bangalore

5.13 Siemens Ltd

Siemens Ltd has its flagship of the Siemens Group in India. Siemens AG, the parent company holds 54.63 per cent in Siemens Ltd. The company mainly deals in power generation and distribution equipment, industrial projects and equipment, transportation systems, communication and healthcare products and has its manufacturing units in Aurangabad, Nashik, Goa, Thane and Parganas North.

6. OPPORTUNITIES AND FUTURE OUTLOOK

6.1 Opportunities

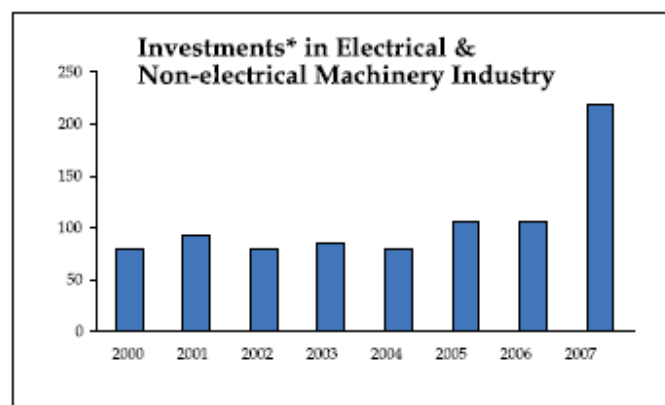
- World-class infrastructure has emerged as one of the most important necessities for unleashing high and sustained growth and alleviation of poverty in any economy. And with poor infrastructure to support other growth initiatives, the Indian economy continues to be a laggard when compared to its developing peers. From a policy perspective, however, there has been a growing consensus that a private-public partnership is required to remove difficulties concerning the development of infrastructure in the country. The realisation finally seems to be setting in. This makes the future of the Indian engineering sector extremely bright. Apart from highway development and construction and modernisation of airports, the potential for the sector lies in the oil and gas space, where high global demand has led to increased action in exploration and production activities. Considering these factors, the sector is expected to grow strongly into the future. However, scale and execution capabilities will be the key mantras for success for the engineering companies.
- Impetus given for growth of infrastructure and core industry in the last two budgets of the central government is expected to increase capacity utilisation of producers of coal, cement, iron ore and likely to increase demand for construction and mining equipments. Industrial growth and capital investment levels have improved and this will drive the growth in the coming years.
- The Government's initiative to bring clarity to the power sector reforms is a welcome sign for the industry. More coordination between the Centre and states for infrastructure development is a step in the right direction. The Electricity Act 2003 has introduced a lot of reforms in the power sector. The unbundling in the sector will definitely boost private investment. PSUs like NTPC are expected to almost double their generation capacity in next few years, which is a good sign for the engineering companies.
- The shift in focus towards reducing T&D losses will further increase the order book size of the companies operating in this realm. With power generation and distribution looking up, power equipment companies can look forward to a promising future.
- Deregulation combined with high global demand for crude has led to a surge in exploration and production activities in India and globally. Also, there has been a radical change in the government's approach to E&P (Exploration and Production) activities in the country. This thrust in development of new wells and improvement of output from old wells promises bright prospects for engineering companies
- Automation business has perked as the user industries started realising its benefits. With increasing competition among the power companies, the consumers will demand better quality and uninterrupted power supply. In such a scenario automation will play an important role. With the automation technologies gaining momentum, companies like ABB and Siemens will benefit a lot going forward.

- Capacity addition and de-bottlenecking exercise being carried by various industries like steel, power, refineries, chemicals etc is likely to provide a fillip to the industrial segment of the engineering companies.

6.2 Future Outlook

Demand in the engineering sector is expected to remain healthy primarily on account of the Government's increased thrust on infrastructure development. The continuing growth of the manufacturing sector and favourable regulatory policies would provide further boost to the sector's growth. Fresh investments in the power equipment, metals, oil & gas, and petrochemicals industries, coupled with robust industrial activity is expected to drive the growth momentum in the capital goods industry in the near term.

Investment projects worth Rs 218.6 billion were outstanding, as at the end of January 2007, in the electrical and non-electrical machinery industry. The sharp increase in investments (announced/ proposed/under implementation) witnessed during the last 1 year or so, indicates the buoyant demand outlook on the user-industry, and thereby on the future prospects of the machinery industry.



*Outstanding Investments as of January each year (Rs bn)

Source: CapEx (CMIE) and D&B Research

Emerging trends such as outsourcing of engineering services can provide new opportunities for quantum growth. Engineering and design services such as new product designing, product improvement, maintenance and designing manufacturing systems are increasingly getting outsourced to countries like India. India's engineering sector has a significant potential for future growth, both in manufacturing as well as services.

Engineering Process Outsourcing (EPO) services from India as it would have a far-reaching impact on the Indian engineering industry as a whole. The EPO market in India has the potential to exceed US \$ 40 billion by 2020. To tap this EPO market all the important stakeholders, including the Government, academic institutions, service providers and trade bodies will need to boost investments in infrastructure and improve marketing efforts.