THE BEST OF INDIA IN ENGINEERING
TABLE OF CONTENTS

1 Engineering Sector in India: Overview
   1.1 Market Overview
   1.2 Contribution of Indian Engineering Sector to the GDP
   1.3 Growth of Indian Engineering Exports
   1.4 Trends in Foreign Direct Investment
   1.5 Government & The Engineering Sector
   1.6 Current Trends in the Indian Engineering Sector
   1.7 R&D and Innovation in the Engineering Sector
   1.8 India Advantage
   1.9 Key Growth Drivers
   1.10 Future of the Indian Engineering sector
   1.11 Cluster Chart of Engineering Sector
   1.12 Business Practices
   1.13 Sub-segments of the Engineering Sector

   Heavy Engineering - Machines

2 Machine Tools
   2.1 Market Overview
   2.2 Key Clusters
   2.3 Key Players
   2.4 Current Trends
   2.5 Key Ministries & Associations in Machine Tool Market
   2.6 Government Regulations
   2.7 Sector Capabilities
   2.8 Innovations in this Segment
   2.9 Business Practices
   2.10 Future Prospects

3 Textile Machinery
   3.1 Market Overview
   3.2 Industry Structure
   3.3 Key Clusters and Facts
   3.4 Key Players
## 3.5 Government Regulations

## 3.6 International Accreditation

## 3.7 Technology and Research & Development

## 3.8 Contract Manufacturing

## 3.9 Future Trends / Prospects

### 4 Material Handling Equipment

#### 4.1 Market Overview

#### 4.2 Product Classification

#### 4.3 Industry Structure

#### 4.4 Key Clusters

#### 4.5 Key Players

#### 4.6 Key Ministries & Associations in Material Handling Industry

#### 4.7 Government Regulations

#### 4.8 Future Outlook

### 5 Cement Machinery

#### 5.1 Market Overview

#### 5.2 Industry Structure

#### 5.3 Key Clusters of Cement Plants / Supplier Location

#### 5.4 Key Players

#### 5.5 Key Ministries & Associations in Cement Machinery Market

#### 5.6 Government Regulations

#### 5.7 Industry Trends

#### 5.8 Future Market Outlook

### 6 Boiler

#### 6.1 Market Overview

#### 6.2 Product Classification

#### 6.3 Geographical Representation of Boiler Manufacturers: Key Clusters

#### 6.4 Major Players

#### 6.5 Government Regulations

#### 6.6 Key Future Technologies

#### 6.7 Future Market Overview

### 7 Turbine & Generator

#### 7.1 Market Overview

#### 7.2 Product Classification

#### 7.3 Business Models

#### 7.4 Turnkey Based Model

#### 7.5 Developer Based Model
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.6</td>
<td>Key Players</td>
</tr>
<tr>
<td>7.7</td>
<td>Turbine Market Overview in India</td>
</tr>
<tr>
<td>7.8</td>
<td>Generator Market Overview in India</td>
</tr>
<tr>
<td>7.9</td>
<td>Future Prospects</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Transformer</td>
</tr>
<tr>
<td>8.1</td>
<td>Market Overview</td>
</tr>
<tr>
<td>8.2</td>
<td>Product Classification</td>
</tr>
<tr>
<td>8.3</td>
<td>Industry Classification</td>
</tr>
<tr>
<td>8.4</td>
<td>Industry Structure</td>
</tr>
<tr>
<td>8.5</td>
<td>Key Clusters</td>
</tr>
<tr>
<td>8.6</td>
<td>Key Players</td>
</tr>
<tr>
<td>8.7</td>
<td>Business Practice &amp; Marketing Strategies</td>
</tr>
<tr>
<td>8.8</td>
<td>Government Regulations</td>
</tr>
<tr>
<td>8.9</td>
<td>Key Trends and Future Prospects</td>
</tr>
<tr>
<td>8.10</td>
<td>Future Outlook</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>Switchgear &amp; Control Gear</td>
</tr>
<tr>
<td>9.1</td>
<td>Market Overview</td>
</tr>
<tr>
<td>9.2</td>
<td>Major Segments</td>
</tr>
<tr>
<td>9.3</td>
<td>Key Players</td>
</tr>
<tr>
<td>9.4</td>
<td>Government Regulations</td>
</tr>
<tr>
<td>9.5</td>
<td>Key Trends</td>
</tr>
<tr>
<td>9.6</td>
<td>Future Prospects</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Conductors</td>
</tr>
<tr>
<td>10.1</td>
<td>Market Overview</td>
</tr>
<tr>
<td>10.2</td>
<td>Products and Sub-products</td>
</tr>
<tr>
<td>10.3</td>
<td>Key Players</td>
</tr>
<tr>
<td>10.4</td>
<td>Trends and Drivers</td>
</tr>
<tr>
<td>10.5</td>
<td>Associations and Ministries</td>
</tr>
<tr>
<td>10.6</td>
<td>Government Initiatives</td>
</tr>
<tr>
<td>10.7</td>
<td>Future Prospects</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Casting and Forging</td>
</tr>
<tr>
<td>11.1</td>
<td>Market Overview</td>
</tr>
<tr>
<td>11.2</td>
<td>Industry Structure</td>
</tr>
<tr>
<td>11.3</td>
<td>Forging Market Overview</td>
</tr>
<tr>
<td>11.4</td>
<td>Product Classification:</td>
</tr>
<tr>
<td>11.5</td>
<td>Key End user Industries for Forging Market (2013-14) &amp; Clusters</td>
</tr>
<tr>
<td>11.6</td>
<td>Forging industry value chain and stakeholders involved:</td>
</tr>
</tbody>
</table>

**Light Engineering - Industry Consumables**
<table>
<thead>
<tr>
<th>11.7</th>
<th>Key Players in Forging Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.8</td>
<td>Casting Market Overview</td>
</tr>
<tr>
<td>11.9</td>
<td>Market Size by End User Segments &amp; Key clusters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12</th>
<th>Fasteners</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1</td>
<td>Market Overview</td>
</tr>
<tr>
<td>12.2</td>
<td>Product Classification</td>
</tr>
<tr>
<td>12.3</td>
<td>Industry Structure</td>
</tr>
<tr>
<td>12.4</td>
<td>Key Clusters</td>
</tr>
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<td>12.5</td>
<td>Key Players</td>
</tr>
<tr>
<td>12.6</td>
<td>Government Regulations</td>
</tr>
<tr>
<td>12.7</td>
<td>Business Practice</td>
</tr>
<tr>
<td>12.8</td>
<td>Future of the Segment</td>
</tr>
</tbody>
</table>

**Light Engineering - Equipment**

<table>
<thead>
<tr>
<th>13</th>
<th>Pumps, Motors &amp; Compressors</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1</td>
<td>Market Overview</td>
</tr>
<tr>
<td>13.2</td>
<td>Pump Market Overview</td>
</tr>
<tr>
<td>13.3</td>
<td>Product Classification</td>
</tr>
<tr>
<td>13.4</td>
<td>Key Clusters</td>
</tr>
<tr>
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<td>Industry Structure</td>
</tr>
<tr>
<td>13.6</td>
<td>Key Players</td>
</tr>
<tr>
<td>13.7</td>
<td>Key Market Trends</td>
</tr>
<tr>
<td>13.8</td>
<td>Growth Trends in the Last 4 Years</td>
</tr>
<tr>
<td>13.9</td>
<td>Compressor Market Overview</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14</th>
<th>VALVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1</td>
<td>Market Overview</td>
</tr>
<tr>
<td>14.2</td>
<td>Key Industry Clusters</td>
</tr>
<tr>
<td>14.3</td>
<td>Key Players</td>
</tr>
<tr>
<td>14.4</td>
<td>Current Trends</td>
</tr>
<tr>
<td>14.5</td>
<td>Innovations and New Developments</td>
</tr>
<tr>
<td>14.6</td>
<td>Future Prospects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>15</th>
<th>Glossary &amp; Acronyms</th>
</tr>
</thead>
</table>

| 16    | Information Sources            |
The Best of India in Engineering
Engineering Sector in India

Overview
1.1 MARKET OVERVIEW

The engineering sector in India was valued at US$ 83.4 billion as of 2014, growing at a CAGR of 15.8 per cent during 2011 to 2014. Overall market production was valued at US$ 80.5 billion in 2014, up 17.8 per cent from 2011. The market size of capital goods and engineering sector is expected to reach US$ 125.4 billion by FY 2017.

In the fiscal year 2014-15, India’s engineering exports was valued at US$ 70.4 billion, a growth of 14.6 per cent over FY 2013-14. A significant amount of Indian exports are in the sectors of transport equipment, capital goods, heavy machinery and equipment, and light engineering products such as castings, forgings and fasteners. India is the 14th largest producer and 10th largest consumer of machine tools in the world. India is also fast emerging as a global research hub for engineering goods, with a significant amount of the country’s GDP invested in R&D.

The growth in India’s engineering industry by market size in value and production value since 2011 is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Size In Value (US$ bn)</th>
<th>Production Value (US$ bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>53.7</td>
<td>49.2</td>
</tr>
<tr>
<td>2012</td>
<td>62.7</td>
<td>58.0</td>
</tr>
<tr>
<td>2013</td>
<td>73.2</td>
<td>68.6</td>
</tr>
<tr>
<td>2014</td>
<td>83.4</td>
<td>80.5</td>
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</tbody>
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Source: Feedback Research
1.2 CONTRIBUTION OF INDIAN ENGINEERING SECTOR TO THE GDP

The Indian engineering sector accounts for 5 per cent of India’s GDP. Rising domestic demand, increasing investment and growth opportunities, favourable government policies and global & domestic focus on establishing low cost plants have propelled the engineering sector to greater heights. The contribution of the engineering sector to India’s GDP over the last three years can be categorised on the basis of cost, the manufacturing segment and pure engineering industry.

The economic contribution of the manufacturing sector to India’s GDP has reported a steady increase through the years, valued at US$ 225 billion in 2014. In the last few years alone, the engineering and machinery sector has played a crucial role in boosting the Indian economy and also contributed towards the promotion of associated industrial sectors of the country. The engineering sector alone is estimated to have generated US$ 52 billion towards the Indian economy in 2014.

<table>
<thead>
<tr>
<th>GDP at Factor Cost</th>
<th>GDP by Manufacturing Industry</th>
<th>GDP by Engineering Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units: US$ bn</td>
<td>Units: US$ bn</td>
<td>Units: US$ bn</td>
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<tr>
<td>FY 2012</td>
<td>FY 2013</td>
<td>FY 2014</td>
</tr>
<tr>
<td>1,398.0</td>
<td>1,565.0</td>
<td>207</td>
</tr>
<tr>
<td>1,565.0</td>
<td>1,733</td>
<td>220</td>
</tr>
<tr>
<td>1,733</td>
<td>225</td>
<td>81</td>
</tr>
<tr>
<td>FY 2012</td>
<td>FY 2013</td>
<td>FY 2014</td>
</tr>
<tr>
<td>58</td>
<td>69</td>
<td>81</td>
</tr>
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</table>

Source: RBI, Feedback Research
1.3 GROWTH OF INDIAN ENGINEERING EXPORTS

In the last five years, Indian engineering exports have achieved an average growth of over 9.1 per cent. As of 2014-15 engineering exports was valued at US$ 70.5 billion, up from US$ 49.9 billion recorded in 2010-11. The value of exports reached US$ 9.2 billion in Jan-Feb 2016. Around 40 per cent of India’s engineering goods and services were exported to Americas and European Union in 2015 (April-February) and 45 per cent to Asian countries.

An analysis of India’s engineering exports over the last year by market value, category of products, and country-wise split is given below.

An impressive 39 per cent of India’s engineering goods and services were exported to the US and Europe in 2013-14 and 30 per cent to other Asian countries.
1.4 TRENDS IN FOREIGN DIRECT INVESTMENT

An analysis of Indian FDI by country and sectors are given below. Trends and projections in turnover and cumulative FDI inflows in the Indian engineering sector have also been represented. The sector has been de-licensed by the government and attracts 100 per cent FDI.

Total cumulative FDI inflows into India in the period April 2000–December 2015 touched US$ 408.7 billion, and total FDI inflows in the engineering and miscellaneous mechanical sector touched US$ 3 billion from April 2000–December 2015.

Singapore topped the list of investing countries by FDI equity inflows into India with US$ 11.7 billion during April–December 2015, followed by Mauritius with US$ 6.1 billion and USA with US$ 3.5 billion.
Mauritius topped the list of investing countries by FDI equity inflows into India with US$ 5,205 million in the financial year April – November 2014.

FDI Equity Inflow in all sectors, Country wise
April – December 2015 (100%= US$ 29,443 million)

FDI Equity Inflow, Sector wise
April – December 2015 (100%= US$ 29,443 million)
1.5 GOVERNMENT & THE ENGINEERING SECTOR

1.5.1 Key Ministries in the Engineering Sector

- **Department of Commerce**
  - The Department of Commerce, under the Ministry of Commerce and Industry, is responsible for regulation, development and promotion of India's international trade and commerce through formulation of appropriate international trade & commercial policy and implementation of the various provisions thereof.
  - The Vision of the Department is to make India a major player in the world trade by 2020 and assuming a significant role in the international trade bodies.

- **Engineering Export Promotion Council (EEPC)**
  - The Engineering Export Promotion Council (EEPC) is the apex body in charge of promoting India's engineering products and services in the global market.
  - India's engineering exports include the sectors of transport equipment, capital goods, other machinery and equipment, and light engineering products such as castings, forgings and fasteners. The EEPC supports and encourages domestic firms in developing international trade.

- **Department of Heavy Industries (DHI)**
  - The Department of Heavy Industries (DHI), under the Ministry of Heavy Industries and Public Enterprises, is the nodal authority in India responsible for promoting the growth of heavy industries.
  - The DHI promotes more than 19 various industrial sub-sectors. Some sectors that the DHI actively encourages include machine tools, heavy electrical engineering, industrial machinery, and automobiles.

- **Department of Industrial Policy and Promotion (DIPP)**
  - The Department of Industrial Policy and Promotion (DIPP), under the Ministry of Commerce and Industry, is the principal agency responsible for monitoring India's industrial growth and production.
  - The DIPP constantly conducts studies to assess and forecast the need for technological development in various industrial sectors including cement and light engineering, among others.
1.5.2 Government Regulatory Framework

India’s National Manufacturing Policy (NMP) aims to increase the percentage contribution of the manufacturing industry in India’s GDP from its current 16 per cent to 25 per cent, by 2022. In order to achieve this significant target, the Government of India has introduced various tax incentives and other key initiatives to support and encourage the growth of the engineering sector. India also plans to facilitate five more National Manufacturing and Investment Zones (NIMZs), each spread over 5,000 hectares, with world-class infrastructure, clean technologies and skill development institutes.

These include:

**Key Government Regulatory Framework**

- **Tax Incentives to SEZ**
  - The Indian Government has granted several incentives, such as tax incentives and physical infrastructure, to SEZ units to bolster the production of manufactured goods

- **Mandatory Procurement from Small & Medium scale Enterprises (SMEs)**
  - Every Central Ministry or Department or Public Sector undertaking shall set up an annual goal of procurement from MSEs with the objective of achieving an overall procurement of minimum 20 per cent of total annual purchases of products produced and services rendered by MSEs in three years

- **National Manufacturing Policy**
  - The Policy is based on a principle on industrial growth in partnership with the Indian States
  - Central Government would create the enabling policy framework, provide incentives for infrastructure development on a PPP basis through appropriate financing instruments, while State Governments would identify suitable land and be equity holders in the NIMZs
  - Eight National Investment and Manufacturing zones (NIMZs) along Delhi - Mumbai Industrial Corridor (DMIC) have been announced
  - The policy has also come up with proposals to improve access to finance for SMEs in the manufacturing sector
Mandatory Procurement from Small & Medium scale Enterprises (SMEs)

Every Central Ministry, department and Public Sector Undertaking has been mandated to set an annual goal of procurement from SMEs. The objective is to achieve minimum 20 per cent overall procurement of total annual purchases from SMEs within three years.

National Manufacturing Policy (NMP)

The National Manufacturing Policy seeks to promote industrial growth in partnership with the various states in India. The Central Government creates the enabling policy framework, and provides incentives for infrastructure development on a Public Private Partnership (PPP) basis through appropriate financing instruments. The State Governments work in tandem to identify suitable land and equity holders in the NIMZs. Eight NIMZs which are proposed to have single window clearance facility have been identified under the Delhi-Mumbai Industrial Corridor and nine outside it. DIPP has also given in-principle approval to 12 NIMZs in Nagpur in Maharashtra; Turnkur, Kolar, Gulbarga and Bidar in Karnataka; Medak in Telangana; Chittor in Rajasthan and Kalinganagar in Odisha, among others.

The policy has also placed various proposals to improve access to finance for small and medium enterprises in the manufacturing sector.

As an incentive the government also plans to share 50 per cent of the international patent filing expenses. It is also committed to promote green initiatives by providing 5 per cent interest in reimbursement and 10 per cent capital subsidy for the production of equipment/machines/devices for controlling pollution, reducing energy consumption and water conservation.
1.5.3 Government Initiatives in Engineering/Manufacturing Sector

**“MAKE IN INDIA” CAMPAIGN:**
A key national initiative, the “Make in India” campaign is focused on making India a global manufacturing hub. The goal of this mega programme is to ensure that the manufacturing sector which contributes to about 16 per cent of India’s GDP increases to around 25 per cent in 2022. The major focus of this initiative is heavy industries and public enterprises. The increase in investment in the manufacturing sector would generate significant employment and empower secondary and tertiary industries as well.

**VIBRANT GUJARAT SUMMIT:**
The seventh edition of the ‘Vibrant Gujarat Global Investors Summit’ was aimed at positioning Gujarat as a “Global Business Hub” through the biggest congregation of businessmen from across the globe.

Corporates from India and abroad pledged to invest US$ 416 billion and signed 21,000 Memorandum of Understandings (MoUs) at the Vibrant Gujarat Summit in January 2015.

The government has also approved the setting up of Centres of Excellence at a cost of US$ 1,350 million. The “Vibrant India First” trade summit saw several top business leaders networking with about 120 foreign buyers/importers from “emerging markets” from more than 18 countries of Africa & the ASEAN region.

**SPECIAL ECONOMIC ZONES:**
Currently, India has over 37 SEZs spread across the country in the engineering sector. More than 20 additional SEZs have been formally approved by the Government of India, and are all set to be established in the next couple of years. The Delhi-Mumbai Industrial Corridor, being developed across seven major states is expected to further strengthen the growth of the Indian engineering sector.

**SMART CITIES INITIATIVE:**
In order to accelerate the ‘Smart Cities Initiative’, the Ministry of Urban Development announced partnership with Bloomberg Philanthropies in June 2015, to facilitate creation of quality urban infrastructure. This partnership is expected to improve the quality of urban life and further drive engineering growth in India.
1.5.4 Government Incentives and Schemes in the Engineering Sector

FINANCIAL SUPPORT:
Key provisions made under the 2015-16 Union Budget include additional investment allowance and higher depreciation (35 per cent) for acquisition of new plant and machinery in notified backward areas in the State of Andhra Pradesh and Telangana.

TAX INCENTIVES:

R&D Incentives: R&D incentives have been offered for industry/private-sponsored research programmes. This includes a weighted tax deduction under Section 35 (2AA) of the Income Tax Act. A weighted deduction of 200 per cent is granted for any sum paid for an approved scientific research to a national laboratory, university or institute of technology.

Companies Engaged in Manufacturing with In-House R&D Centre: A weighted tax deduction of 200 per cent under Section 35 (2AB) of the Income Tax Act has been granted. This includes both capital and revenue expenditure incurred on scientific research and development (except expenditure on land and buildings).

State Incentives: Each state in India offers additional incentives for industrial projects. Such incentives include subsidised cost of land, relaxation in stamp duty, exemption on sale/lease of land, power tariff incentives, concessional interest rate on loans, investment subsidies/tax incentives, subsidies for backward areas, and special incentive packages for mega projects.

Export Incentives: Several schemes have been implemented to support and encourage engineering exports. Some of these include export promotion capital goods scheme, duty remission scheme, focus product scheme, special focus product scheme and focus market scheme.

Area-based Incentives: Various incentives have been launched to encourage setting up of projects or units in specific areas or regions in India. These include setting up shop in SEZ/NIMZs, North-Eastern India and the states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand.

Import Incentives: To provide a boost to the manufacturing sector, the government reduced the basic customs duty from 10 per cent to 5 per cent on forged steel rings used in the wind operated electricity generators. It also relaxed excise duties on capital goods, consumer durables and vehicles.
1.6 CURRENT TRENDS IN THE INDIAN ENGINEERING SECTOR

In the last few years, India has emerged as a global engineering hub. Several global manufacturing majors have partnered with Indian firms in setting up successful engineering units across the country. A few of these include Alstom (France), Ansaldo (Italy), Babcock (UK), Colfax Corporation, GE (USA), Hitachi (Japan), Legrand (France), MHI (Japan), Schneider Electric (France), and Toshiba (Japan). One of the key areas of focus for domestic players has also been technology up-gradation. Several firms have formed strategic alliances with technology suppliers to upgrade their production and processing capabilities. With the entry of foreign players, competition has further increased, spurring domestic investment in technology to significantly improve production quality and capacity. Increasingly, domestic players are securing ISO 9,000 accreditation to further strengthen their position in the global market.

1.7 R&D AND INNOVATION IN THE ENGINEERING SECTOR

India ranks 2nd in the global Engineering and R&D (ER&D) sourcing/offshoring segment with 22 per cent share. The revenue generated by the Indian ER&D services segment is currently valued at US$ 18.2 billion and is expected to touch US$ 38 billion by 2020. In-house R&D centre revenue as of today is valued at US$ 11.3 billion in 2014, up from US$ 10.3 billion in 2013.

<table>
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<tr>
<th>Research and Development</th>
<th>In-House R&amp;D Centers</th>
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<td>Units: US$ bn</td>
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<tr>
<td></td>
<td>2013</td>
</tr>
<tr>
<td>10.37</td>
<td>11.3</td>
</tr>
<tr>
<td>9.06%</td>
<td></td>
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</table>
Increasingly, R&D has been aggressively outsourced to Indian firms especially in verticals such as medical devices, industrial automation, energy and other areas in the engineering sector.

The R&D ecosystem in India, as of today, presents a significant opportunity for players across this segment. MNCs with highly talented engineers have been able to take advantage of the burgeoning research and development environment to develop several patentable products and processes.

Several key players have initiated in-house R&D centres. Over the next few years, these centres are expected to become powerhouses of the Indian engineering sector. This includes industry players like the Department of Heavy Industry, GOI, which seeks to achieve its vision of ‘global automotive excellence’ through the creation of state-of-the-art Research and Testing centres.
1.7.1 Innovation in the industry:

Recent Mergers and Acquisitions (M&As) in the Indian engineering industry have introduced new technologies in the Indian market. As a result, Indian engineering firms have been able to achieve lower costs of production & high quality products, meeting consumer demand.

Few of the companies that pay special focus to innovation in manufacturing/engineering in India include:

- **GE** - focuses on innovations in composite material design, electromagnetic analytics, non-destructive evaluation technology
- **Honeywell** - concentrates on next generation magnetic sensors, image analysis and computer vision, and intelligent vehicle technologies
- **General Motors** – focuses on innovations in smart system modelling, vehicle structure and safety, and chemical reaction modelling
- **Philips** - introduces innovations in healthcare systems and technologies, energy and lighting, and consumer lifestyle technologies
- **EADS** - identifies the latest in high performance computing, avionics and structures
- **Siemens** - leads innovations in decentralised energy systems, embedded systems and S.M.A.R.T. technologies.
- **ABB** - introduces advances in manufacturing technologies, communication technologies and robotics

1.7.2 Key Merger & Acquisitions in last 3 years:

- Diamond Power Infrastructures acquired a significant stake in Utkal Galvanizers in 2011.
- Mitsubishi Electric strengthened its Industrial Automation Systems Business in India through the acquisition of Pune-based Messung Group in Jan 2012
- Power equipment and consumer durable maker Crompton Greaves acquired smart grid automation company ZIV Group for an enterprise value equivalent to Euro 150 million in July 2012.
- JBM Group acquired TESCO GO in 2012, a leading provider of global engineering services in product development process automotive (cars, heavy and light trucks), railways, aerospace and other domains
- The German subsidiary of Geometric Europe GmbH, a leader in Product Lifecycle Management (PLM) has acquired 100 per cent stake in 3Cap Technologies GmbH (3Cap) in January 2013, a specialist in electronics engineering, primarily for the automotive industry. 3Cap is valued at US$ 12.85 million.
- Titagarh Wagons acquired 100 per cent stake in Titagarh Marine (TML) in April 2013, making it a wholly-owned subsidiary with effect from March 25, 2013
- Engineering major Larsen & Toubro acquired UK-based Thalest for US$ 5 million in June 2014. The latter offers various solutions for naval and mercantile marine ships.
- The cement plants of Jaypee Cement Corporation, Gujarat, were acquired by UltraTech Cement in August 2014. UltraTech has also acquired integrated cement units at Sewagram and a grinding unit at Wanakbori, Gujarat.
- In January 2015, CDP Bharat Forge Holding GmBH acquired Mecanique Generate Langroise (MGL), a France-based oil and gas machining company
- In December 2015, Reliance Infrastructure acquired India’s largest ship building and heavy industries company, Pipavav Defence and offshore Engineering Company Limited
1.8 INDIA ADVANTAGE

Industry growth in the export market has been driven by unique local advantages. These include:

- **Low cost of labour force**: India’s manufacturing wages are among the lowest worldwide, averaging US$ 1.50 per hour
- **Demographic dividend**: India’s abundant labour force is English-speaking, young, skilled, and cost efficient
- **Free Trade Agreements**: India is one of more than 10 nations that have signed Free Trade Agreements. It is a signatory to the ASEAN-India Free Trade Area and provides companies’ access to one of the world’s largest FTAs.
- **Growing domestic market**: Rapid economic growth has provided a large domestic market for manufacturers
- **Strategic location**: Manufacturing in India gives companies direct access to the vast domestic and South Asian market

1.9 KEY GROWTH DRIVERS

Growth of the engineering sector is linked to investments in the sectors of power, infrastructure, automobile, auto components etc.

India’s power sector is the single largest revenue generator for engineering companies. This sector’s performance is driven primarily by the augmentation of capacity and restructuring of state electricity boards.

The growth in capital goods sector is also directly related to the overall engineering sector. Industry competition, rising infrastructure demand, export incentives and conducive policy environment are expected to facilitate growth in this industry.

Government projects such as the World Bank-funded Golden Quadrilateral Project and the North-South and East-West corridors, which are focus areas for infrastructure development, have fuelled growth in the construction industry as well as in the overall industrial sector.

The government has launched the ‘Make in India’ campaign, combined with detailed process and policy re-engineering to make India a Global Manufacturing Hub. The campaign is set to boost job creation in the manufacturing sector for the large young demographic of the country. The government also plans to reduce corporate tax from 30 per cent to 25 per cent over the next 4 years, which is expected to lead to higher levels of investment in Indian industry.

By the end of 2020, India is expected to have 590 million middle class, which will drive demand in the auto sector, consumer goods, infrastructure etc. Engineering firms need to ensure they address the requirements of this segment with products of adequate quality. This opens a large avenue for both domestic and international investment in this sector, especially in the large manufacturing & infrastructure projects. This is estimated to be over and above the mid-and innumerable small engineering projects expected to be announced in the next couple of years. The year 2014 alone witnessed more than 50 mergers & acquisitions (M&A) that addressed the requirements of the growing domestic market.
Indian engineering products are also highly valued in the global market. Several Free Trade Agreements (FTAs) with ASEAN and BRIC nations have significantly liberalised trading policies. As of January 2015, more than 10 FTAs have been formally approved, five of which are already in effect.

India has close to 500 million workers in the labour force. Around 60 per cent of who are employed in agriculture, 28 per cent in services, and 12 per cent in manufacturing. This is expected to change over the next few years as more workers move from agricultural jobs to manufacturing, taking advantage of the growing manufacturing sector.

India also enjoys a significant lead in terms of labour cost per hour over developed countries such as the US and Hong Kong, Taiwan, South Korea and China. Labour cost in the country is around US$ 1.5 per hour in the organised sector, and is expected to stay low compared to other countries, over the next few years.

Venturing into unexplored geographies and adopting newer services with the use of technologies such as Big Data, Cloud, M2M and Internet of Things (IoT) are also expected to drive the growth.

Source: Research Reports, Secondary Research
1.10 FUTURE OF THE INDIAN ENGINEERING SECTOR

India's engineering sector is expected to grow by almost 25 per cent annually during the period 2015-18. Increased investment in infrastructure, favourable government policies, new oil & gas power and metallurgy projects are expected to give this segment the required fillip. Spending in this sector is expected to reach US$ 1.1 trillion by 2020. The export market also helped establish brand recall for the local players, in the global scene. As a result emerging services such as new product design, product improvement, maintenance, and manufacturing systems design are getting progressively outsourced to these Indian firms.

The Government of India (GoI) launched the National Manufacturing Policy in 2012 with two important objectives:

- To increase the contribution of the manufacturing sector to India’s GDP to 25 per cent within a period of ten years
- To create 100 million jobs by 2022

In order to achieve this target, GoI has introduced several initiatives and incentives to give further impetus to this sector.

- The Indian government has appointed the Engineering Export Promotion Council (EEPC) to be the apex body in charge of promotion of engineering goods, products and services from India
- Recent government initiatives like Make In India campaign & Vibrant Gujarat summit aims to boost manufacturing sector in India

<table>
<thead>
<tr>
<th>Market Value (US$ bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>2016</td>
</tr>
<tr>
<td>101</td>
</tr>
<tr>
<td>2017</td>
</tr>
<tr>
<td>111</td>
</tr>
<tr>
<td>2018</td>
</tr>
<tr>
<td>122</td>
</tr>
</tbody>
</table>

Source: Feedback Research
### 1.10.1 CLUSTER CHART OF ENGINEERING SECTOR

<table>
<thead>
<tr>
<th>State</th>
<th>No of clusters</th>
<th>State</th>
<th>No of clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>4</td>
<td>Madhya Pradesh</td>
<td>3</td>
</tr>
<tr>
<td>Bihar</td>
<td>1</td>
<td>Maharashtra</td>
<td>16</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>2</td>
<td>Odisha</td>
<td>1</td>
</tr>
<tr>
<td>Delhi</td>
<td>5</td>
<td>Punjab</td>
<td>14</td>
</tr>
<tr>
<td>Gujarat</td>
<td>12</td>
<td>Rajasthan</td>
<td>4</td>
</tr>
<tr>
<td>Haryana</td>
<td>11</td>
<td>Tamil Nadu</td>
<td>6</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>1</td>
<td>Uttar Pradesh</td>
<td>9</td>
</tr>
<tr>
<td>Jammu &amp; Kashmir</td>
<td>1</td>
<td>Uttaranchal</td>
<td>1</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>3</td>
<td>West Bengal</td>
<td>5</td>
</tr>
<tr>
<td>Karnataka</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 hubs of manufacturing activities in the engineering industry sector. Maharashtra topped the list of engineering clusters at 16, followed by Punjab with 14 and Gujarat with 12.
1.11 BUSINESS PRACTICES

Heavy engineering goods account for the largest chunk in the Indian manufacturing pie. Manufacturing heavy engineering goods requires huge capital investment, especially when competing with leading players who invest in high-end technology. This has become an entry barrier for many firms.

Supplementing the large firms are small and medium scale enterprises. SMEs specialise in manufacturing low technology products, a few of which are involved only in the assembly of imported components.

Engineering companies in India employ a dual go-to market strategy, focusing on a single channel such as a large distributor or direct dealer, or utilising multiple channels of distribution. While most Indian engineering firms approach the market through large distributors, leading MNCs have also adopted the channel of traditional or direct dealers.

Industrial events at the national and international levels also provide a significant avenue for firms to penetrate the growing market for engineering products. The online approach to B2B marketing and sales, while still in its infancy is fast catching on as a successful alternate channel of distribution.
1.12 SUB-SEGMENTS OF THE ENGINEERING SECTOR

1.12.1 Major Sub-Segments of the Engineering Sector – 2014-15

Source: Ministry of Heavy Industries, Research Reports, News Articles, Ministry of Commerce & Industry
The engineering sector can be divided into two main segments: heavy engineering and light engineering. Heavy engineering accounts for more than four-fifths of the sector and includes capital goods and machinery. Light engineering industry on the other hand consists of industrial consumables, components, devices and equipment.

Heavy Engineering: This segment in India manufactures a variety of products. Most of the leading players in the heavy engineering goods segment manufacture high-value heavy engineering goods using high-end technology. Consequently, the small and mid-sized firms have a smaller market presence. They often supply components to the large players while a few small scale units are involved only in the assembly of imported components.

Light Engineering: This segment is characterised by the dominant presence of small and mid-sized players, who manufacture low technology products. The few medium and large firms in this segment produce high value added products.

Source: Ministry of Heavy Industries, Research Reports, News Articles, Ministry of Commerce & Industry
### 1.12.2 Engineering Sub-segments FDI & Export Scenarios (All values in US$ million)

<table>
<thead>
<tr>
<th>Segments</th>
<th>FDI Inflow (2011-2014)</th>
<th>Exports Value (Jan 2014-April 2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial Machinery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textile Machinery</td>
<td>385.2</td>
<td>338.9</td>
</tr>
<tr>
<td>Cement Machinery</td>
<td>379.8</td>
<td>34.9</td>
</tr>
<tr>
<td>Plastic Processing Machinery</td>
<td>-</td>
<td>3.3</td>
</tr>
<tr>
<td>Machine Tools</td>
<td>260.7</td>
<td>119.4</td>
</tr>
<tr>
<td>Earth Moving &amp; Construction Machinery</td>
<td>42.7</td>
<td>14.1</td>
</tr>
<tr>
<td>Mining Equipment</td>
<td>84.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Material Handling Equipment/ Port Handling Equipment</td>
<td>-</td>
<td>25.1</td>
</tr>
<tr>
<td>Steel Plant Machinery</td>
<td>-</td>
<td>16.6</td>
</tr>
<tr>
<td>Rubber Machinery</td>
<td>1,510.0</td>
<td>49.0</td>
</tr>
<tr>
<td>Sugar Machinery</td>
<td>16.0</td>
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<tr>
<td>Oil Field Equipment</td>
<td>0.0</td>
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<tr>
<td>Metallurgical Machinery</td>
<td>2,439.8</td>
<td>0.0031</td>
</tr>
<tr>
<td>Dairy Machinery</td>
<td>-</td>
<td>6.6</td>
</tr>
<tr>
<td>Agricultural Machinery</td>
<td>264.9</td>
<td>77.0</td>
</tr>
</tbody>
</table>

Source: DIPP
<table>
<thead>
<tr>
<th>Segments</th>
<th>FDI Inflow (2011-2014)</th>
<th>Exports Value (2011-Present)</th>
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</thead>
<tbody>
<tr>
<td><strong>Components &amp; Devices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roller Bearings</td>
<td>-</td>
<td>513.8</td>
</tr>
<tr>
<td>Gears</td>
<td>-</td>
<td>1,593.7</td>
</tr>
<tr>
<td>Pipes &amp; Tubes</td>
<td>-</td>
<td>824.0</td>
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<tr>
<td><strong>Capital Goods</strong></td>
<td></td>
<td></td>
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<tr>
<td>Boilers</td>
<td>21.7</td>
<td>553.4</td>
</tr>
<tr>
<td>Transformers</td>
<td>120.0</td>
<td>1,351.1</td>
</tr>
<tr>
<td>Turbines &amp; Generator sets</td>
<td>42.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Switchgear &amp; Control Gears</td>
<td>24.0</td>
<td>16.9</td>
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<tr>
<td>Process plant Equipment</td>
<td>18.0</td>
<td>7.4</td>
</tr>
<tr>
<td>Heat Exchangers</td>
<td>-</td>
<td></td>
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<tr>
<td>Industrial Structures</td>
<td>-</td>
<td>3.0</td>
</tr>
<tr>
<td>Water, waste water &amp; effluent treatment plants</td>
<td>-</td>
<td>1.0²</td>
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<tr>
<td><strong>Industrial Consumables</strong></td>
<td></td>
<td></td>
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<tr>
<td>Fasteners</td>
<td>164.0</td>
<td>263</td>
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<tr>
<td>Casting</td>
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<tr>
<td>Forging</td>
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<tr>
<td>Welding Equipment &amp; Consumables</td>
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</tr>
<tr>
<td>Abrasives</td>
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<td>224.7</td>
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<tr>
<td><strong>Equipment</strong></td>
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<td></td>
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<tr>
<td>Compressors</td>
<td>259.4</td>
<td>772.1</td>
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<tr>
<td>Pumps</td>
<td>555.8</td>
<td>1,742.3</td>
</tr>
<tr>
<td>Motors, Engines</td>
<td>92.6</td>
<td>758.0</td>
</tr>
<tr>
<td>Process Control Equipment</td>
<td>-</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: DIP, EEPC, Zauba
1.12.3 Major Constituents of the Engineering Sector – Market Size 2013-14

**Heavy Engineering**

US$ 66.7 Bn

**Machinery**
- Textile Machinery
- Steel Plant Machinery
- Rubber Machinery
- Earth Moving & Construction Machinery
- Sugar Machinery
- Oil Field Equipment
- Cement Machinery
- Plastic Processing Machinery
- Machine Tools
- Mining Equipment
- Material handling Equipment/Port Handling Equipment
- Metallurgical Machinery
- Dairy Machinery
- Agricultural Machinery

**Capital Goods**
- Boilers
- Transformers
- Conductors
- Industrial Structures
- Turbines and Generator sets
- Switch Gears and Control Gears
- Waste, Waste Water & Effluent treatment plants
- Process Plants Equipments (Heat Exchangers)
Key 15 Segments for Detailed Study

US$ 16.7 Bn

Light Engineering

Industrial Consumables
- Welding Equipment & Consumables
- Fasteners
- Casting and Forging
- Abrasives

Components & Devices
- Roller Bearings
- Gears
- Pipes & Tubes

Equipment
- Process Control Equipment
- Pumps, Motors, Engines & Compressors
- Valves

Note: Segments Shortlist based on FDI Inflow & Export capabilities

Source: Ministry of Heavy Industries, Research Reports, News Articles, Ministry of Commerce & Industry
1.12.4 Heavy Engineering: Machinery

EARTH MOVING & CONSTRUCTION MACHINERY:
The Indian earth moving & construction industry was valued at US$ 5.2 billion in 2014. It is estimated that the industry has the potential to expand by 4 times, achieving US$ 22.7 billion by 2020. In terms of output, the market has the potential to grow by 20-25 per cent to reach sales of 330-450 thousand units by 2020.

MACHINE TOOLS:
The Indian machine tool industry was valued at US$ 1.5 billion in 2014-15. More than 160 players are estimated to be the part of organised machine tools sector, while approximately 400 units constitute the small and medium enterprises (SMEs) segment. This sector is driven to a large extent by the increasing demand for machine tools from the capital goods sector, especially automobile and textile industries. With rising demand for higher productivity, superior precision and accuracy, as well as low-cost manufacturing solutions, Computer Numerically Controlled (CNC) machine tools are also set to be in greater demand going forward.

TEXTILE MACHINERY:
The Indian textile machinery industry stood at US$ 2.0 billion in 2014-15, and is expected to reach US$ 3.1 billion by 2016-17. The sector has more than 1,446 firms, of which 80 per cent are small & medium scale manufacturers. As per government records, 600 units manufacture complete machinery, while remaining units produce parts and accessories. Current domestic production in the sector is US$ 1.1 billion, and is expected to reach US$ 2.4 billion by 2016-17. Exports were valued at US$ 0.3 billion in 2013-14.

MATERIAL HANDLING EQUIPMENT / PORT HANDLING EQUIPMENT:
The Indian material handling equipment market was valued at US$ 1.3 billion in 2013-14. The sector is expected to make significant gains with growing demand from steel, power, mineral and other infrastructure industries.

MINING EQUIPMENT:
The Indian mining equipment market is valued at US$ 1.2 billion as of 2013-14. The sector encompasses more than 200 different types of mining equipment including earth movers, excavators, rope shovels, motor graders, rotary drills, large excavators (below 35 tonnes), surface miners, long wall equipment, dragliners, continuous miners, loaders, dumpers and dozers. Total demand for select construction and mining equipment in India was estimated to be 105,811 units in 2013-14 and is expected to grow at a CAGR of 9.6 per cent to 166,876 units by 2018-19.

PLASTIC PROCESSING MACHINERY:
The Indian plastic machinery market was valued US$ 0.5 billion as of 2014-15. This market is highly dominated by imports. India’s exports include various processing machinery such as injection and blow moulding machines, extrusion machinery and vacuum forming machines. The export revenue of plastic machinery in 2013-14 was US$ 70 million. By 2016-17, plastic processing & rubber machinery combined is estimated to reach a market size of US$ 2.2 billion.

CEMENT MACHINERY:
The Indian cement machinery market was worth US$ 333 million in 2013-14. Exports in this sector were valued at US$ 1.4 million in the same period. The fact that 100 per cent FDI is allowed under the automatic route, paved the way to provide the required impetus to increase global investment. Cement machinery manufacturing in India includes raw mill grinding, pre-processing and cement grinding process technology (for capacities up to 10,000 tonnes per day).

With rising demand for higher productivity, superior precision and accuracy, as well as low-cost manufacturing solutions, Computer Numerically Controlled (CNC) machine tools are also set to be in greater demand going forward.
1.12.5 Heavy Engineering: Capital Goods

**BOILERS:**
This sub-segment's market size was valued at US$ 5.2 billion in 2013-14. It is expected that the industry will achieve US$ 5.8 billion by 2016-17, and US$ 11.7 billion by 2021-22 at a CAGR of 10.8 per cent.

**PLANT PROCESSING EQUIPMENT (HEAT EXCHANGERS):**
The Indian process plant equipment market was valued at US$ 3.9 billion in 2014-15. Exports in this sector reached US$ 1.2 billion in 2014-15, while imports touched about US$ 2.1 billion during the same period. Over 200 units are engaged in the manufacturing of process plant machinery across the country, of which 35 per cent are large manufacturers.

**TURBINES & GENERATOR SETS:**
Total Indian production of turbines and generators was valued at US$ 2.3 billion in 2013-14 and is estimated to reach US$ 13.4 billion by 2021-22. This sector includes the manufacture of various turbines including those in the range of generating 800–7,000 MW per annum, and generators ranging from 0.5 Kilo Volt Ampere (KVA) to those even higher than 25,000 KVA.

**TRANSFORMERS:**
The transformers market in India was valued at US$ 1.8 billion as of July 2015. It is expected to grow at a CAGR of 10 per cent till 2020 to reach US$ 2.9 billion. With an overall annual installed capacity of over 370,000 Mega Volt Ampere (MVA), the Indian transformers market is characterised by 20 large players of the more than 300 transformer companies. Power transformers contribute to 45 per cent of the total market, while distribution transformers form the balance 55 per cent.

**SWITCHGEAR AND CONTROL GEAR:**
The Indian switch and control gear industry was valued at US$ 2.1 billion in 2013-14 and has been growing at a rate of 15 per cent over the past few years. The industry is expected to be worth US$ 3.5 billion by 2016-17. The Medium & High Voltage Switchgear industry size is US$ 0.6 billion and that of Low Voltage Switchgear is US$ 1.8 billion (2014-15). Large enterprises comprise 75 per cent of the overall market. This is in direct contrast to the Low voltage switchgears market, which accounts for more than 55 per cent of the total market, and is serviced by a higher number of small and medium enterprises.
1.12.6 Light Engineering: Industrial Consumables

**CASTING & FORGING:**

The Indian casting industry ranks 2nd in the world, producing 10 Million Metric Tons (MMT) of various grades of casting. There are approximately 5,000 units in the casting sector out of which 90 per cent can be classified as MSMEs. The Indian casting and forging industry is currently estimated at 13.6 MMT per annum.

The sector is supplied by more than 400 units, of which only 9-10 are large ones based across India. The organised sector accounts for about 65-70 per cent of the total forging production while the rest is serviced by small and some even tiny units.

1.12.7 Light Engineering: Equipment

**FASTENERS:**

This industry includes two categories of fasteners – high tensile and mild steel fasteners. Mild steel fasteners are primarily manufactured by the unorganised sector, while the high tensile steel segment is dominated by the organised sector. The Indian fastener industry was estimated at about US$ 432 million in 2014, with an annual growth of 10 per cent year-on-year.

**PUMPS, MOTORS AND COMPRESSORS:**

The Indian pump industry was worth US$ 956 million in 2014, and is expected to grow at a CAGR of 13 per cent over the period 2013-2018. Agriculture and industrial sectors are the main consumers of the electric motor industry, accounting for more than 75 per cent of the demand. This sub-segment is fragmented comprising more than 800 small scale units that supplement the MNCs.

The industrial compressors industry in India, valued at US$ 550 million in 2013-14 has been growing at a CAGR of 7 per cent for the last three years. The industry is expected to grow at a CAGR of 9 per cent going forward and be worth US$ 833 million by 2018-19.

**VALVES:**

The market size of valves in India was worth US$ 1.5 billion in 2013-14. India constitutes 2.5 per cent of the global market. Pumps and valves exports were worth US$ 1.8 billion in 2014-15, representing an annual growth of 20 per cent from US$ 1.5 billion in 2013-14.

The Indian valve industry is highly fragmented with around 600 valve manufacturers, of which more than 95 per cent are in the micro, small and medium enterprise (MSME) category.

On-Off valves accounts for 98 per cent of the valves market by volume and 90 per cent by value and the rest is accounted for by Control Valves.
Heavy Engineering

Machines
MACHINE TOOLS
2.1 MARKET OVERVIEW

The market size of machine tools in India was worth US$ 1.5 billion in 2014-15. During the same period the production of machine tools in the country was US$ 692.9 million. Imports were valued at US$ 871.1 million, while exports stood at US$ 46.0 million. The market is expected to reach US$ 3.0 billion by 2019-20, growing at a CAGR of nearly 14 per cent from 2013-14 to 2019-20. Since 2014, the industry has reported significant development, employed skilled talent of over 30,000 engineers, managers and professionals. This figure is expected to grow beyond 50,000 by 2017.
2.1.1 Industry Structure

The Indian Machine Tool Industry has approximately 1,000 units spread across the county, involved in the production of machine tools, accessories/attachments, subsystems and parts. Of these, about 25 are large companies, accounting for almost 70 per cent of the industry turnover. The bulk of the industry is made up of small and medium scale enterprises. While the large players from the organised sector cater to India’s heavy and medium industries, the small-scale segment meets the demands of the ancillary industries. Approximately 75 per cent of the Indian machine tool manufacturers are ISO certified and many have also obtained Conformité Européene (CE) marking certification, in keeping with European market standards. Bengaluru is the hub for the Indian machine tools industry.

2.1.2 Products and Sub-Products
<table>
<thead>
<tr>
<th>Type of Equipment</th>
<th>Large OEMs</th>
<th>Medium &amp; Small OEMs</th>
<th>Imports</th>
</tr>
</thead>
</table>
| Metal Cutting     | • Around 10  
- Key OEMs  
  – ACE, BFW, Batliboi, HMT, JYOTHI, Lakshmi Machine Works, Lokesh Machines, TAL manufacturing solutions  
- All large players manufacture the entire product range  
- Average turnover > US$ 10 million. | • Around 50  
- Key OEMs  
  – Premier Machine Tools, Godrej and Boyce, SandVik Asia  
- All the medium OEMs are mostly into manufacturing the machining centres  
- Average turnover of medium OEMs is in the range of US$ 1-2 million  
- Small OEMs largely manufacture conventional drilling machines | • Many global OEMs like Yamakazi, DMG, Makino, Schuler import products into India  
- All importers approach the market through import agents or assembly units |
| Metal Forming     | • Large OEMs not present in this segment | • Around 65  
- Key OEMs: Premier Machine Tools and other medium and small manufacturers located in Pune and NCR region  
- Average turnover in the range of US$ 1-2 million per annum  
- Majority of the medium players manufacture press fit machines | • Negligible imports of metal forming machines in India |
| Computer Numerical Control (CNC) Machines | • Top 6 OEMs in the machine tools industry account for more than 90 per cent of CNC machines produced in India  
- Computer Numerical Control (CNC) machines account for more than 70 per cent of total metal working machines produced in India | • Medium OEMs account for 5-10 per cent of the total number of CNC machines produced in India  
- Small OEMs are not present in this segment | • Major OEMs like Yamakazi and DMG import SPM Computer Numerical Control (CNC) machines |
| Conventional Machines | • Large OEMs only contribute to less than 10 per cent of conventional machines produced in India | • Medium and small OEMs account for about 90 per cent of conventional machines produced | • Negligible imports of conventional machines into India |
Almost 90 per cent of total production of metal cutting machines comes from cities like Bengaluru, Pune, Mumbai, Ahmedabad and Chennai. In contrast 90 per cent of total production of metal forming machines is from Baroda, Coimbatore, Batala, Jalandhar, Pune and Ludhiana.
### 2.3 KEY PLAYERS

Hindustan Machine Tools Limited (HMT Ltd.), Lakshmi Machine Works Ltd., Premier Ltd., and IFB Industries Ltd. are the leading players that dominate the Indian machine tools sector.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Background Information</th>
<th>Headquarter</th>
<th>Revenue</th>
<th>Sales Growth</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindustan Machine Tools Limited (HMT Ltd.)</td>
<td>HMT Limited is a machine tool manufacturing company diversified into watches, tractors, printing machinery, metal forming presses, die casting and plastic processing machinery, CNC systems and bearings</td>
<td>Bengaluru</td>
<td>2014-15: US$ 45.3 mn</td>
<td>2.2%</td>
<td>Watches, tractors, printing machinery, metal forming presses, die casting and plastic processing machinery, CNC systems and bearings</td>
</tr>
<tr>
<td>Lakshmi Machine Works Limited</td>
<td>Lakshmi Machine Works Limited is engaged in the manufacturing and selling of Textile Spinning Machinery, computer numerical control (CNC) Machine Tools, Heavy Castings and parts and components for Aerospace industry. The Company caters to both domestic and international markets</td>
<td>Coimbatore</td>
<td>2014-15: US$ 408.0 mn</td>
<td>5.6%</td>
<td>Textile Spinning Machinery, computer numerical control (CNC) Machine Tools, Heavy Castings and parts and components for Aerospace industry</td>
</tr>
<tr>
<td>Premier Limited</td>
<td>The Company’s engineering segment consists of manufacture of CNC Machines and large mechanical components for the wind energy and infrastructure sectors and professional and engineering services</td>
<td>Mumbai</td>
<td>2013-14: US$ 27 mn</td>
<td>-33%</td>
<td>Computerized Numerical Controllers (CNCs)</td>
</tr>
<tr>
<td>IFB Industries Ltd</td>
<td>The company’s product range includes Fine Blanked components, tools and related machine tools, such as Straighteners, Decoilers, Strip loaders and other</td>
<td>Kolkata</td>
<td>2014-15: US$ 209.1 mn</td>
<td>24.1%</td>
<td>Machine tools: Straighteners, decoilers and strip loaders</td>
</tr>
</tbody>
</table>
2.4 CURRENT TRENDS

India is rated 14th in production and 10th in consumption of machine tools in the world. The country is set to become a key player in the global machine tools industry and is expected to witness substantial high-end machine tool manufacturing in the next couple of years.

The industry is moving towards increasingly sophisticated Computer Numerical Control (CNC) machines, driven by demand from key user segments such as automobiles and consumer durables.

A rapid growth in engineering and manufacturing industry has led to an increased demand for high-end machinery like 3/4/5 axis milling and turning machines for metal cutting, SPMs (Special Purpose Machines), EDM (Electro discharge machining), Wire cutting/Laser cutting/Waterjet cutting machines, Spark erosion machining, Chemical etching machines, Bending & Forming machines, etc.

2.5 KEY MINISTRIES & ASSOCIATIONS IN MACHINE TOOL MARKET

Several ministries govern the machine tool industry. The Department of Heavy Industries (DHI) under the Ministry of Heavy Industries and Public Enterprises is the nodal authority in India, promoting the growth of heavy industries. The department mainly deals with the development of the heavy engineering industry, machine tool industry, heavy electrical industry, industrial machinery and auto-industry besides 19 industrial sub-sectors.

Indian Machine Tool Manufacturers’ Association (IMTMA) plays a vital role in the development of machine tool industry. It supports its members with modern machine tool technologies, and provides them with competitive manufacturing solutions.

The country is set to become a key player in the global machine tools industry and is expected to witness substantial high-end machine tool manufacturing in the next couple of years.
2.6 GOVERNMENT REGULATIONS

Some of the major regulations impacting the industry include:

- The industry is open to 100 per cent FDI allocation
- Firms are exempt from obtaining an industrial license to manufacture
- Manufacturers have the liberty to select a suitable location for their project
- Specific items such as conventional drilling machines are reserved for production specifically by the small scale industry
- Ongoing focus on reduction in import duties to promote import and usage of machine tools
- The Export Promotion Capital Goods (EPCG) scheme allows import of capital goods including spares for pre-production, production and post-production at zero duty
- ‘National Capital Goods Policy 2016’ by the Department of Heavy Industry has laid down certain policy actions to boost the machine tools sector:
  - Develop and manufacture higher axes technologies, high-precision and heavy-duty machine tools, metal-forming machines of modern design
  - Acquire technological know-how through acquisition of potential overseas companies from regions such as the European Union
  - Develop technology centres in Thailand, Turkey, Brazil and Mexico
  - Exclude machine tools from trade agreements with strong countries, and include in agreements with countries like South East Asia with a relatively weaker market
  - For the benefit of SMEs, extend investment allowance for a 5-year period and reduce permissible limit to US$ 3.6 million
  - Enhance depreciation allowance to 25 per cent
  - Initiate 200 per cent weighted deduction on R&D activities by SMEs
  - Encourage group participation in global exhibitions and participation in Indian trade fairs

2.7 SECTOR CAPABILITIES

Research & Development

The Core Advisory Group for Research and Development (C-MAT) fosters academia-R&D-Industry cooperation. In certain cases it also executes R&D projects in the machine tool sector. The CMAT receives R&D proposals jointly from all the stakeholders and after a process of due diligence and evaluation by experts, allocates funds for the project.

R&D processes that come under the purview of the C-MAT include:

- Thermal Analysis of Machine tool
- AMTTF - Advanced Machine Tool Testing Facility
- Prediction of Residual Life in Bearings
- Development of Next Generation Precision Grinders
- Design and fabrication of 3 Roller Flow Forming Machine
- Development of alternate materials for improving dynamic response and damping properties of machine tool structures
2.8 INNOVATIONS IN THIS SEGMENT

Siemens has set up Technology & Application Centre (TAC) at Peenya, Bengaluru in the machine tools segment. This centre is aimed at providing hands-on experience on the latest Computer Numerical Control (CNC) machines for manufacturers and users. The Siemens TAC is also expected to showcase “SinuTrain”, a simulation tool for training users on higher productivity using technology-specific functions and features, shortly.

Delta Electronic Inc. has invested in specially trained skilled man-power and high-end technology on research and development of their Computer Numerical Control (CNC) system. Delta’s CNC which is currently reaching its final stages of testing will help improve client servicing in the industrial-control fields.

New technologies such as multi-spindle and multi-turret turning centres and green initiatives like coolant purification, vision based inspection and re-engineering systems have gained popularity with the introduction of the ‘Make in India’ initiative.

Technical improvements like operator friendly CAD/CAM software and automation, and initiatives on metrology like 3D measuring systems are some of the trends being displayed by the companies.

During the IMTEX 2015, companies presented few technological breakthroughs such as Y-axis on CNC Turn Mill, Enhanced CNC system, Cryogenic Machining Technology, Twin Spindle Horizontal Machining for Higher Productivity.

2.9 BUSINESS PRACTICES

India is set to become a key player in the global machine tools industry and is expected to see substantial increase in high-end machine tool manufacturing. While the SME sector specialises primarily in manufacturing low technology products, few of them also trade in imported machinery.

Machine tools companies in India sell their products directly as well as through a single distribution channel or through multiple channels. These include:

Distributors

- **Direct dealers**: This practice is followed primarily by the large MNCs who sell through either traditional or direct dealers.
- **Online channel**: This is not yet popular in the B2B segment and is still in the initial stages.
- **Industrial events**: In order to ensure better penetration into fast growing markets, leading companies often participate in industrial events/exhibitions at a global level. IMTEX is the such popular event of this sector.
2.10 FUTURE PROSPECTS

Currently, India imports heavily from countries like Germany, Taiwan, Korea, Italy and China. The ‘Make in India’ campaign is expected to fill the demand and supply gap through domestic suppliers thereby reducing the country’s dependence on imports substantially in the next five years.

Large and medium companies have to a large extent refrained from investing in R&D in the past. With investment in R&D set to grow significantly in the future, low cost innovative products are likely to hit the market over the next few years.

Several large companies have adopted latest technology in their processes. Small and medium firms still use out-dated technologies due to capital constrains. The ‘Make in India’ initiative is expected to help make the required changes and introduce cutting-edge technological know-how to this sector.

The machine tools segment as a strategic industry, determines the country’s manufacturing competitiveness in important sectors such as automobiles, heavy electrical equipment, defence, aerospace and consumer goods.

The Indian automotive industry across vehicle and component segments is expected to witness robust growth through 2019-20. The growth in the automotive sector is expected to propel the machine tool consumption in India.

Machine tool industry parks, currently being set up in South India, are expected to help SMEs expand their production capacities and provide common facilities for machine tool companies; thereby resulting in increased productivity.

100 per cent FDI through the automatic route for investments in the manufacture of power equipment is expected to have a positive impact in the machine tools segment. Several multinationals in India have already started investing in advanced manufacturing technologies in the segment.
3.1 MARKET OVERVIEW

Textile manufacturing machinery is one of the largest segments of machinery manufacturing in India. In 2014-15, the market size of textile machinery sector was estimated to be US$ 2.0 billion, with production levels reaching US$ 1.1 billion. The industry comprises more than 1,446 manufacturing units, nearly 600 of which produce complete machinery while the remaining manufacture various textile machinery components. This sector provides direct and indirect employment to over 250,000 people.

Imports play a significant role in the sector. In value terms, imports tend to be higher than domestic production. A part of the domestic production is also exported especially to developing countries in South East Asia and Africa. India's export, as a proportion of the domestic production, has increased from about 13 per cent in 2009-10 to almost 35 per cent in 2014-15. In 2014-15, 37 per cent of India's textile machinery demand was met through domestic production.
3.2 **INDUSTRY STRUCTURE**

Indian textile machinery/engineering sector consists of more than 1,446 machinery and components manufacturing units of which 600 units produce complete machinery, and the rest manufacture parts and accessories.

Domestic manufacturers produce textile machineries across several process segments, the majority of whom concentrate on the spinning segment. They also manufacture products catering to individual process requirements such as weaving. The bulk of the components are sourced from local vendors while critical components are procured from global markets.

Companies actively importing machinery from the international market predominantly import for sectors such as weaving, processing & garmenting and represent multiple-brands catering to requirements across processes. They also offer complete sales & service solutions to customers.

Firms importing second hand machinery, though currently forming a very small portion of the industry, are starting to gain a foothold aiming to cater to machinery needs across processes. Machinery is primarily imported from closed units in the US and Europe and sales are predominantly to medium & small textile manufacturing units.

The spinning segment comprises a significant market share with almost equal contributions from domestic production & imports. Weaving, knitting & the garmenting machinery segments on the other hand are dominated by imports.

- **Unorganised sector constitutes about 85 per cent**
  - These are the textile manufacturers
  - Purchase domestic machines or import machines from Europe or China through their representatives in India
  - Focus on manufacturing products catering to individual process requirements (spinning or processing or weaving, etc.)
  - High Concentration of manufacturers in the spinning segment
  - Most parts are provided by the domestic manufacturers and a few critical ones are imported
3.3 KEY CLUSTERS AND FACTS

Around 87 per cent of the total production is manufactured in Ahmedabad, Bengaluru, Coimbatore, Ludhiana, Mumbai and Surat. At the regional level, around 84 per cent is manufactured in Tamil Nadu and Gujarat. These clusters are strategically located to serve the textile industry and meet industry requirements.
3.4 KEY PLAYERS

- Lakshmi Machine Works (LMW) Limited
- Stovec Industries Ltd.
- Chandni Textiles Engineering Industries
- Himson Engineering Pvt. Ltd. (HEPL)
- Veejay Lakshmi Engineering Works Limited

3.5 GOVERNMENT REGULATIONS

The government has introduced several key policies and initiatives to boost the textile machinery sector. The Technology Up-gradation Fund (TUF) Scheme, 2011 has spurred demand for textile machinery in India and has attracted over US$ 40 billion worth of investments since inception. It also supports modernisation and up-gradation through the provision of interest reimbursement (2 to 6 per cent) and capital subsidy (10 to 30 per cent), including credit at reduced rates.

Several textile companies prefer purchasing old second hand machines from Europe under this scheme in an effort to cut down costs. Restrictions have now been placed that ensure second hand equipment older than 10 years cannot be brought in to the market. As a result, Indian textile machinery is expected to be much more cost effective and witness a significant increase in demand over the next 3-5 years.

The government has approved 100 per cent FDI (Foreign Direct Investment) in the textile sector under the automatic route. The Ministry of Textiles has also set up an “FDI Cell” to attract foreign investments. The cell assists foreign companies in identifying potential joint venture partners in India and supports the Ministry in coordinating with state governments to set up shop.

A Scheme for Integrated Textile Parks (SITP) was launched to help the industry secure world class infrastructure facilities for new and planned textile units. In 2014, 57 Textile Parks have been sanctioned with an investment of US$ 1 billion. By 2017, 25 more Textile Parks are set to be sanctioned. An Integrated Processing Development Scheme for sanctioning processing parks has also been initiated with US$ 0.08 billion earmarked for the scheme.

In the “National Capital Goods Policy” 2016, the government announced its plans to amend the TUF scheme as below:

- Revised user friendly and stable TUF scheme with no change in next 10 years
- Allocate funds in Central Budget in consultation with the textile Industry
- Enable online and time-bound procedures for application, approval and disbursement
- Ensure TUF is not extended for imported second hand machinery

Apart from the above amendments to TUF, the government plans to restrict imports of low technology shuttle-less rapier looms and impose zero import duty on specific critical components till the same are produced in India.
3.6 INTERNATIONAL ACCREDITATION

**Major policies include:** Centres of Excellence (COEs) have been set up for various sectors including non-wovens, composites, Indutech and Sportech which further support manufacturers of technical textiles. Funds have been allocated in these centres to set up facilities such as testing with national/international accreditation, resource centres with IT infrastructure, development of prototypes, training of core personnel and setting up of incubation centres.

Common testing facilities are being set up as per international standards which include the American Society for Testing and Materials (ASTM), British Standards (BS), German Institute for Standardisation (DIN), International Organization for Standardisation (ISO) & European Standards (EN) etc., for different product segments.

These testing facilities cater to various requirements such as testing of the final product, along with the fibre, yarn, fabrics and other elements that contribute to the final product. These laboratories will soon be evaluated and suitably accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) and by certain international institutes as well, giving the certification global recognition.

3.7 TECHNOLOGY AND RESEARCH & DEVELOPMENT

The spinning machinery sector in India has developed significantly over the past few decades. Indian spinning machines are among the most advanced machines in the world and are in high demand in the domestic and global markets.

In the other machinery segments, Indian companies have lagged behind their European counterparts so far. However, they are increasingly acquiring cutting-edge knowledge from foreign companies and rapidly upgrading their technology and processes.
3.8 CONTRACT MANUFACTURING

Certain small-scale component manufacturers have developed specialised capability to manufacture specific components for use in diverse textile machinery. These manufacturers also support textile machinery manufacturers in terms of design and development of components.

3.9 FUTURE TRENDS/PROSPECTS

Indian spinning machines are very popular in the domestic and international markets. Lakshmi Machine Works (LMW) is one of the key players in this segment. Other textile machinery segments are also growing and have begun to gain domestic and international presence in the last couple of years.

The “Make in India” initiative is expected to attract the best textile machinery manufacturers from across the world. With increase in entry of foreign players, domestic companies are also expected to improve their product offerings and become more competitive across the different machinery segments.

The Indian textiles industry, currently estimated at around US$ 108 billion, is expected to reach US$ 223 billion by 2021, growing at a CAGR of 15.6 per cent. This is expected to provide a boost to the textile machinery sector in India.

The Indian textile market has been growing at a CAGR 9-10 per cent over the past 2 years. India presents a good opportunity for foreign machinery manufacturers. Until recently, FDI in this sector has been low as most foreign players prefer to export machinery to India. This trend, however, is expected to change as various initiatives are being introduced, to make doing business in India easier.
MATERIAL HANDLING EQUIPMENT
4.1 MARKET OVERVIEW

The material handling equipment sector covers equipment used for the movement, storage, control and protection of products spanning the processes of manufacturing, distribution, consumption and disposal. It can be categorised into four main segments in India: storage and handling equipment, engineered systems, industrial trucks and bulk material handling.

The Indian material handling equipment market is estimated at US$ 1,322 million as of 2013-14. In India, the city of Chennai is emerging as a key market due to a significant increase in the number of warehouses and container freight stations (CFS) in and around the city.

This sector caters predominantly to industries such as coal, cement, power, port, mining, fertilizers and steel plants. To this end, the market is dominated by conveyors, cranes and other warehouse equipment. Players in this sector also manufacture a range of equipment such as crushing and screening plants, coal/ore/ash handling plants and associated equipment such as stackers, reclaimers, ship loaders/unloaders, wagon tipplers and feeders among others.

As of 2014, of the total 59,200 units within the construction equipment industry, 11,850 units were part of the material handling equipment industry; thus, becoming the 2nd largest segment after earth-moving equipment.

Break-up Material Handling Units, 2014

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forklifts</td>
<td>49%</td>
</tr>
<tr>
<td>Pick &amp; Carry</td>
<td>40%</td>
</tr>
<tr>
<td>Tower Cranes</td>
<td>5%</td>
</tr>
<tr>
<td>Crawler Cranes</td>
<td>1%</td>
</tr>
<tr>
<td>AWP</td>
<td>3%</td>
</tr>
<tr>
<td>Others</td>
<td>2%</td>
</tr>
</tbody>
</table>

In India, the city of Chennai is emerging as a key market due to a significant increase in the number of warehouses and container freight stations (CFS) in and around the city.

Market growth in US$ mn

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth (US$ mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-10</td>
<td>972</td>
</tr>
<tr>
<td>2010-11</td>
<td>1050</td>
</tr>
<tr>
<td>2011-12</td>
<td>1134</td>
</tr>
<tr>
<td>2012-13</td>
<td>1225</td>
</tr>
<tr>
<td>2013-14</td>
<td>1322</td>
</tr>
</tbody>
</table>

Market US$ 1,322 mn; 2013-14

- 30% Domestic Production
- 70% Import
4.2 PRODUCT CLASSIFICATION

Material handling equipment is mainly classified into three types of products: **warehousing equipment**, **conveyors** and **cranes**.

**Warehousing Equipment:** Products include platform trucks, stackers/reach trucks, pickers, forklifts and racking systems. The weight capacity of such products could range anywhere from 500 kilogram to 5 tonnes. They are used for warehousing (material handling) activities along with other hydraulic, diesel and battery-operated equipment.

**Conveyors:** The market witnesses significant demand for certain types of conveyors such as assembly line conveyors, industrial conveyors, slat conveyors, chain conveyors and belt conveyors. Some of the largest consumers of these products are the power industry, the mines & minerals industry and the cement industry.

**Cranes:** Cranes used for heavy material handling are in high demand in the market. They include products such as Electric Overhead Travelling (EOT) cranes, Jib cranes, electric wire rope hoists and travelling machines. In India, the power capacities of these cranes are between 5–20 tonnes; overall the capacity of cranes ranges from 3-30 tonnes.
## 4.3 INDUSTRY STRUCTURE

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Large OEMs</th>
<th>Medium &amp; small OEMs</th>
<th>Imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehousing equipment</td>
<td>6 - 7 OEMs</td>
<td>40 - 45 OEMs</td>
<td>No major imports into India</td>
</tr>
<tr>
<td></td>
<td>• Key OEMs:</td>
<td></td>
<td>India is self-sufficient in warehousing equipment</td>
</tr>
<tr>
<td></td>
<td>– Godrej and Boyce Ltd, Voltas Ltd, Maini Materials Movement P Ltd, Jost’s Engineering Company Ltd., TIL ltd, Tech Mech Handling Equipment</td>
<td>• Key OEMs:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All large OEMs manufacture the entire range of products</td>
<td>– Material Handling, Puma Lift Trucks, Punjab Tractors Ltd</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Average turnover US$ 5 mn per annum</td>
<td>• Manufacture select range of equipment</td>
<td></td>
</tr>
<tr>
<td>Conveyors</td>
<td>5 - 7 OEMs</td>
<td>60 - 65 OEMs</td>
<td>Negligible import of conveyors</td>
</tr>
<tr>
<td></td>
<td>• Key large OEMs:</td>
<td></td>
<td>India is self-sufficient in the manufacture of conveyors</td>
</tr>
<tr>
<td></td>
<td>– Mc Nelly Bharat Engg. Co., Macmet, Vinar Systems Ltd, TRF ltd, TAL Ltd, International Combustion</td>
<td>• Key OEMs:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mainly undertake turnkey projects for power, cement, mining, steel, automotive industries</td>
<td>– Vega Conveyors and Automotive Ltd, S.V. Modular Conveyors, Dhanwanti Engineering Pvt. Ltd, Automation and Control, Pune India Pvt. Ltd., Jai Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• All large OEMs achieve turnover greater than US$ 10 mn per annum</td>
<td>• Average turnover in the range of US$ 1-2 mn per annum</td>
<td></td>
</tr>
<tr>
<td>Cranes</td>
<td>7 - 8 OEMs</td>
<td>45 - 50 OEMs</td>
<td>Certain high-end port handling equipment is imported into India, amounting to around US$ 30 mn</td>
</tr>
<tr>
<td></td>
<td>• Key large OEMs:</td>
<td></td>
<td>• Key equipment imported – Rubber Tyred Gantry (RTG), reach stackers</td>
</tr>
<tr>
<td></td>
<td>– Demag Cranes &amp; Components Pvt. Ltd, Reva Industries, VMI Cranes Ltd, Allied Cranes Ltd, Avon Cranes Ltd</td>
<td>• Key OEMs:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Average turnover of US$ 3-10 mn per annum</td>
<td>– Indian Machine Tools, Century Cranes, SAMCO, Chandrapur Works, IMT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OEMs manufacture the entire range of products</td>
<td>• Average turnover of US$ 2 mn per annum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• They also manufacture standard size cranes</td>
<td>• Most players achieve turnover in the range of US$ 1-2 mn</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• They manufacture a select range of products</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Key importers - Kalmar, Noell, Fantuzzi</td>
</tr>
</tbody>
</table>
Warehousing Equipment is manufactured at key locations in India such as Mumbai, Pune, Bengaluru, Faridabad, Coimbatore and Kolkata. Almost 60 per cent of the manufacturers are clustered in the cities of Mumbai, Pune and Bangalore.

Conveyors are produced in cities such as Pune, Bengaluru, Faridabad, Chennai, Coimbatore, Mumbai, Kolkata and Ahmedabad. Of the manufacturers, 40 per cent operate out of Pune, Kolkata, Faridabad and Mumbai.

Crane manufacturers are located in Faridabad, Pune, Mumbai, Bangalore, Haryana and Coimbatore. Of these, Pune hosts a major chunk (approximately 50 per cent) of the manufacturers in its outskirts.
## 4.5 KEY PLAYERS

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Background Information</th>
<th>Headquarter</th>
<th>Revenue</th>
<th>Sales Growth</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Godrej &amp; Boyce Mfg Co.</strong></td>
<td>Godrej Material Handling is the largest lift truck manufacturer &amp; exporter in India. It provides mobile path material handling solutions to virtually all industries in manufacturing, infrastructure, services, aviation, logistics, defence, ports, railways and power.</td>
<td>Mumbai</td>
<td>2014-15: US$ 1,381.1 million</td>
<td>10.8%</td>
<td>Material handling, motors, precision engineering, precision systems, process equipment, security solutions, storage solutions, tooling, and vending.</td>
</tr>
<tr>
<td><strong>McNally Bharat Engineering Company Ltd</strong></td>
<td>McNally Bharat Engineering Company Ltd. (MBE) is the Engineering Company in India. The Company is engaged in providing turnkey solutions in the areas of Power, Steel, Aluminium, Material Handling, Mineral Beneficiation, Pyro processing, Pneumatic Handling of powdered materials.</td>
<td>Kolkata</td>
<td>2014-15: US$ 357.4 million</td>
<td>1.2%</td>
<td>Fly ash handling and disposal, Port cranes</td>
</tr>
<tr>
<td><strong>Escorts Limited</strong></td>
<td>The company manufactures and sells construction and material handling equipment, and auto products in the domestic and global market.</td>
<td>Faridabad</td>
<td>2014-15: US$ 662.8 million</td>
<td>-36.5%</td>
<td>It offers tractors under the Farmtrac, Powertrac, and Escort brands; engines for agricultural tractors; round end flat tubes; heating elements; double acting hydraulic shock absorbers for railways coaches; and centre buffer couplers</td>
</tr>
<tr>
<td><strong>Voltas Ltd.</strong></td>
<td>Voltas, headquartered in Mumbai is a leading provider of industrial trucks in India. It has a network of more than 50 dealers in India engaged in sales and service. Voltas has recently re-branded and operates under the name of “KION India Private Limited”</td>
<td>Mumbai</td>
<td>2013-14: US$ 877</td>
<td>-4.79%</td>
<td>Counter Balanced Forklifts, Warehousing Equipment, Diesel trucks, electric forklift trucks and warehouse trucks</td>
</tr>
</tbody>
</table>
4.6 KEY MINISTRIES & ASSOCIATIONS IN MATERIAL HANDLING INDUSTRY

The principal governing body is the Department of Heavy Industry (DHI) under the Ministry of Heavy Industries and Public Enterprises.

The Society of Indian Materials Handling Equipment Manufacturers (SIMHEM) provides a platform to its members to collectively discuss growth and challenges in the industry. Members also interact and partner with various international bodies and associations. They are presented the opportunity to participate in domestic and international conferences, trade shows and exhibitions.

4.7 GOVERNMENT REGULATIONS

The Indian material handling equipment industry is de-licensed and allows 100 per cent Foreign Direct Investment (FDI) under the automatic route. Technology collaboration is encouraged by the government between domestic firms and their international partners.

The government has also granted sops along with the setting up of several SEZs for the capital goods industry, including the material handling equipment industry. Various incentives have been introduced with an eye to provide further impetus to the exports segment.

4.8 FUTURE OUTLOOK

Market Size – Material Handling Equipment Market (US$ mn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>2312</td>
</tr>
<tr>
<td>2016-17</td>
<td></td>
</tr>
<tr>
<td>2017-18</td>
<td></td>
</tr>
<tr>
<td>2018-19</td>
<td>2659</td>
</tr>
</tbody>
</table>
5.1 MARKET OVERVIEW

The cement machinery sector in India has evolved rapidly, keeping pace with technological developments in overseas markets. There are 18 units in the organised sector which are engaged in the manufacturing of cement machinery. Modern cement plants are designed to ensure zero downtime, high product quality and better output with minimum energy consumed per unit of cement production. A few companies are also engaged in making parts for plants of capacities up to 10,000 tonnes per day (TPD). Cement plants based on dry processing and pre-calcination technologies for capacities up to 7,500 TPD are currently being set up to meet growing demand.

As of 2014, cement machinery production was valued at US$ 0.37 billion, growing at a rate of about 5-6 per cent in the past 3 years. Small and medium enterprises account for 70 per cent of the market.

Market Size of the Cement Machinery Sector (US$ bn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value (US$ bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>0.33</td>
</tr>
<tr>
<td>2012-13</td>
<td>0.35</td>
</tr>
<tr>
<td>2013-14</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Modern cement plants are designed to ensure zero downtime, high product quality and better output with minimum energy consumed per unit of cement production.
5.2 INDUSTRY STRUCTURE

### Cement machinery - Industry Structure

<table>
<thead>
<tr>
<th>Category</th>
<th>Large</th>
<th>Medium</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Players</td>
<td>4</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Key Players</td>
<td>FL Smith, ThyssenKrupp Industries, Promac Engineering, LMV technologies</td>
<td>Walchandnagar Industries, CPW Chandpur Works, Sabash Engineering</td>
<td>Sabko Industries, Ashoka Group, Laxmi Engineering</td>
</tr>
</tbody>
</table>

Cement Machineries Manufactured - Ball Mills, Vertical Rollers Mills, Separator/Classifiers, Inlet/Outlet Pipes, High Efficiency Coolers, Pyro Processing - Pre Heaters, Clinker Grinding Plant
5.3 KEY CLUSTERS OF CEMENT PLANTS / SUPPLIER LOCATION

Cement production is spread evenly across the country as it is usually manufactured close to construction sites. Andhra Pradesh, Tamil Nadu and Rajasthan contribute to 40 per cent of the production due to wide availability of raw materials. As a result, there is a relatively higher concentration of cement plant and parts manufacturers in these states. States such as Gujarat, Maharashtra, Karnataka, MP, UP and Chhattisgarh have medium concentration levels of cement plant manufacturers.
5.4 KEY PLAYERS

- Larsen & Toubro Limited
- Walchandnagar Industries Limited
- Chanderpur Works Pvt. Ltd.
- Isgec Heavy Engineering Ltd.
- Ashoka Machine Tools International Private Limited
- Rachitech Engineering Private Limited

5.5 KEY MINISTRIES & ASSOCIATIONS IN CEMENT MACHINERY MARKET

Several government associations are involved in governing the Indian cement machinery industry. The Department of Heavy Industry (DHI) under the Ministry of Heavy Industries and Public Enterprises deals with 19 industrial sub-sectors including cement machinery.

The Cement Machineries Manufacturers Association (CMMA) is the apex body of cement manufacturers in India. CMMA helps the industry with manpower development, technology upgrade, equipment design, manufacturing procedures improvement and quality assurance. The association comprises both private and public sector cement companies as members.

The Engineering Export Promotion Council (EEPC) appointed by the Indian government is the apex body in charge of promoting engineering products and services from India in the international market.
5.6 GOVERNMENT REGULATIONS

The government has launched various initiatives providing financial support to local cement machinery manufacturers who plan to set up plants in foreign countries. The government has also granted sops, including setting up of a large number of Special Economic Zones (SEZs) for the capital goods industry, especially with a focus on increasing exports.

The industry is also completely de-licensed and foreign direct investment (FDI) of up to 100 per cent under the automatic route and technology collaboration is promoted extensively. Companies are also allowed to import old and new machinery into the domestic market.

The government is investing heavily in developing skilled labour. With various schemes introduced, more than 1 million people are expected to be trained over the next few years for jobs in several manufacturing sectors including the cement machinery segment.

The government has also introduced plans to impose stringent rules with respect to emissions from cement plants. This provides an opportunity for various suppliers to provide additional machines to cement plants that would help reduce emissions.
Cement manufacturers are researching newer methods to reduce production costs while increasing productivity. They are also keen on extensive automation to bring down costs and improve quality. Leading machinery manufacturers are investing heavily in R&D in the areas of plant operations, use of alternative fuels, emission reductions and quality production of goods.

In the last couple of years, cement machinery manufacturers have been setting up ‘ash’ handling plants to process by-products into sellable products. Thus, bringing in extra revenue to the customer while reducing emission and waste.

The key organisations engaged in R&D activities for the cement industry in India include the National Council for Cement and Building Materials (NCCB), Central Research Station (CRS) of ACC and Dalmia Institute of Scientific and Industrial Research (DISIR). Two main indigenous machinery suppliers who have their own R&D divisions are Larsen & Toubro and Walchandnagar Industries.

The Cement Corporation of India has set up a centralised R&D Centre which contributes towards making the cement industry technologically competitive through the development of indigenous technologies and by adapting the international technology protocols.

### Technology Trends in Cement Industry:

<table>
<thead>
<tr>
<th></th>
<th>Low-Technology Plants</th>
<th>Modern Plants</th>
<th>Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining and Material Handling</td>
<td>Conventional</td>
<td>Computer aided</td>
<td>Computer aided</td>
</tr>
<tr>
<td>Crushing</td>
<td>Two stage</td>
<td>Single stage</td>
<td>In-pit crushing &amp; conveying</td>
</tr>
<tr>
<td>Conveying of Limestone</td>
<td>Dumpers/Ropeway/Tippers</td>
<td>Belt conveyors</td>
<td>Pipe conveyors, belt conveyors</td>
</tr>
<tr>
<td>Grinding</td>
<td>Ball Mills with/without conventional classifier</td>
<td>VRMs, Roller Presses with dynamic classifier</td>
<td>VRMs, Roller Press</td>
</tr>
<tr>
<td>Pyro-Processing</td>
<td>Wet</td>
<td>Dry</td>
<td>Dry</td>
</tr>
<tr>
<td></td>
<td>Semi-Dry</td>
<td>6 stage pre-heater</td>
<td>6 stage pre-heater</td>
</tr>
<tr>
<td></td>
<td>DRY</td>
<td>• 5/6 stage pre-heater</td>
<td>• High efficiency coller</td>
</tr>
<tr>
<td></td>
<td>• 4 stage pre-heater</td>
<td>• High efficiency coller</td>
<td>• Multi-channel burner</td>
</tr>
<tr>
<td></td>
<td>• Conventional coller</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Single channel burner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blending &amp; Storage</td>
<td>Batch Blending silos</td>
<td>Continuous Blending silos</td>
<td>Continuous Blending silo</td>
</tr>
<tr>
<td>Packing &amp; Dispatch</td>
<td>Bag</td>
<td>Bag &amp; Bulk</td>
<td>Bulk, palletizing and shrink wrapping</td>
</tr>
<tr>
<td>Process Control</td>
<td>Relay logic/hard wired/PLC</td>
<td>DDC, Fuzzy logic expert system</td>
<td>DDC, neurofuzzy expert system</td>
</tr>
<tr>
<td>Adopted by</td>
<td>Mini Cement Plants</td>
<td>ACC, Ambuja Cements, UltraTech, etc.</td>
<td>Lafarge</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
5.8 FUTURE MARKET OUTLOOK

In recent years, Indian companies have paid special focus on manpower training and technology upgrade, resulting in rapid improvement in quality.

India has also benefited from the improved quality of products by predominantly exporting machinery to developing countries such as Bangladesh, Indonesia, Malaysia, Nepal, Burma and countries in Africa along with Middle East and South East Asian countries.

Infrastructure development is one of the key focus areas in the 12th Five Year Plan. Increased construction activities are expected to create huge demand for cement, which in turn is expected to fuel the growth of cement machinery industry.

The cement machinery market is expected to reach US$ 446 million by 2019-2020. Increasing growth in real estate and construction are propelling this segment forward. Technology upgrades by major players and capacity addition to cement plants provide further impetus to the growth of the industry.

Cement Machinery - Future Market Size

<table>
<thead>
<tr>
<th>Year</th>
<th>2016-17</th>
<th>2017-18</th>
<th>2018-19</th>
<th>2019-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$ mn</td>
<td>385</td>
<td>405</td>
<td>425</td>
<td>446</td>
</tr>
</tbody>
</table>
Heavy Engineering
Capital Goods
6.1 MARKET OVERVIEW

The Indian boiler industry is currently valued at US$ 5.2 billion as of 2013-14. The boiler industry witnessed a compounded annual growth rate of 11 per cent from 2010-11 to 2013-14 and is expected to touch US$ 6.3 billion by 2014-15. Boiler exports reached US$ 579.03 million in 2013-14 up from US$ 524.80 million in 2012-13. Various types of boilers manufactured in India include those for super thermal power plants, utility boilers, industrial boilers, and boilers with super critical parameters up to 1,000 MW unit size. The industry is dominated by domestic players. BHEL is the market leader with over 60 per cent market share. Emerging players include L&T, Siemens, ABB India, Doosan Heavy Industries and Crompton Greaves.

### Market Sales By Value

<table>
<thead>
<tr>
<th>Year</th>
<th>Value (US$ bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-11</td>
<td>3.8</td>
</tr>
<tr>
<td>2011-12</td>
<td>4.2</td>
</tr>
<tr>
<td>2012-13</td>
<td>4.7</td>
</tr>
<tr>
<td>2013-14</td>
<td>5.2</td>
</tr>
<tr>
<td>2014-15</td>
<td>6.3</td>
</tr>
</tbody>
</table>

### Domestic Production By Value

<table>
<thead>
<tr>
<th>Year</th>
<th>Value (US$ bn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-11</td>
<td>3.4</td>
</tr>
<tr>
<td>2011-12</td>
<td>4.1</td>
</tr>
<tr>
<td>2012-13</td>
<td>4.6</td>
</tr>
<tr>
<td>2013-14</td>
<td>5.0</td>
</tr>
<tr>
<td>2014-15</td>
<td>5.6</td>
</tr>
</tbody>
</table>

6.2 PRODUCT CLASSIFICATION

- **Steam Boilers**
  - **Indian Boiler Regulation (IBR) –Boilers**
  - **Non-Indian Boiler Regulation (IBR)**
- **Hot Water Generators**

**Steam Boilers**

**Indian Boiler Regulation (IBR)-compliant Boilers**

In compliance with IBR regulations, these boilers exhibit water holding capacity of 22.74 litres (5 gallons) and steam pressure of 3.5 Kg/sq.cm. They support varying capacities, ranging from 1 tonne/hour to 1,650 tonnes/hour, and are extensively used in the Auto, Pharma, Chemical, Sugar, Cement and Power sectors.

**Non – IBR compliant Boilers**

They comply in part with IBR regulations, ensuring that either water holding capacity or steam pressure is kept constant. Available from 50 kg/hour – 850 kg/hour capacity, they are widely used in both industrial and commercial segments.

**Hot Water Generators**

In compliance with IBR regulations, these generators are available in 50,000 Kcal/hour to 10,000,000 Kcal/hour capacity. They are mainly used for commercial water heating and industrial & commercial hot water applications.
6.3 GEOGRAPHICAL REPRESENTATION OF BOILER MANUFACTURERS: KEY CLUSTERS

1. Thermax
2. Shanti Boilers
3. WaliaEngg
4. ISGEC
5. Vinosha Boilers Systems
6. Cethar Vessels Limited
7. J.N. Marshall Limited
8. ThyssenKrupp Industries India Pvt. Ltd.
9. Larsen & Toubro Limited
10. Nestler Limited
11. Shanti Boilers & Pressure Vessels Pvt. Ltd.
12. Bharat Heavy Electricals
13. Thermax Limited
14. Thermax Babcock & Wilcox Limited
15. Transparent Energy Systems Pvt. Ltd.
16. Transparent Technologies Pvt. Ltd.
17. Veesons Energy Systems Pvt. Limited
18. Vinosha Boilers Systems Pvt. Limited
19. Walchandnagar Industries Limited
22. Energy Machine
23. Energypack Boilers Pvt. Limited
6.4 MAJOR PLAYERS

More than 675 manufacturers produce boilers, turbines and generator sets in India, of which over 90 per cent are SMEs. BHEL is the market leader with over 60 per cent share and an installed base of 120,000 MW. Other leading players include Thermax, Gammon, BGR and Alstom. In order to capitalise on the growing demand, various domestic OEMs have collaborated with global players to acquire new technology.

As the lion’s share of the market is captured by BHEL, contract manufacturing is very popular in the industry. Certain players also outsource component manufacturing viz., super heater tubes, economizers and condensers. Companies such as Alstom and L&T are some of the biggest contract manufacturers of boilers, especially for BHEL.

Investments/JVs between local manufacturers and global players till 2014:

<table>
<thead>
<tr>
<th>Player</th>
<th>Boiler Manufacturing Capacity</th>
<th>Technology Partner</th>
<th>Share Pattern (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indian Partner</td>
</tr>
<tr>
<td>BHEL</td>
<td>20,000</td>
<td>Alstom (France)</td>
<td>NA</td>
</tr>
<tr>
<td>L&amp;T MHPS</td>
<td>4,000</td>
<td>Mitsubishi Heavy (Japan)</td>
<td>51</td>
</tr>
<tr>
<td>Thermax Babcock</td>
<td>3,000</td>
<td>Babcock Wilcox (US)</td>
<td>51</td>
</tr>
<tr>
<td>Ansaldo (Gammon)</td>
<td>1,000</td>
<td>Ansaldo (Italy)</td>
<td>NA</td>
</tr>
<tr>
<td>BGR-Hitachi</td>
<td>4,000</td>
<td>Hitachi Japan</td>
<td>70</td>
</tr>
<tr>
<td>Bharat Forge</td>
<td>4,000</td>
<td>Alstom</td>
<td>51</td>
</tr>
<tr>
<td>Company Name</td>
<td>Company Overview</td>
<td>Revenue</td>
<td>Products</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Bharat Heavy Electricals Ltd (BHEL)</td>
<td>• Bharat Heavy Electricals Limited operates as an engineering and manufacturing company worldwide&lt;br&gt;• The company operates through Power and Industry segments&lt;br&gt;• It provides power generation equipment, such as boilers and air pre-heaters&lt;br&gt;• Bharat Heavy Electricals Limited was founded in 1964 and is based in New Delhi, India&lt;br&gt;• Headquartered in New Delhi</td>
<td>2014-15: US$ 5,143.8 million</td>
<td><strong>Boilers:</strong>&lt;br&gt;Utility Boilers&lt;br&gt;Industrial Boilers&lt;br&gt;Circulating Fluidised Bed Combustion Boilers</td>
</tr>
<tr>
<td>Larsen &amp; Toubro (L&amp;T)</td>
<td>• L&amp;T-MHPS Boilers Private Limited (formerly known as L&amp;T-MHI Boilers Private Limited) is a Joint Venture Company formed between Larsen &amp; Toubro Limited (L&amp;T), India and Mitsubishi Hitachi Power Systems (MHPS)&lt;br&gt;• The company has its own manufacturing facility at Hazira, Surat&lt;br&gt;• Headquartered in Faridabad</td>
<td>2014-15: US$ 9,713.4 million</td>
<td><strong>Boilers:</strong>&lt;br&gt;Super Critical Boilers</td>
</tr>
<tr>
<td>Thermax Ltd</td>
<td>• Founded in 1966, Thermax Limited provides engineering solutions to the energy and environment sectors in India and internationally&lt;br&gt;• The company offers various types of boilers for different segments&lt;br&gt;• Headquartered in Pune</td>
<td>2014-15: US$ 787.6 million</td>
<td><strong>Boilers:</strong>&lt;br&gt;Industrial Boiler&lt;br&gt;Municipal Waste Boiler</td>
</tr>
<tr>
<td>Alstom India</td>
<td>• ALSTOM India Limited was incorporated in 1992 as a subsidiary of ALSTOM Finance BV&lt;br&gt;• It is engaged in the power generation, power transmission, and rail infrastructure industries primarily in India&lt;br&gt;• The company’s Power segment is involved in the engineering, procurement, and construction of power plants; and the manufacture of steam raising plants, ancillary equipment, steam generator parts, pressure vessels, boiler and pulverisers&lt;br&gt;• In the boiler segment, the company has its own manufacturing plant in Durgapur&lt;br&gt;• Headquartered in Noida</td>
<td>2014-15: US$ 368.1 million</td>
<td><strong>Boilers:</strong>&lt;br&gt;Pulverised Coal Tower Type Boiler&lt;br&gt;Pulverised Coal Two Pass Boiler&lt;br&gt;Circulating Fluidised Bed (CFB) Boiler&lt;br&gt;Gas and Oil Fired Boilers</td>
</tr>
</tbody>
</table>
### Company Name

**BGR Energy Systems Limited**

- Incorporated in 1985, BGR Energy Systems Limited manufactures and sells capital equipment for power plants, petrochemical industries, refineries, and process industries in India and internationally.
- The company’s product offerings include heat exchangers, pressure vessels, reactors, columns, waste heat recovery modules and convection coils, surface condensers and HP/LP heaters, and boiler components.
- Headquartered in Chennai.

**Revenue**

2014-15: US$ 551.4 million

**Products**

- **Boilers**: Super Critical Boiler

**Recent Developments & Future Plans**

- In November 2015, BGR’s Electrical Projects Division received new orders worth US$ 45.6 million.
- In October 2014, BGR Energy’s Electrical Projects Division received orders worth US$ 42 million from Tamil Nadu Transmission Corporation Ltd. for establishment of three substations in Tamil Nadu.

### Bharat Forge Ltd. (BFL)

- Founded in 1966, BFL is one of the largest and technologically advanced manufacturers of forged & machined components.
- As one of India’s emerging multinationals, the company has manufacturing operations across nine locations and six countries – 2 in India, 3 in Germany and one each in Sweden, Scotland UK, USA & China.

**Revenue**

2014-15: US$1,271.3 million

**Products**

- **Boilers**: Thermal power boilers

**Recent Developments & Future Plans**

- In 2014, Alstom Bharat Forge Power Ltd. (ABFPL), JV between Alstom and Bharat Forge, signed a contract with NTPC Limited to supply two units of 660 MW supercritical turbine islands for the Tanda coal power plant, located in the Uttar Pradesh, India.
- By May 2015, The Alstom-Bharat Forge JV employed more than 250 skilled employees and planned to scale up to 650 in future.

### 6.5 GOVERNMENT REGULATIONS

Up to 100 per cent Foreign Direct Investment (FDI) is allowed under the automatic route in the industry. FDI inflow has witnessed a steady growth with a CAGR of about 28.5 per cent amounting to US$ 64 mn in 2013-14 up from US$ 50 mn in 2012-13.

Several ministries/government associations govern the boiler market. The Department of Heavy Industries (DHI) under the Ministry of Heavy Industries and Public Enterprises is the nodal authority in India, promoting growth of the heavy industries. It is concerned with the development of the heavy engineering industry, machine tool industry, heavy electrical industry, industrial machinery and auto-industry, along with 19 industrial sub-sectors.

The Engineering Export Promotion Council (EEPC) is in charge of promoting engineering products and services from India. The Department of Industrial Policy and Promotion (DIPP) under the Ministry of Commerce and Industry is the principal agency monitoring industrial growth and production in general. It also studies, assesses and forecasts the need for technological development in specific industrial sectors including the boiler segment.

Power generation equipment attracts a customs duty of 5 per cent. The National Manufacturing Policy (2011) envisages greater harmony between manufacturing and trade policy. Power equipment for projects of less than 1,000 MW attracts basic duty of 5 per cent, but projects of over 1,000 MW have been exempt from 2012.
6.6 KEY FUTURE TECHNOLOGIES

The key to the future lies in manufacturing large package boilers with high efficiency. Supercritical and Ultra supercritical technologies are increasingly gaining ground. Supercritical technology utilises steam pressure beyond the critical point of water/steam, 225 kg/cm$^2$. BTG units with Supercritical parameters are currently available in the Indian market in units of 660 MW, 700 MW, 800 MW and 1,000 MW. Ultra supercritical parameters with pressure of 250-300 kg/cm$^2$ and main stream/ reheat steam temperatures of 600/6,100°C are also being widely adopted. Firms have invested heavily in research to further increase the steam temperatures to 7,000°C.

6.7 FUTURE MARKET OVERVIEW

The boiler market is expected to touch US$ 10.6 billion by 2020, with a CAGR of 11 per cent. The demand for new boilers, especially in segments such as sugar, textile and garment, and paper and paper products are on an upswing and have resulted in the introduction of high efficiency boilers that conform to current emission standards.

The focus is now shifting to upcoming segments such as utilities, paper, chemical and other industries. In order to penetrate the market more effectively, firms are initiating designs for customised boilers for different segments. Investment in R&D to improve design capabilities and develop new technologies with multi-fuel options and enhanced efficiency is a key to overcome competition.

The Department of Heavy Industry (DHI), Government of India, in consultation with various stakeholders and Indian Electrical & Electronics Manufacturers Association (IEEMA), has launched the Mission Plan 2012-2022, with a view to support the domestic electrical equipment industry’s future development and enhance its global competitiveness. Vision 2022 as articulated in the Mission Plan is to make India the country of choice for the production of electrical equipment and reach an output of US$ 100 billion by balancing exports and imports.

Through the “Make in India” initiative launched by the government, opportunities for Indian players to export their products & services to new markets are on the rise.
“Make in India” Focus

The industrial boilers market in India has opened up new vistas for vendors. Such vendors must improve technical expertise and invest in R&D in order to improve design capabilities and develop new technologies with multi-fuel options and enhanced efficiency.

According to market analysts, the demand for stand-alone boilers is very limited. Most consumers prefer turnkey solutions from manufacturers, and products that are environment-friendly.

Through the “Make in India” initiative launched by the government, opportunities for Indian players to export their products & services to new markets are on the rise. It is also a significant opportunity for medium and small players to grow rapidly in terms of technology, turnover & export within a short span of time and sell their products in the global market.
TURBINE & GENERATOR
7.1 MARKET OVERVIEW

Turbine & generator production in India touched US$ 2,300 million in 2013-14, up from US$ 995 million in 2009. Thermal turbine-generators make up for over 60 per cent of the market in terms of value, followed by wind turbine generators. An organised industry, it comprises around 10-16 large players, wherein public sector companies such as BHEL have the largest installed capacity.

As of 2014, India has indigenous capability to manufacture various turbines of more than 18,000 MW per annum capacity including steam turbines (800 MW), hydro turbines (270 MW) and gas turbines (260 MW) along with industrial turbines. In addition, India also manufactures generators of up to 800 MW size for utility and combined cycle application, and AC generators in the range 0.5 KVA to 25,000 KVA and above. Almost 60 per cent of the market is dominated by domestic manufacturing.

As of 2014, India has indigenous capability to manufacture various turbines of more than 18,000 MW per annum capacity including steam turbines (800 MW), hydro turbines (270 MW) and gas turbines (260 MW) along with industrial turbines.
7.2 PRODUCT CLASSIFICATION

The industry broadly comprises Compressors, Steam Turbines, Steam Turbine Generator Sets, Power Recovery Expanders, Control Systems, Lubrication, Seal & Piping Systems and Other Parts.

Turbine & Generator Classification

“16 Leading Manufacturers in this Industry”

Players Count:
Market is dominated highly by unorganized players

Segment Breakup (2013-2014)

- Thermal: 60%
- Hydro: 35%
- Nuclear: 4%
- Wind: 1%
7.3 BUSINESS MODELS

Two business models are prevalent in the turbine & generator market: Turnkey Based Model and Developer Based Model.

7.4 TURNKEY BASED MODEL

Majority of the Indian wind turbine generator manufacturers provide end-to-end turnkey solutions to investors. The role of these manufacturers extends from identification of potential sites to O&M (operation and maintenance) to completed projects. These firms undertake wind monitoring and mapping exercises and studies to identify viable wind sites. From then on, they are responsible for the complete development of the wind farm and sale of individual/multiple Wind Turbine Generator (WTG) units.

7.5 DEVELOPER BASED MODEL

The developer-based business model has been gaining significant momentum with Independent Power Producer (IPP) developers. Many global entrants who have recently approached the market also prefer this model of operations. Wind farm developers are primarily responsible for building wind farms; some players take this a step forward preferring to own and control operations themselves. These companies undertake the entire lifecycle of the process from land acquisition, installing meteorological equipment to measuring wind resource, securing transmission, power sales, turbine supply, construction and financing agreements.
7.6 KEY PLAYERS


<table>
<thead>
<tr>
<th>Company Name</th>
<th>Sub- Segment</th>
<th>Products</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elliott Group</td>
<td>Turbines and generator sets</td>
<td>Compressors, Steam Turbines, Steam Turbine Generator Sets</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Chola Turbo Machinery International Private Limited</td>
<td>Turbines and generator sets</td>
<td>Steam Turbines</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Maxwatt Turbines Pvt. Ltd.</td>
<td>Turbines</td>
<td>Turbines</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>IB Turbo Pvt. Ltd.</td>
<td>Turbines</td>
<td>Turbines</td>
<td>Manufacturer</td>
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<tr>
<td>Siemens Limited</td>
<td>Turbines</td>
<td>Steam Turbines</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Larsen &amp; Toubro - Mitsubishi Hitachi Power Systems (L&amp;T-MHPS) Turbine Generators Private Limited</td>
<td>Turbines and generator sets</td>
<td>Steam Turbines</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Company Name</td>
<td>Sub- Segment</td>
<td>Products</td>
<td>Type</td>
</tr>
<tr>
<td>------------------------------</td>
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</tr>
<tr>
<td>Suzlon Group</td>
<td>Turbines and generator sets</td>
<td>Wind Turbine Generators</td>
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<tr>
<td></td>
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<td>Wind power Generators</td>
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<td></td>
<td>Generator Sets</td>
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<td>JSW Energy Ltd.</td>
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<td>Jakson &amp; Company</td>
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<td>Generator Sets</td>
<td>Manufacturer</td>
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<td>Turbodyne Energy Systems</td>
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<td>Manufacturer</td>
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<td>Steam Engine Turbines</td>
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<tr>
<td>N. S. Terbo Private Limited</td>
<td>Turbines and generator sets</td>
<td>Turbines</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Tech - Ed Equipment Company</td>
<td>Turbines</td>
<td>Steam Turbines</td>
<td>Manufacturer</td>
</tr>
</tbody>
</table>
7.7 TURBINE MARKET OVERVIEW IN INDIA

As of 2013-14, turbine production in India is estimated at US$ 1,577.2 million. More than 50 per cent of power supplied to the grid is generated by steam turbine-based thermal power plants burning coal and fuel oil. Similar turbines are also used in power plants based on alternative energy forms such as nuclear, geothermal energy, wind and hydro power. Gas turbines in gas-based power generation also form a significant share of the market. Pioneering electrical companies in the market manufacture custom built turbines of over 400 MW. Featuring simple design, versatility and increased turbine efficiency, gas turbines are increasingly being used in power generation.

Source: Infraline, SIA Statistics

<table>
<thead>
<tr>
<th>Turbine Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$ mn</td>
</tr>
<tr>
<td>698.8</td>
</tr>
<tr>
<td>904.7</td>
</tr>
<tr>
<td>1164.7</td>
</tr>
<tr>
<td>1288.2</td>
</tr>
<tr>
<td>1425.4</td>
</tr>
<tr>
<td>1577.2</td>
</tr>
</tbody>
</table>
### 7.7.1 TURBINE MANUFACTURERS BY KEY CLUSTERS

Tamil Nadu, Haryana and Maharashtra are the key manufacturing clusters for turbines in India.

<table>
<thead>
<tr>
<th>Turbine Manufacturers</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suzlon Energy Ltd</td>
<td>Mumbai</td>
</tr>
<tr>
<td>The Tata Power Company</td>
<td>Mumbai</td>
</tr>
<tr>
<td>GE India</td>
<td>Gurgaon</td>
</tr>
<tr>
<td>Vestas Wind Technology</td>
<td>Chennai</td>
</tr>
<tr>
<td>Kenersys India</td>
<td>Pune</td>
</tr>
<tr>
<td>Gamesa Wind Turbine</td>
<td>Chennai</td>
</tr>
<tr>
<td>RRB Energy Ltd</td>
<td>Chennai</td>
</tr>
<tr>
<td>Global Wind Power</td>
<td>Mumbai</td>
</tr>
<tr>
<td>Regan Powertech Ltd</td>
<td>Chennai</td>
</tr>
</tbody>
</table>
7.8 GENERATOR MARKET OVERVIEW IN INDIA

As of 2013-14, generator production in India is estimated at US$ 723.8 million. Large firms account for about 35 per cent of the total market. The industry has a large number of players focused primarily in manufacturing products of lower ranges. A host of generators of varying capacities are used in various industries across the country. Stationary generators with less than 125 KVA are used by large residential and commercial complexes, hotels and hospitals. Generators of above 125 KVA capacity on the other hand are used in large core sector and process industries. AC-generators form separate categories that cater to the alternative power requirements of large and small industries, commercial establishments and domestic households. Diesel generator sets are increasingly being used to meet shortages in industrial and commercial units. As of 2014, they accounted for 90,000 MW of capacity.

<table>
<thead>
<tr>
<th>Year</th>
<th>Generator Production (US$ mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-09</td>
<td>296.3</td>
</tr>
<tr>
<td>2009-10</td>
<td>352.8</td>
</tr>
<tr>
<td>2010-11</td>
<td>622.2</td>
</tr>
<tr>
<td>2011-12</td>
<td>654.5</td>
</tr>
<tr>
<td>2012-13</td>
<td>688.3</td>
</tr>
<tr>
<td>2013-14</td>
<td>723.8</td>
</tr>
</tbody>
</table>
7.8.1 GENERATOR MANUFACTURERS: KEY CLUSTERS

Many small and mid-sized players operate out of Tamil Nadu and Karnataka.

<table>
<thead>
<tr>
<th>Generator Manufacturers</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caterpillar India</td>
<td>Bengaluru</td>
</tr>
<tr>
<td>Jackson &amp; Company</td>
<td>New Delhi</td>
</tr>
<tr>
<td>Suzlon</td>
<td>Pune</td>
</tr>
<tr>
<td>Klemmen Engineering Corporation</td>
<td>Chennai</td>
</tr>
<tr>
<td>Eletro Power India</td>
<td>Chennai</td>
</tr>
<tr>
<td>Tech-mech Engineering Co</td>
<td>Mumbai</td>
</tr>
<tr>
<td>GMMCO Limited</td>
<td>Pune</td>
</tr>
<tr>
<td>Global Wind Power</td>
<td>Mumbai</td>
</tr>
<tr>
<td>Regan Powertech Ltd</td>
<td>Chennai</td>
</tr>
</tbody>
</table>
7.8.2 GOVERNMENT REGULATIONS

FDI of up to 100 per cent is allowed by the Government of India (GoI) under the automatic route for generation & transmission of power produced by hydro-electric, coal/lignite-based, oil-based and gas-based thermal plants. Non-conventional energy generation and distribution and the distribution of this converted electric energy to households, industries, commercial and other users and power trading has continued to be a focus area of GoI, over the years.

The government has also offered an income tax holiday for a period of 10 years during the initial 15 years of operation and a waiver of import duties on capital goods for mega power projects which have above 1,000 MW generation capacities. A 10-year income tax exemption is also allowed for profits earned from wind generation.

The Power Ministry is also in the process of developing a series of coal-based Ultra Mega Power Projects, each with a capacity of 4GW and above. These projects are spread across 5 Indian states along the coast in Eastern and Western India and 3 states in central India. The equipment for the development of these power projects is mandatory to be manufactured in India. Foreign manufacturers are therefore required to tie-up with Indian firms to bid for these projects. It is expected that this will provide a strong impetus to the growth of the turbine and generator market in India.

The turbines and generator industry is governed by various government ministries and associations. The Department of Heavy Industry (DHI) under the Ministry of Heavy Industries and Public Enterprises is the principal governing body.

The Indian Wind Turbine Manufacturer Association (IWTMA) is an industrial body representing the country’s wind turbine manufacturers. It is also a single point of contact for policy makers at the state and national levels.

7.9 FUTURE PROSPECTS

The “Make in India” initiative launched by the Government of India provides further opportunities to the turbines & generators market. Research & development in the sector is expected to take centre stage introducing new technologies in the sector. Private sector companies in partnership with the government are co-investing in R&D and technology development. Several firms are also entering into joint ventures or planning mergers and acquisitions with foreign investors. Investment from foreign countries is set to provide opportunities to Indian companies to compete in the global market. Assuming a realistic CAGR of 12 per cent over the next 5 years, the turbines & generator production is expected to reach US$ 4,542 mn by 2020. An addition of 3,500 MW capacity in the wind energy sector in 2015-16 is expected to drive the wind turbine market.

<table>
<thead>
<tr>
<th>Future</th>
<th>2016-17</th>
<th>2017-18</th>
<th>2018-19</th>
<th>2019-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$ mn</td>
<td>3233</td>
<td>3621</td>
<td>4055</td>
<td>4542</td>
</tr>
</tbody>
</table>
TRANSFORMERS
8.1 MARKET OVERVIEW

The Indian transformer industry is more than five decades old; hence mature. Domestic manufacturers have developed capabilities to manufacture all types of equipment to meet the country’s demand for transformers up to 800 Kilovolts (KV) and 1,200 KV. The industry enjoys a good reputation in terms of quality, price and delivery in the domestic as well as overseas markets.

As of July 2015, the Indian transformer industry was valued US$ 1.8 billion.

Transformers comprise 19-20 per cent of total transmission & distribution equipment manufactured in the country. Transformer manufacturing capacity in India is currently valued at 370 Giga Volt Amperes (GVA), with capacity utilisation rates at an average of 60-70 per cent over the last five years.

India exports 10 per cent of domestic transformer production to over 100 nations including the US, Europe, Malaysia, Singapore, Bangladesh, several African and Gulf countries. In the domestic power transformer segment, almost 15 per cent is exported to international markets.

India also imports transformers from China, Germany, USA, Korea, and Japan.

<table>
<thead>
<tr>
<th>Market Sales By Value</th>
<th>Market Size by Type of Transformer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US$ bn</strong></td>
<td><strong>(2014-15)</strong></td>
</tr>
<tr>
<td>2011-12</td>
<td>2.1</td>
</tr>
<tr>
<td>2012-13</td>
<td>45%</td>
</tr>
<tr>
<td>2013-14</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>55%</td>
</tr>
</tbody>
</table>

8.2 PRODUCT CLASSIFICATION

Transformers are classified into two major segments, viz., power transformers and distribution transformers. Power transformers alone are utilised in power generation stations, while both power and distribution transformers are employed in operating transmission and distribution utilities. Power transformers contribute to 45 per cent of the total market, while distribution transformers account for the bulk of the industry at 55 per cent.

Transformer manufacturers cater to all utility boards across India. Over the last couple of decades, Indian manufacturers have developed a mature technology base with proven technology and the capability to manufacture a wide range of transformers for various applications.

India’s transformer market is dominated by several small companies. However, in recent years, many such companies are rapidly growing into medium-sized enterprises, expanding the organised sector and providing further impetus to the growth of the industry.
8.3 INDUSTRY CLASSIFICATION

POWER TRANSFORMERS
- Generator Step up Transformers
- High Voltage Direct Current (HVDC) converters Transformers
- Shell Transformers
- System Intertie Transformers

DISTRIBUTION TRANSFORMERS
- Single phase distribution Transformers up to 315 KVA
- Small distribution Transformers (0-315 KVA)
- Medium distribution Transformers (316-2,499 KVA)
- Large distribution Transformers (2,500-10,000 KVA ONAN)

8.4 INDUSTRY STRUCTURE

There are approximately 300+ transformer companies in India, with an overall installed capacity of over 370,000 Megavolt Amperes, (MVA) per annum. The market is fragmented with 20 organised players including Bharat Heavy Electricals Limited (BHEL), ABB Ltd., Crompton Greaves Ltd. (CGL), Areva T&D, EMCO Ltd., Bharat Bijlee Ltd. (BBL), Vijai Electricals, Transformers and Rectifiers India Limited (TRIL), Voltamp Transformers Ltd., among others.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Large</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Players</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Average Turnover (US$ mn)</td>
<td>&gt;35</td>
<td>&lt;35</td>
</tr>
</tbody>
</table>

Key Players
- Crompton Greaves
- BHEL
- Emco Limited
- Vijai Electricals
- Bharat Bijlee
- Areva T&D
- ABB India
- Indo Tech Transformers
- Voltamp
- Kirloskar Electricals
- Accurate Transformers
- Rts

Split by type of Player

- Large Players 56%
- Medium Player 41%
- Imports 3%
### Distribution Transformers

<table>
<thead>
<tr>
<th>Classification</th>
<th>Large</th>
<th>Medium</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Players</td>
<td>5</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>Average Turnover (US$ mn)</td>
<td>&gt; 25</td>
<td>5-25</td>
<td>&lt; 5</td>
</tr>
</tbody>
</table>

#### Key Players

- **Large Players**
  - Vijai Electricals
  - Crompton Greaves
  - Voltamp
  - Emco Limited
  - Areva T&D

- **Medium Players**
  - Kirloskar Electricals
  - ABB India
  - Accurate Transformers
  - RTS Power
  - Indo Tech Transformers

- **Small Players**
  - Andrew Yule
  - Alfa Transformers
  - Rima Transformers

---

**Split by type of Player**

- Large Players: 54%
- Medium Player: 30%
- Small Players: 12%
- Imports: 4%
8.5 KEY CLUSTERS

- Rajasthan transformers & Switchgears
- Technical Associates
- Accurate Transformers
- Kerela Electricals Allied Engg.
- EFG
- Danish private LTD
- PME
- Kotsons
- East India Udyog
- Mirzapur Electrical India
- ABB
- Transformers & Rectifiers
- Tata transformers Ltd.
- Crompton Greaves
- BHEL
- Andrew Yule & Co.
- RTS Power Corporation
- Marson's Limited
- Alfa Tranformers Ltd.
- Toshiba (acquired by Vijay Electricals)
- Pan-Electro technic Enterprises
- The Thana Electric Supply Company
- Orissa tranformers Ltd.
- Aarkay tranformers
- Indo-Tech Transformers
- P.S. Electricals
- Venkateshwar Electrical Industries (p) Ltd.
## 8.6 KEY PLAYERS

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Company Overview</th>
<th>Revenue</th>
<th>Products</th>
<th>Recent Developments &amp; Future Plans</th>
</tr>
</thead>
</table>
| **ABB India** | • Incorporated in 1949, it is a subsidiary of ABB Schweiz AG.  
• ABB India Limited operates as a power and automation technology company  
• Headquartered in Bengaluru  
  
  **Year ended December 2014:** US$ 1,273.7 million  
| | | | • Operates in the Power Systems, Power Products, Process Automation, Discrete Automation and Motion, and Low Voltage Products segments.  
• The company provides solutions for generation, transmission, and distribution of electricity; and for increasing productivity in industrial, commercial, and utility operations.  
• In September 2015, ABB India won orders worth US$ 17.9 million to provide electrification, automation and substation solutions for solar power plants in the states of Karnataka, Tamil Nadu and Andhra Pradesh  
• In July 2015, ABB India was awarded an order by PowerGrid Corporation of India Ltd. (PGCIL), for the extension of three substations in Vadodara, Manesar and Malerkotla | |
| **Siemens Ltd** | • Incorporated in 1957, Siemens Limited provides technology enabled solutions for the infrastructure and cities, energy, industry, and healthcare sectors.  
• Key Customers:  
  – Power Grid Corporation of India Ltd  
  – Uttar Pradesh Power Corporation Ltd.  
  – Adani Power Ltd  
  – Tata Power Co. Ltd  
  – Headquartered in Mumbai  
  
  **Year ended September 2015:** US$ 1,692.7 million  
| | | | • Transformers up to 750 MVA, 800 KV  
• Power Transformers  
• Generator-Step-Up Transformers  
• System / Grid / Network Transformers  
• HVDC  
• Transformers up to 800 KV  
• Traction Transformers  
• Shunt Reactors (range 1-ф and 3-ф reactors up to 400 KV)  
• In January 2016, Siemens Ltd. won an order worth US$ 22.8 million from PSI International to supply 420KV GIS for a Greenfield project  
• In January 2016, Siemens Ltd. won order worth US$ 16.5 million from Rajasthan Rajya Vidyut Prasaran Nigam Limited, a State Power Transmission Utility owned by Government of Rajasthan to supply air insulated substations | |
### 8.7 BUSINESS PRACTICE & MARKETING STRATEGIES

Leading manufacturers such as CGL, ABB and Schneider among others prefer to enter into contract manufacturing partnerships to fill large orders. However, the market for contract manufacturing is largely dependent on order size and several big players are rapidly expanding their manufacturing facilities. The extent of contract manufacturing is, therefore, limited and irregular.

Several companies are also pursuing business opportunities in new segments such as renewable energy, ultra-high voltage and energy automation. Their focus is now on building competencies to further augment products supplied for windmills and solar power projects. Organisations have also forayed into turnkey solutions for renewable energy, designing and building transmission grids for instance, for offshore wind parks.

Large organisations use various strategic marketing practices to build brand value in the domestic and international markets. These include publishing details of executed projects in industry-specific magazines, announcing upcoming projects with large clients in the domestic and overseas market, and marketing promotions through large turnkey project consultants. Several large firms are also developing their marketing teams and allocating significant budget to promotional activities.
8.8 GOVERNMENT REGULATIONS

The Energy Label Scheme (ELS), by the Government of India, is applicable for outdoor distribution transformers that are liquid filled, naturally air cooled, three phased, and are double-wound and non-sealed, ranging from 16 to 200 KVA.

The Central Electricity Authority (CEA) is mandated by government regulations to ensure purchase of only those oil-filled distribution transformers that meet the prescribed minimum efficiency value for KVA. Manufacturers must maintain a three-star rating as specified by the Bureau of Energy Efficiency (BEE).

Several government and industrial associations are involved in the functioning of this industry. Established in 1979, the Indian Transformer Association (ITMA) is a national association with the objective of promoting the interest of manufacturers of distribution and power transformers, auto transformers, furnace transformers, rectifier transformers, instrument transformers and allied goods.

The Ministry of Power administers the policies set forth in the Electricity Act - 2003 and the Energy Conservation Act - 2001. It also undertakes amendments to these Acts, as necessary and in conformity with the Government’s policy objectives to ensure growth in the industry. The Indian Electrical and Electronics Manufacturers Association (IEEMA), founded in 1948, is the apex association of manufacturers of electrical, industrial electronics and allied equipment in India. The IEEMA has around 800 member organisations encompassing the complete value chain in power generation, transmission and distribution equipment.

The Central Power Research Institute (CPRI) is the power house of the Indian electrical industry. Set up in 1960 by the Government of India, it functions as a centre for applied research in electrical power engineering, assisting the electrical industry in product development and quality assurance.

8.9 KEY TRENDS AND FUTURE PROSPECTS

KEY TRENDS

India has become an attractive destination for international transformer companies. In addition to various government initiatives, several other factors have contributed significantly to making India the country of choice. Several foreign players are already setting up base in India. Over the last 12-15 months, new players have entered the market either through acquisitions or have set up facilities of their own. This includes the likes of the Canadian company, Hammond Power Solutions, which has acquired 70 per cent equity stake in the Hyderabad-based transformer supplier Pan-Electro Technic Enterprises Pvt. Ltd. South Korea’s Hyundai Heavy Industries is also planning a facility for manufacturing transformers in Sanand, Gujarat. Several Chinese companies have also entered into JVs with domestic companies to set up plants in India for the manufacture of transformers. Chinese manufacturer, TBEA has set up a manufacturing unit in Gujarat in order to qualify for the bids from Power Grid Corporation of India Limited (PGCIL). Another Chinese player, Baoding Tianwei Baodian Electric Co. (BTBE) has set up a joint venture with Anand-based Atlanta Electricals Private Limited to set up a transformer factory in India.

Over the last 12-15 months, new players have entered the market either through acquisitions or have set up facilities of their own.
The Indian transformer industry is projected to reach US$ 3 billion by 2016-17, growing at a CAGR of 10 per cent.

Currently, 10 per cent of India’s export market is contributed by transformers. With the introduction of the “Make in India” initiative, the share of transformers is set to grow to 22 per cent of national exports by 2019-20. Several incentives have also been introduced for capacity addition in power generation, which are expected to significantly increase the demand for transformers and other electrical equipment in the coming years.

With huge investments proposed across sectors such as power, infrastructure, etc., the transformers market in India is slated for strong growth. The excess capacity in the transformer industry in India, and entry of new players is further expected to increase market competitiveness. This is also expected to lead to market consolidation over the next few years.

With the introduction of the “Make in India” initiative, the share of transformers is set to grow to 22 per cent of national exports by 2019-20.
The Best of India in Engineering
SWITCHGEAR & CONTROL GEAR
9.1 MARKET OVERVIEW

In 2014-15, the market size of Medium & High Voltage Switchgear industry was US$ 0.6 billion, and that of Low Voltage Switchgear was US$ 1.8 billion.

9.2 MAJOR SEGMENTS

Switchgears are used in various sectors including utilities, infrastructure, residential complexes, power plant modernisation and refurbishment. Indian switchgear industry is classified based on the insulation medium and breaking medium used into: Low voltage switchgear (up to 1.1 KV), Medium voltage switchgears (up to 33 KV) and High voltage switchgears (above 33 KV).
9.3 KEY PLAYERS

The industry is dominated by 5-6 major players including Areva SA, Larsen & Toubro Ltd., Schneider Electric SA, and Siemens AG. Other companies contributing significantly to the sector include ABB Ltd., Crompton Greaves Ltd., Havells India Ltd., Legrand SA, HPL Group, General Electric Co., C&S Electric Ltd., BCH Electric Ltd., Bharat Heavy Electricals Ltd., Jyothi Ltd., Megawin Switchgear Pvt. Ltd., and Easun Reyrolle Ltd.

<table>
<thead>
<tr>
<th>Major Players</th>
<th>LV Switchgear</th>
<th>MV Switchgear</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&amp;T</td>
<td>Areva</td>
<td></td>
</tr>
<tr>
<td>Schneider Electric</td>
<td>Siemens</td>
<td></td>
</tr>
<tr>
<td>Siemens</td>
<td>CGL</td>
<td></td>
</tr>
<tr>
<td>ABB</td>
<td>ABB</td>
<td></td>
</tr>
<tr>
<td>Havells</td>
<td>Schneider Electric</td>
<td></td>
</tr>
<tr>
<td>Legrand</td>
<td>BHEL</td>
<td></td>
</tr>
<tr>
<td>Contactors &amp; Relays</td>
<td>RMU</td>
<td></td>
</tr>
<tr>
<td>MCCB</td>
<td>CSS</td>
<td></td>
</tr>
<tr>
<td>MCB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industries</td>
<td>T&amp;D Utilities</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Industries</td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Power Gencos</td>
<td></td>
</tr>
</tbody>
</table>

9.4 GOVERNMENT REGULATIONS

The electrical equipment industry is de-licensed and is open to 100 per cent FDI, providing the required impetus to the switchgear sector.

To overcome the demand and supply deficit of electricity, the Indian government has also launched initiatives to increase planned capacity addition in the power sector. Power transmission network in India which currently operates at 220 KV and 400 KV is expected to step up to 765 KV and high voltage direct current. Power equipment, however, attracts an import duty of 21 per cent.

Certain key government associations are actively involved in governing the switchgear industry. The Control Panel & Switchgear Manufacturers Association (COSMA) is a non-trading and non-profit body managed by professionals with considerable experience in the field of Control Panel and Switchgear Manufacturing.

The Industrial Electricals and Electronics Manufacturers Association (IEEMA) is the apex industry association for manufacturers of electrical, industrial electronics and allied equipment in India.

The Ministry of Power (Government of India) is primarily responsible for the development of electrical energy in the country.

The Central Power Research Institute is the power house of the Indian electrical industry. It functions as a centre for applied research in electrical power engineering assisting the electrical industry in product development and quality assurance.

INTERNATIONAL ACCREDITATIONS RECOGNISED IN THE SECTOR:
- Certification by reputed authorities like DEKRA (Netherlands), UL (US), ASTA (UK) and CPRI (India) for various types and ratings as per IEC.
9.5 KEY TRENDS

Over the last 5 years, the Indian manufacturing sector for switchgears and control gears has been growing at the rate of 15-18 per cent. Growth in 2013-14 was 10 per cent. It is expected that the sector growth in 2014-15 will remain steady at 10 per cent.

Significant research & development talent is available in India and has been steadily growing over the last 5 years. In 2015 alone, approximately US$ 33 million has been set aside to be solely invested in research & development.

Increase in civil construction & positive signs from the residential industry are encouraging for the switchgear and control gear sector. Power plant modernisation is another emerging trend which directly impacts the growth of switchgears and control gears, along with steady replacement rate of legacy switchgears.

Medium voltage switch-gear manufacturers have developed a number of alternative solutions to help customers find the best safety and lifecycle management option for their equipment. Large companies usually enter into contract-manufacturing agreements, sub-contracting design and allot specification-specific development to medium and small players. Though this cuts cost, it also increases the time-to-market for the larger firms.

With more choices available, and each offering coming with different advantages at different price points, customers can select the specific solution that best fits their overall business strategy.

ALTERNATIVE CHOICES FOR CUSTOMERS INCLUDE:

- Refurbishment: Wherein the existing switchgear is fully overhauled and restored
- Retrofit: One or more main elements of the switchgear are replaced with modern equivalents. Elements with the highest maintenance cost and failure risk are specifically targeted.
- Growing segments include power generation projects, petrochemical complexes, chemical plants, integrated steel plants and non-ferrous metal units.

However, growth in domestic manufacturing has been negatively impacted due to an increase in low-cost imports from China. With China holding the largest market-share in the export of switchgear and control gear globally, Indian exports in the sector are not likely to increase rapidly. The exports market has in fact decreased by a CAGR of 21 per cent over the last 3 years.

There is a growing awareness of the lack of adoption of international standards in manufacturing by local players. This has increased the focus towards development of quality products by several leading and innovative players in the domestic market.

FUTURE TECHNOLOGIES EXPECTED TO PLAY A SIGNIFICANT ROLE IN THIS SECTOR INCLUDE:

- Embedded intelligence and communication enabled equipment
- Improved materials for cost saving, environmental conservation and Restriction of the Use of Certain Hazardous Substances (RoHS)
- Movement from motor starters to submersible pump controllers
- Vacuum contactors for higher ratings
- More use of magnetic actuators
- Field for life-maintenance free (IEC- M2 duty -10,000 Operations)
- Shift from electromagnetic to numerical relays
- Shift from electrical sensors- CT/PT to electronic sensors
- Ring main units
- Intelligent switchgear
- High voltage and extra high voltage switchgears
- Compact switchgears
- Controlled switching
- Solid state switchgears
- Polymers of HV equipment
9.6 FUTURE PROSPECTS

The industry is expected to grow at a CAGR 10 per cent over the next 5 years; the industry's market size is expected to be worth US$ 3.50 billion by 2018-19.

<table>
<thead>
<tr>
<th></th>
<th>2016-17</th>
<th>2017-18</th>
<th>2018-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future Market Size (US$ bn)</td>
<td>2.9</td>
<td>3.1</td>
<td>3.5</td>
</tr>
</tbody>
</table>

There is a growing awareness of the lack of adoption of international standards in manufacturing by local players. This has increased the focus towards development of quality products by several leading and innovative players in the domestic market.
CONDUCTORS
10.1 MARKET OVERVIEW

Conductors are also one of the largest exported products within the Transmission & Distribution equipment segment. In 2014, the overall conductors sector registered an annual growth of about 16 per cent, primarily due to an increase in the demand from major buyers such as Power Grid. The sector is expected to grow at a CAGR of 13 per cent from 2014-18.

During 2010 – 2014, the market for Aluminium Conductor Steel Reinforced (ACSR), All Aluminium Conductors (AAC) and All Aluminium Alloy Conductors (AAAC) grew at a CAGR of 4.7 per cent and 9.6 per cent in terms of volume and value, respectively.

Estimated Industry Market Size of ACSR, AAC & AAAC Conductors by Value

(US$ mn)

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1242.6</td>
<td>1516.1</td>
<td>1555.6</td>
<td>1243.9</td>
<td>1338.2</td>
</tr>
</tbody>
</table>

Estimated Industry Market Size of ACSR, AAC & AAAC Conductors by Volume

('000 MT)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>318</td>
<td>358</td>
<td>417</td>
<td>331.6</td>
<td>382.9</td>
</tr>
</tbody>
</table>
## 10.2 PRODUCTS AND SUB-PRODUCTS

### Conductor Types

- **ACSR (Aluminium Conductor Steel Reinforced)**
  - Conductor ranging from cross-sectional area from 15 mm² to 1,750 mm² with maximum construction of 126 wires in conductor
  - Basic features of conductors are high tensile strength, better sag properties, economic design and suitability for remote application involving long span

- **AAC (All Aluminium Conductors)**
  - Conductor ranging from cross-sectional area from 15 mm² to 1,700 mm² with maximum construction of 126 wires in conductor
  - Basic features of conductors are high current carrying capacity, suitability for low and medium voltage line in urban area, excellent resistance to corrosion and ideal for use in coastal area

- **AAAC (All Aluminium Alloy Conductors)**
  - Conductor ranging from cross-sectional area from 15 mm² to 1,700 mm² with maximum construction of 126 wires in conductor
  - Basic features of conductors are high strength to weight ratio, better sag characteristics, improved electrical properties, excellent resistance to corrosion; compared to ACSR, AAAC have lighter weight, lower losses & excellent resistance to corrosion

### Characteristics

<table>
<thead>
<tr>
<th>Types of Conductors</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAC (All Aluminium Conductors)</td>
<td>Conductor ranging from cross-sectional area from 15 mm² to 1,700 mm² with maximum construction of 126 wires in conductor</td>
</tr>
<tr>
<td></td>
<td>Basic features of conductors are high current carrying capacity, suitability for low and medium voltage line in urban area, excellent resistance to corrosion and ideal for use in coastal area</td>
</tr>
<tr>
<td>ACSR (Aluminium Conductor Steel Reinforced)</td>
<td>Conductor ranging from cross-sectional area from 15 mm² to 1,750 mm² with maximum construction of 126 wires with various combination of Steel &amp; Aluminium proportion in conductor</td>
</tr>
<tr>
<td></td>
<td>Basic features of conductors are high tensile strength, better sag properties, economic design and suitability for remote application involving long span</td>
</tr>
<tr>
<td>AAAC (All Aluminium Alloy Conductors)</td>
<td>Conductor ranging from cross-sectional area from 15 mm² to 1,700 mm² with maximum construction of 126 wires in conductor</td>
</tr>
<tr>
<td></td>
<td>Basic features of conductors are high strength to weight ratio, better sag characteristics, improved electrical properties, excellent resistance to corrosion; compared to ACSR, AAAC have lighter weight, lower losses &amp; excellent resistance to corrosion</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td><strong>Conductor Description</strong></td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>ACAR (Aluminium Conductor Alloy Reinforced)</strong></td>
<td>Conductor ranging from cross-sectional area from 15 mm² to 1,750 mm² with maximum construction of 126 wires with various combination of Aluminium &amp; Aluminium Alloy proportion in conductor. Basic features of conductors are improved strength to weight ratio, improved electrical properties, excellent resistance to corrosion and improved mechanical properties.</td>
</tr>
<tr>
<td><strong>ACSR/AW or ACSR/AS (Aluminium Conductor Aluminium Clad Steel Reinforced)</strong></td>
<td>Conductor ranging from cross-sectional area from 13 mm² to 1,750 mm² with maximum construction of 126 wires with various combinations of Aluminium and Aluminium Clad Steel wires in conductor. Basic features of conductors are good mechanical properties, improved electrical characteristics, excellent corrosion resistance and better sag properties.</td>
</tr>
<tr>
<td><strong>AL 59, AL-57 &amp; AAAC 1120 (High Conductivity Alloy Conductors)</strong></td>
<td>Conductor ranging from cross-sectional area from 31 mm² to 910 mm² with maximum construction of 126 wires in conductor. Basic features of conductors are better conductivity, leading to better power transmission, lower operating cost due to lower ohmic losses; also can be recycled easily.</td>
</tr>
<tr>
<td><strong>TACSR, TACSR/AW, TACSR/MA (High Temperature Thermal Resistant Alloy Conductors)</strong></td>
<td>Conductor ranging from cross-sectional area from 15 mm² to 1,750 mm² with maximum construction of 126 wires with various combination of Aluminium &amp; Aluminium Clad Steel or Mischmetal coated steel proportion in conductor. Basic features of conductors are these can operate up to 150°C with specified strength loss; can carry 50%-60% more current than ACSR of the same size and for up rating lines; no modification or reinforcement is required to the existing towers.</td>
</tr>
<tr>
<td><strong>ACSS and ACSS/TW (Aluminium Conductor Steel Supported)</strong></td>
<td>Conductor ranging from cross-sectional area from 15 mm² to 1,750 mm² with maximum construction of 126 wires with various combination of Steel &amp; Aluminium proportion in conductor. These conductors are with round wires and/or with Trapezoidal Shaped Annealed Aluminium wires. Basic features of conductors are these can operate up to 200°C with specified strength loss; its sag is less than that of conventional composite conductors and final sag is not affected by creep; it has excellent self-damping characteristics.</td>
</tr>
<tr>
<td><strong>STACIR/AW (High Temperature Super Thermal Resistant Alloy Conductor)</strong></td>
<td>Conductor ranging from cross-sectional area from 15 mm² to 1,750 mm² with maximum construction of 126 wires with various combinations of Al. Clad Invar Steel &amp; Super thermal resistant aluminium alloy proportion in conductor. These conductors are with round wires and/or with Trapezoidal Shaped STAL wires. Basic features of conductors are these can operate up to 210°C with specified strength loss, its sag is less than that of conventional composite conductors and final sag is not affected by creep.</td>
</tr>
<tr>
<td><strong>GZTACSR GAP-Type Super Thermal Resistant Aluminium Alloy Conductor Steel Reinforced</strong></td>
<td>Conductor ranging from cross-sectional area from 50 mm² to 1,750 mm² with maximum construction of 126 wires with various combinations of Steel &amp; Super thermal resistant aluminium alloy proportion in conductor. These conductors are with round wires and/or with Trapezoidal Shaped STAL wires. The gap between first layer of STAL and Steel core is filled with high temperature grease having drop point of 300°C and above. Basic features of conductors are limiting the sag increase with the increase in temperature by the thermal expansion coefficient above knee point related to the steel core, maintaining the mechanical strength of the conductor with continuous operating temperature up to 150°C &amp; 210°C; reduced costs as no expansion material being required.</td>
</tr>
<tr>
<td><strong>ACCC (Aluminium Conductor Composite Core)</strong></td>
<td>Conductor ranging from cross-sectional area from 155 mm² to 1,451.2 mm². The product is proprietary and manufactured under license of CTC Global USA. Basic features of conductors are superior strength to weight ratio, low coefficient of thermal expansion that allows additional electrical current and increases thermal capacity and a 30%-40% reduction in losses.</td>
</tr>
<tr>
<td><strong>GSW Earth wire, Stay wire, Guy wires, Spaces Cables, etc.</strong></td>
<td>Conductor ranging up to 3 wires strand to 61 wires strands with tensile grades of 350 N/mm² to 1,800 N/mm².</td>
</tr>
</tbody>
</table>
### 10.3 KEY PLAYERS

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Background Information</th>
<th>Headquarter</th>
<th>Revenue</th>
<th>Sales Growth</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apar Industries Ltd.</td>
<td>Incorporated in 1958, Apar is engaged in the production of bare overhead aluminium conductors, GS earth wires and HTLS. It accounts for 22% of Indian aluminium conductor market. The company also deals in petroleum specialty products, automotive lubricants, transformer oils, polymers and cables</td>
<td>Mumbai</td>
<td>2014-15: US$ 822.1 million</td>
<td>11.8%</td>
<td>Aluminium &amp; alloy conductors, Electrical &amp; telecom cables, Speciality oils &amp; lubricants, Polymers</td>
</tr>
<tr>
<td>Gupta Power Infrastructure Ltd.</td>
<td>Founded in 1961, Gupta Power is the flagship company of JRG group. Under its Conductor segment, Gupta Power manufactures overhead and HTLS conductors</td>
<td>Orissa</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Conductors, Wires &amp; cables, EPC, Wire rods</td>
</tr>
<tr>
<td>JSK Industries Private Ltd.</td>
<td>JSK Industries Pvt Ltd. was established in 1965 and is one of the leading aluminium conductor manufacturers specialising in power T&amp;D conductors, aluminium wire rods, aluminium alloys and EC and De-oxi flipped coils</td>
<td>Mumbai</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Aluminium conductors, Aluminium EC and alloy wire rods, Aluminium De-oxi flipped coils, LED lighting products, Solar powered lights and Solar grid solutions</td>
</tr>
<tr>
<td>Hindustan Urban Infrastructure Ltd.</td>
<td>Incorporated in 1959 as The Indian Aluminium Cables Ltd., Hindustan Urban Infrastructure Ltd. manufactures overhead conductors and electro-porcelain high tension insulators. It also deals in plant and machinery for a wide array of products</td>
<td>New Delhi</td>
<td>2014-15: US$ 129.9 million</td>
<td>10.0%</td>
<td>Conductors, Cables, Insulators</td>
</tr>
<tr>
<td>NECCON Power</td>
<td>Incorporated in 1986, North Eastern Cables &amp; Conductors Pvt. Ltd. (NECCON) is a manufacturer of LT distribution conductors. Its key clients include state electricity boards of Assam, Uttar Pradesh, Haryana and Tripura</td>
<td>Jaipur</td>
<td>N.A.</td>
<td>N.A.</td>
<td>Aluminium conductors, Power cables, Turnkey projects-overhead lines, Substation and PLCC</td>
</tr>
<tr>
<td>Sterlite Technologies Ltd.</td>
<td>Sterlite Technologies is a global player in transmission solutions for telecom and power. It manufactures conductors, cables and accessories under its power products division</td>
<td>Pune</td>
<td>2014-15: US$ 503.6 million</td>
<td>12%</td>
<td>Power and telecom products and services, Software services</td>
</tr>
</tbody>
</table>

### 10.4 TRENDS AND DRIVERS

One of the major trends in the electrical conductor market is the increasing use of green products. Companies are focusing on developing wires and cables that have a less detrimental impact on the environment, without compromising on the quality, flexibility, efficiency and ease of usage. Functions such as flame and fire retardant, low emission of poisonous fumes, non-corrosive and halogen-free insulation are being adopted by major power cables companies.

Another trend that has been observed in the recent years is the entry of foreign companies through collaborations. US-based CTC Global Technology partnered with leading market players, Sterlite Technologies and Apar Ltd., to supply its patented ACCC (Aluminium composite core conductor) in the Indian market. In July 2012, US-based Mercury Cable & Energy entered into partnership with Gupta Power Infrastructure Ltd. to manufacture and market conductors using HVCRC (high voltage composite reinforced conductor) technology.
An increase in the demand for electrical conductors from replacement market and rapid urbanization are also driving the growth in this segment. Old equipment such as T&D transformers, switchgears, circuit-breakers and power cables are being replaced with technically advanced T&D equipment; thus, increasing the demand for electrical conductors.

10.5 ASSOCIATIONS AND MINISTRIES

Founded in 1948, Indian Electrical & Electronics Manufacturers’ Association (IEEMA) is the apex industry association with 800 plus manufacturers of electrical, industrial electronics and allied equipment in India. The Association member companies have contributed to more than 90 per cent of power equipment installed in India.

10.6 GOVERNMENT INITIATIVES

Government has taken several positive initiatives in this sector. Some of the recent ones are

- Electricity generation capacity additions
- Debottlenecking fuel supply through coal block auction
- Boosting RE
- Better penetration in rural India
- Improvement in quality of power in urban and industrial area
- Speedy project clearances

10.7 FUTURE PROSPECTS

Power Grid Corporation of India has recently approved six new investment plans worth US$ 842.7 million. The projects involve implementation of two green energy corridors, three communication investment projects and implementation of interconnection between India and Bangladesh.

Telangana is also planning to invest more than US$ 6.9 billion in the next five years for capacity additions, besides improving transmission network in the power sector.
Light Engineering

Industry Consumables
CASTING & FORGING
11.1 MARKET OVERVIEW

The Indian casting and forging industry is currently estimated at 13.6 million metric tonnes per annum. The industry is dominated by small and medium enterprises. Almost 70 per cent of the players are SMEs. Large companies operate with an installed capacity that accounts for 5 per cent, the remaining are medium and small companies with an installed capacity below 15,000 MT. Key target segments for this industry are automobile, general engineering, construction equipment, oil and gas and the power sector.

Casting & Forging Production

<table>
<thead>
<tr>
<th></th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
<th>2012-13</th>
<th>2013-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>mn MTPA</td>
<td>8.6</td>
<td>9.7</td>
<td>11.7</td>
<td>12.2</td>
<td>13.6</td>
</tr>
</tbody>
</table>


11.2 INDUSTRY STRUCTURE

The industry is classified in India based on several key factors. These include the nature of the business, capacity level and the organisation structure.

**Casting**
- Approx 4,500 units
- **Large:** 450
- **Medium:** 450
- **Small:** 3,600

Total casting by products: Grey Iron (70 per cent), Steel (12 per cent), Ductile Iron (9 per cent), Non-ferrous (8 per cent), Others (1 per cent)

Key Players: Ennore Foundries, Chennai; Electrosteel Casting, Kolkata; Secals, Chennai; Tata Yokogawa, Jamshedpur; Mukund Ltd., Mumbai; Jayaswal Neco, Nagpur

Cluster: Batala, Jalandhar, Ludhiana, Belgaum, Chennai, Kolhapur, Rajkot, Coimbatore, Howarah, Agra, Pune

**Forging**
- Approx 1,200 Units
- **Organized:** 200 (9 to 10 Large units)
- **Unorganized:** 1,000

**Total Forging by Product:** Carbon Steel (28 per cent), Alloy Steel (29 per cent), Super Alloy (4 per cent), Special Stell (7 per cent), SS (17 per cent) Titanium (2 per cent), Non-Ferrous (6 per cent), Aluminium (1 per cent)

Key Players: Bharat Forge, MM Forging, Super Auto Forge, RN Gupta & Co, Victor Forging, Fine Forge

Cluster: States of Maharashtra, Punjab, Gujarat, Tamil Nadu, Haryana, Delhi, Karnataka, Jharkhand, West Bengal and Andhra Pradesh
### DISTRIBUTION OF FORGING AND CASTING UNITS BY SIZE (CAPACITY AS ON 2014)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Installed Capacity</th>
<th>Number of Units (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Above 30,000 MT</td>
<td>5 per cent</td>
</tr>
<tr>
<td>Medium</td>
<td>12,500 to 30,000 MT</td>
<td>8 per cent</td>
</tr>
<tr>
<td>Small</td>
<td>Capacity below 12,500 MT</td>
<td>87 per cent</td>
</tr>
</tbody>
</table>

#### 11.3 FORGING MARKET OVERVIEW

The Indian forging industry was estimated at 3.8 million metric tonnes per annum in terms of installed capacity in 2014-15. The industry is driven primarily by the Indian automobile industry, along with other industries such as general engineering, construction equipment, oil, gas and power.

It is well recognised globally for its technical capabilities. The industry's export major markets are USA, Europe and China. There are approximately 400 units in the forging sector including organised (110) and unorganised (290) sub-segments. Total forging production in India was about 2.3 million MT in 2013-14 including several by-products such as Carbon steel (28 per cent), Alloy Steel (29 per cent), Super alloy (4 per cent), Special Steel (7 per cent), SS (17 per cent), Titanium (2 per cent), Non Ferrous (6 per cent) and Aluminium (1 per cent).

The Indian forgings industry has made rapid strides and not only meets most of the domestic demand, but has also emerged as a large exporter. The industry is increasingly addressing opportunities arising out of the growing trend among global automotive OEM's (Original Equipment Manufacturers) to outsource components from manufacturers in low-cost countries. Traditionally the sector has been labour intensive. But due to change in requirements of the end-user industries, forging units across the board have invested in capital intensive manufacturing technologies.

<table>
<thead>
<tr>
<th>Total Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mn MTPA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2010-11</th>
<th>2011-12</th>
<th>2012-13</th>
<th>2013-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4</td>
<td>2.1</td>
<td>2.1</td>
<td>2.3</td>
</tr>
</tbody>
</table>
11.4 PRODUCT CLASSIFICATION:

- Engine Components
- Suspension System
- Steering System
- Gearbox
- Transmission Systems

- Valves
- Flanges
- Rigs

- Shafts
- Axles
- Wheels

- Landing Gear Cylinder

- Bomb Shells
- Gun Barrels
- Track Shoes

- Shafts in power System
- Turbine Blades

Forged Components

Applications

Cold Forge Components

Hot Forge Components

Auto
Agri
OTR vehicle
Oil & Gas
Railways
Aerospace
Defence
Others
11.5 KEY END USER INDUSTRIES FOR FORGING MARKET (2013-14) & CLUSTERS

The Indian forging industry is concentrated around its end user customer locations, which are Maharashtra, Punjab, Gujarat, Tamil Nadu, Haryana, Delhi, Karnataka, Jharkhand, West Bengal and Andhra Pradesh.

<table>
<thead>
<tr>
<th>Region</th>
<th>Total Demand `</th>
<th>Market Share</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>North India</td>
<td>880,000 MTPA</td>
<td>36%</td>
<td>157</td>
</tr>
<tr>
<td>East India</td>
<td>240,000 MTPA</td>
<td>8%</td>
<td>22</td>
</tr>
<tr>
<td>South India</td>
<td>458,000 MTPA</td>
<td>16%</td>
<td>81</td>
</tr>
<tr>
<td>West India</td>
<td>1,280,000 MTPA</td>
<td>40%</td>
<td>159</td>
</tr>
<tr>
<td>Total</td>
<td>2,640,000 MTPA</td>
<td></td>
<td>422</td>
</tr>
</tbody>
</table>

Map showing distribution of forging units across different regions in India.
11.6 FORGING INDUSTRY VALUE CHAIN AND STAKEHOLDERS INVOLVED:

STEEL SUPPLIERS
Carbon Steel Grades and Alloy Steel grades: Forging companies procure steel and other metals from integrated steel plants and other Original Equipment Manufacturers (OEMs). Production is predominantly order-driven. In case of smaller steel quantity or flexible commercial terms, steel is also procured from local distributors.

USER INTERMEDIARIES
Several forging units manufacture components as per the design specified by OEMs. The OEMs also specify the steel grades to be used and are actively involved in approving the steel suppliers that the intermediary must purchase from. Post negotiations with the steel suppliers, forging companies procure steel in the form of Round/RCS. All the processing is then done in-house.

In some cases, OEMs/Auto component manufacturers also procure steel and outsource forging activity on a project basis.

END USERS
The automotive industry is the major end-user for the forging segment. Other end users include industrial machines, railways, oil & gas, power plants and chemical plants.
# 11.7 KEY PLAYERS IN FORGING INDUSTRY

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Background</th>
<th>Product range</th>
<th>Key end user segments</th>
</tr>
</thead>
</table>
| HEC Ltd   | Established in 1958  
Planned JV with BHEL  
Manufacture both castings & forgings in-house  
Plant capacity: 81,645 MT  
Manufactures and supplies capital equipments& machineries  
Captive consumption & sales to customers also  
Key customers:  
BHEL, BARC, SAIL, CIL, Railways | Heavy steel castings of piece weight 65 Ton  
Forgings up to 120 MT  
Forged Rings up to diameter : 4.2 M | Steel Plants, Railways, Mining, General engineering |
| Bharat Forge | Incorporated in 1961  
Flagship company of the US$ 2.4 billion Kalyani Group  
Manufactures various forged and machined components for the automotive and non-automotive sector  
Having 12 manufacturing units  
Indian non-automotive forging capacity: 125,000 MT  
JV with Alstom, NTPC, Areva  
Key customers: L&T, BHEL, NTPC etc | Large closed die forgings up to 2.5 MT & 4.5 m long  
Crankshafts & other components for Locomotives, Marine & Power Generation  
Max Ingot weight up to 70 MT single piece  
Rings up to 4,000 mm in dia | Aerospace  
Oil & Gas  
Diesel Engines Marine  
Power Generation  
Wind Energy  
Railway & Construction |
<table>
<thead>
<tr>
<th>Supplier</th>
<th>Background</th>
<th>Product range</th>
<th>Key end user segments</th>
</tr>
</thead>
</table>
| Western India Forgings | Founded in 1980 in Pune  
Manufacturers closed die, open die, ring rolled forgings  
Plant capacity: 80,000 MT  
Number of employees over 700  
Global sales in North America, South America, Asia and Europe  
Key customers:  
BHEL, Cameron, Elecon, Kirloskar, Wartsila, Demag | Customized forgings in weights ranging from 1 kg to 10,000 Kgs | Power generation, Oil & Gas, Gear, Material handling, Construction, Mining, Railways |
| SE Forge          | Incorporated in 1958  
Manufacture both castings & forgings in-house  
Plant capacity: 42,000 MT  
Key customers:  
Suzlon energy ltd | Forged rings from 800 mm to 5,000 mm  
Casting weighing from 1,000 Kgs to 55,000 Kgs | Wind energy, Defence, Machine tool, Aerospace, Oil & Gas, Construction equipment, Power |
| Chaudhry Hammer  | Incepted in 1956 in Ghaziabad  
Manufacturers manufacturing steel forgings, carbon steel forgings and alloy steel forgings  
Plant capacity: 10,200 MT | Flanges – Rolled and Forged, Tower Flanges for Windmill, Rolled Rings, Slewing Bearings and Gear Rings, Blinds and Tube Sheets  
Forge single piece weighing up to 5,000 Kgs | Oil and Gas, Wind Turbine and Wind Energy, Heat Exchanger and Pressure Vessel, Gears and Bearings, Nuclear and Thermal Power Generation, Ship Building and Steel Plants, General Engineering |
11.8 CASTING MARKET OVERVIEW

Indian casting industry production is valued at 11.36 million metric tonnes per annum. India is the second largest producer of casting in the world. The industry provides direct employment to around 500,000 professionals and indirectly to about 150,000 people.

There are approximately 5,000 units in the casting sector out of which 90 per cent can be classified as MSMEs. The total casting segment accounted for 10 million MT in 2014-15, comprising of several by-products like Grey Iron (68.1 per cent), Steel (9.6 per cent), Non Ferrous (10.9 per cent) and others (10.7 per cent).
11.9 MARKET SIZE BY END USER SEGMENTS & KEY CLUSTERS

Key players in this sector include Ennore Foundries, Chennai; Electrosteel Castings, Kolkata; Secals, Chennai; Tata Yokogawa, Jamshedpur; Mukund Ltd., Mumbai and Jayaswal Neco, Nagpur. They operate from various cities like Batala, Jalandhar, Ludhiana, Belgaum, Chennai, Kolhapur, Rajkot, Coimbatore, Howrah, Agra and Pune.
### 11.10 KEY PLAYERS: CASTING INDUSTRY

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Company Overview</th>
<th>Revenue</th>
<th>Products</th>
<th>Future Plan</th>
</tr>
</thead>
</table>
| JayaswalNeco Industries Ltd   | • JayaswalNeco Industries Limited (JNIL) is the flagship company of NECO Group of Industries  
• JNIL was established in 1976, is headquarter located in Nagpur  
• The company engaged in Steel, Casting, and Valves business.  
• JayaswalNecoUrja Limited is a subsidiary of JNIL.  
• Headquartered in Nagpur | 2014-15: US$ 498.2 million | Ferrous Castings: Railway castings, engineering castings, automobile castings, construction castings and valves  
Non-ferrous Castings: Railway castings, engineering castings, automobile castings, construction castings and valves | • Increasing Installed capacity of the manufacturing plan |
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Company Overview</th>
<th>Revenue</th>
<th>Products</th>
<th>Future Plan</th>
</tr>
</thead>
</table>
| Electrosteel Castings Ltd | • Electrosteel Castings Ltd is a flagship company of Electrosteel Group  
• The company was established in 1954, is headquartered in Kolkata  
• Number of Employees: 1,500  
• The company manufactures ductile iron pipes (installed capacity of 200,000 tpa) – the largest in India – and ductile iron pipe fittings  
• Headquartered in Kolkata | 2014-15: US$ 357.8 million | Pipes: Ductile iron pipes  
Fittings: Ductile iron fittings | • The company's future plans are as follows:  
• Increasing installed capacity of the manufacturing plant.  
• Upgradation of manufacturing processes, continuous vigilance on adopting the right culture, extensive research for product development and complete customer orientation through user-friendly services.  
• The company plans to enlarge their operations in foreign markets and enter new countries through business dynamics that evolve with time. |
| TATA Metaliks             | • Tata Metaliks Limited (TML) is a subsidiary of Tata Steel Limited. TML established in 1990, is headquartered in Kolkata.  
• Tata Metaliks Limited (TML) is one of the leading manufacturers of foundry grade pig iron in India.  
• Number of Employees: 660  
• The manufacturing plant has annual production capacity of 345,000 tonnes.  
Others: DI pipes, Iron ore fines, coke breeze, potted pig, consumables | • Tata Metaliks is plans to expand capacity of Kharagpur plant  
• Production of pig iron in 2014-15 is projected to be slightly higher than last year. |


11.11 GOVERNMENT REGULATIONS (CASTING AND FORGING)

The Department of Heavy Industries (DHI) in the Ministry of Heavy Industries and Public Enterprises is the nodal authority in India for promoting the growth of heavy industries. The department is involved in the development of the heavy engineering industry, the machine tool segment, the heavy electrical segment and the industrial machinery and auto-industry. In addition, it also deals with 19 industrial sub-sectors.

The Association of the Indian Forging Industry (AIFI) is the governing body for the Indian forging industry, and currently has close to 180 ordinary members from all over India. AIFI's key role is to promote and develop the Indian forging industry so as to meet the demands and expectations of forging customers, both domestic and global as well as end users by improving the business environment for its members and contribute in increasing their competitiveness through mutual cooperation and understanding through constant update of information and technology.

The Indian Ferro Alloy Producers Association (IFAPA) is an apex body representing manufacturers of Bulk and Noble Ferro Alloys in the country. Similarly, the Aluminium Casters Associations (ALUCAST) is a registered body whose list of members includes manufacturers of Aluminium castings, users of castings, die casting machines and peripherals for die casting machines, foundry chemicals & consumables, design software, casting process simulation software, dies, and others connected with casting manufacture and post casting processes.

IndianFoundries.com brings together all the major players involved in the Indian Foundry industry, i.e., the foundry manufacturers and exporters, the producers, suppliers and importers of raw materials, machinery and equipment, the agents, quality controllers and other service providers, federations and institutions.

11.12 KEY CAPABILITIES OF THE SECTOR

11.12.1 INNOVATIVE PRODUCT

The forging & casting industry's continuous efforts in upgrading technologies and diversifying product range has enabled it to expand its customer-base in the domestic market. Newer target segments include aerospace, power, energy, oil and gas, and heavy engine parts, even though automotive industry continues to be its primary end-user.

The organised sector has been consistently incorporating latest technologies with added emphasis on CAD/CAM, simulation, semi-automatic and automatic manufacturing and other forms of computer-based technologies to produce quality forgings conforming to international standards and with better output.

Companies are also using quality tools such as Sound Pressure Level (SPL) studies to reduce rejections. Bharat Forge along with Larsen & Toubro (L&T) and Tata Power are planning to locally develop the Indian prototype of the 155mm Bofors artillery gun system.

11.12.2 RESEARCH & DEVELOPMENT

Few large and very large units in India have dedicated technological and design development focus. The medium and small scale units on the other hand have not invested in R&D due to financial constraints. Kalyani Centre for Technology and Innovation (KCTI), an R&D centre recognised by DSIR, Government of India, is the sole exception to the rule. The KCTI addresses the requirements of augmenting employee knowledge and skills through Advanced Technical Training, Advanced Academic Courses and Research and Development. To improve its service, the AIFI has promoted a new world-class R&D centre at Chakan near Pune with facilities for product testing and validation for the forging industry. The centre has been funded by the Ministry of Heavy Industries & Enterprises, Government of India and the Government of Maharashtra.
11.13 FUTURE PROSPECTS

The industry is expected to grow at CAGR of 8 per cent to reach a production of 35.1 Lakh MTPA by 2020 from the current 22 Lakh MTPA. Opportunity for “Made in India” products is very positive. Growth of ‘Made in India’ products will increase investments and revenues in the segment, and thus attract more talent. Bharat Forge has tied up with BITS-Pilani, Warwick University, UK and IIT-Powai to provide on-campus engineering programmes for employees. The employees who undergo training will then be deployed in the industrial manufacturing business.

Better technology: With more FDI, companies could invest in latest technologies and know-how, and increase quality and productivity of the products. Medium and small companies with better brand marketing could also jointly invest in R&D and produce innovative quality products.

Increase in Exports: Demand for automobile components is increasing in developed countries including United States, Germany and United Kingdom. Global automotive OEMs are procuring components from manufacturers in low-cost countries. As a result, the industry in India has been making significant contributions to the country’s growing exports.

Government initiatives: The Government of India has permitted 100 per cent Foreign Direct Investment (FDI) in the automotive industry through the automatic route.

Opportunity for “Made in India” products is very positive. Growth of ‘Made in India’ products will increase investments and revenues in the segment, and thus attract more talent.
FASTENERS
12.1 MARKET OVERVIEW

The fasteners market in India is closely linked to the performance of the Indian auto industry as it is the largest consumer of fasteners. Currently, the auto industry is growing, resulting in an upswing witnessed in the fasteners sector.

The Indian fastener industry was estimated at about US$ 432 million in 2014, with an annual growth of 10 per cent year-on-year.

<table>
<thead>
<tr>
<th>Domestic Market Size for Industrial Fastener</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US$ mn</strong></td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>High Tensile Fasteners</td>
</tr>
</tbody>
</table>

12.2 PRODUCT CLASSIFICATION

The other major user segments of fasteners include textile machinery, railway locomotives, construction, computer hardware, general engineering, refineries, thermal/ water projects, oil & gas and electricity boards.

Fasteners can be broadly classified into two groups - high tensile strength fasteners and mild steel fasteners - depending on their tensile strength. Manufacturing of high tensile fasteners requires superior technology and so are mainly manufactured in the organised sector. On the other hand, manufacturing of mild steel fasteners is concentrated in the unorganised sector. Industrial fasteners cover a wide range of products such as nuts, screws, bolts, studs, rivets, nails and washers to name a few. High tensile fasteners account for 82-85 per cent of the market share and mild steel make up the balance.
12.3 INDUSTRY STRUCTURE

Suppliers

- Domestic
  - Over 80% of the market dominated by Organized Segment
  - Wide range of Products (both standard and design specific products)
  - Wide channel network
  - Estimated universe: 112

- Import
  - Addresses the rest of the market
    - Mostly to major wind segment OEMs, after sales, service market, Small OEMs
    - Mostly design specific products and cheap standard products
    - Estimated universe: 85

Channel

- Distributors
  - Directly supply to small OEMs
  - Also Supply to dealers

- Dealers
  - In some regions domestic suppliers have an office, through which they supply to dealers
  - Dealers supply to after sales service market

End Users

- OEMs
  - Auto/Auto Components
  - Wind
  - General Engineering
  - Earth Moving/Construction
  - Others

- After Sales Service Units
  - After Sales Service/Spares

- Dealers
  - Directly supply to small OEMs
  - Also Supply to dealers
12.4 KEY CLUSTERS

Delhi/Haryana/Ludhiana
Lakshmi Precision Screws
Pooja Forge
Sterling Tools
Super Screws
Deepak Fasteners
Mohindra Fasteners
Arise Industries
GS Auto International
Mitra Industries
Good Good manufacturers
TKW Fasteners
Hind Fasteners
AVR Fasteners
Rishi International
Kaypee Fasteners
ABM Fasteners
Micron Precision

Uttar Pradesh
Nipman Fasteners

Maharashtra
Right Tight Fasteners
Tork Fasteners
Pacific Forging & Fasteners
Precision Fasteners
SKS Fasteners
ASP Fasteners
Simmonds Marshall

Karnataka
MK Fasteners
IOTEK Fasteners
Ankit Fasteners
Hiten Fasteners
MK Fasteners

Tamil Nadu
Sundaram Fasteners
Koyas Fasteners
Umaa Engineers
Koya Fasteners
Leo Fasteners
Caparo Engg
IOTEK Engineers

North : 160,300 MT (49%)
West : 58,800 MT (18%)
South : 106,400 MT (33%)
East : 500 MT (~0%)
## 12.5 KEY PLAYERS

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Company Overview</th>
<th>Revenue</th>
<th>Products</th>
<th>Recent Developments &amp; Future Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sundaram Fasteners Limited</td>
<td>• Year of Incorporation: 1980&lt;br&gt;• Manufacturing locations: Chennai, Hosur, Villupuram, Puducherry, Medak, Rudhrapur&lt;br&gt;• User Segments: Auto/Auto components, Wind Energy, General Engineering, Railways, Construction and Earth moving.&lt;br&gt;• Headquartered in Chennai</td>
<td>2014-15:&lt;br&gt;US$ 394.6 million</td>
<td>• Products range: Fasteners, Radiator Caps, Powder Metal Parts, Cold Extruded Parts, Hot Forged Parts, Pumps &amp; Assemblies&lt;br&gt;• Key Products: Nuts, Bolts, Screws, Keys, Nylon inserted products, Studs, Rivets, Pins, Washers</td>
<td>• Expanding capacities in all products lines and adding secondary capacities to develop new products for its customers&lt;br&gt;• The company has set up facilities at Mittamandagapet in Tamil Nadu for the manufacture of Wind Energy fasteners&lt;br&gt;• Looking to capture more market share in wind segment and aerospace</td>
</tr>
<tr>
<td>Lakshmi Precision Screws (LPS)</td>
<td>• Year of Incorporation: 1972&lt;br&gt;• Key User segments: Auto/Auto components, Wind Energy, Oil &amp; Gas, Construction and Earth moving, General Engineering, Defence&lt;br&gt;• Headquartered in Rohtak</td>
<td>2014-15:&lt;br&gt;US$ 6.1 million</td>
<td>Fasteners (Bolts, Screws, Nuts, Pins, Allen Keys, Axle, Stud)</td>
<td>• Developing a system to manufacture aerospace fasteners&lt;br&gt;• Aiming to boost fasteners market share&lt;br&gt;Collaborations:&lt;br&gt;• Has signed an agreement with EJOT Germany GmbH to manufacture Self-tapping fasteners for plastics. Has entered into a license agreement with DORKEN to provide finishing coatings for fasteners</td>
</tr>
<tr>
<td>Company Name</td>
<td>Company Overview</td>
<td>Revenue</td>
<td>Products</td>
<td>Recent Developments &amp; Future Plans</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Sterling Tools Limited</td>
<td>• Year of Incorporation: 1979&lt;br&gt;• Key user segments: Auto/Auto components,</td>
<td>2014-15:&lt;br&gt;</td>
<td>Fasteners (Bolt, Screw)</td>
<td>• The company plan to increase its key accounts</td>
</tr>
<tr>
<td></td>
<td>Agricultural equipment&lt;br&gt;• Headquartered in New Delhi</td>
<td>US$ 5.6 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caparo Engineering India Limited</td>
<td>• Year of Incorporation: 1994&lt;br&gt;• Caparo Engineering India Limited designs,</td>
<td>2013-14:&lt;br&gt;</td>
<td>Fasteners</td>
<td>• Increased its strategic focus to improve its sales</td>
</tr>
<tr>
<td></td>
<td>develops, and manufactures automotive systems, assemblies, advanced composites,</td>
<td>US$ 333 million</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>modules, and components for automotive OEMs and engineering majors.&lt;br&gt;•</td>
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<tr>
<td></td>
<td>Headquartered in Pithampur</td>
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</tbody>
</table>

### 12.6 GOVERNMENT REGULATIONS

Several government associations are involved in the fastener industry. At the top of the list is the Fastener Manufacturer Association of India, which has about 300 members on roll from across the country. Of these, over 60 members are ISO Certified and many units actively export products to various global customers.

The Department of Industrial Policy and Promotion (DIPP) under the Ministry of Commerce and Industry, is the next important organisation monitoring the fastener industry. The DIPP is a watchdog establishment that also promotes industrial development and growth in general. The DIPP also studies, assesses and forecasts the need for technological development for specific industrial sectors such as cement and light engineering among others, which impact the fastener industry.

The other important association is the Engineering Export Promotion Council (EEPC). This is the apex body in charge of the promotion of engineering goods, products and services from India. India exports all transport equipment, capital goods and other machinery/equipment under the approval and surveillance of the EEPC.

FDI up to 100 per cent is allowed in the fasteners industry in India. De-licensing of the industry has also ensured the entry of global majors. The fastener industry however attracts a customs duty to the tune of about 10 per cent.
12.7 BUSINESS PRACTICE

The fastener sector is predominantly comprised of small and medium enterprises (40 per cent large firms and 60 per cent SMEs). They primarily manufacture low value-added products.

Large companies in the segment sub-contract non-critical jobs to smaller players. This helps the larger players focus on their core activities that are mission-critical. In the overall manufacturing process, at an average, around 8 per cent of the deliverables are sub-contracted.

Only the large players in this segment invest in Research & Development. However, the industry witnessed a downturn in 2013, due to which companies had put expansion plans on hold. This has resulted in a lag in the market, opening up the opportunity for international players to introduce the latest innovations into the market. Domestic firms are also keen on entering into partnerships with international players to rapidly increase technical know-how and capitalise on the growing market.

12.8 FUTURE OF THE SEGMENT

Increasing opportunity for “Made in India” products is expected to impact the fastener industry positively. A greater focus on domestic innovation is expected to increase investment and consequently revenues in the segment. This in turn is expected to attract more skilled labour to this industry.

With 100 per cent FDI, domestic players today can afford to invest in the latest technology to boost productivity and developing the quality of the end-product. Demand for fasteners in the domestic market is expected to witness significant growth with increase in local innovation and target-specific quality products. Increase in FDI in end-user segments including automobile and railways segments is also expected to give the required fillip to the fasteners industry.

Exports are predicted to swell with increase in manufacturing thereby reducing the import quotient in the fasteners segment. The export potential for ‘Made in India’ components has been estimated at US$ 20 billion.

Several domestic firms have entered into successful partnerships with leading international players. For example, Karnataka-based aerospace components manufacturer Aequs Pvt. Ltd has received approval from the Foreign Investment Promotion Board (FIPB) to increase overseas funding in its Indian unit to 40 per cent of its equity through ‘Joint Venture’.

MARKETING PRACTICES

Fasteners companies in India sell their products through multiple distribution channels. These include:

- **Distributors**: In India, most of the fastener companies sell their products through this channel.
- **Direct dealers**: Adopted primarily by major MNCs in India, they sell through traditional or direct dealers.
- **Online channel**: This is not yet popular in the B2B segment.
- **Industrial events**: To ensure better penetration and direct connect with prospective customers, leading companies today participate in industrial events/exhibitions in India and abroad.
With 100 per cent FDI, domestic players today can afford to invest in the latest technology to boost productivity and developing the quality of the end-product.
Light Engineering Equipment
PUMPS, MOTORS AND COMPRESSOR
13.1 MARKET OVERVIEW

The Pumps, Motors and Compressors (PMC) industry is a key sector integral to various industries such as oil & gas, power generation, water handling/sewage treatment, infrastructure development, chemicals and pharmaceuticals among others. Polyvinyl Chloride (PVC) has scaled new horizons in serving the pump industry.

With several reputed manufacturers, authorised dealers and buyers coming under one roof in the PVC sector, it is expected to create an opportunity to showcase all leading technologies in the field of industrial pumps and valves.

Most of the requirements for pumps, compressors and motors in India are met through indigenous development and local production. Key vendors of the PMC industry include: Crompton Greaves Ltd., Elgi Equipment Ltd., Flowserve Corp., Ingersoll Rand Inc., Kirloskar Brothers Ltd., Kirloskar Pneumatic Co. Ltd., KSB Pumps Ltd., L&T Ltd., Pentair Ltd., CRI Pumps Pvt. Ltd. and Altas Copco AB.

Major end-user segments include the aerospace industry, automobile industry, food processing, chemical/petrochemicals, manufacturing industry, semiconductor industry and gas/oil industry among others.

13.2 PUMP MARKET OVERVIEW

MARKET SIZE

This segment was estimated to be around US$ 956 million in 2014. The country exports pumps to almost 100 countries, with USA and Germany accounting for the largest shares (13 and 12 per cent respectively). International players with Indian presence have buyback arrangements wherein the pumps manufactured in their Indian facilities are sold abroad. Pumps and valves exports were worth US$ 1.8 billion in 2014-15, representing an annual growth of 20 per cent from US$ 1.5 billion in 2013-14.

Imports account for around 7 per cent of the total domestic consumption, with the US, China and France being the largest sources. More recently, local manufacturers of the low cost model have limited the scale of Chinese imports capitalising on their lack of established after-sales service.

Segmental demand/growth in this industry are primarily driven by the water and waste-water treatment sector and the power segment. In the last four years the two sectors have grown from 14 per cent in 2010 to 20 per cent in 2014.
13.3 PRODUCT CLASSIFICATION

The Indian water pumps market is segmented into two categories viz., Positive Displacement Pumps and Centrifugal Pumps. Of these Centrifugal Pump holds the larger market share. Since 2010 this segment has been growing at a healthy CAGR of 11.4 per cent.

In 2014, centrifugal pumps dominated the Indian market accounting for around 85 per cent of the total sales while positive displacement pumps accounted for the remaining 15 per cent.

In the centrifugal pumps category, sub-sector offerings like the single stage radial-flow pumps and submersible pumps proved to be the market leaders during the period 2010-2014.

In the positive displacement pumps category, sub-segments like the rotary and reciprocating pumps recorded the largest chunk of the market in the same period.

13.4 KEY CLUSTERS

Demand in the North and Eastern regions in India is driven mainly by the increased central government focus on river cleaning and small hydel schemes. Punjab and Himachal Pradesh in the North and the Orissa and Bengal in the East have been key beneficiaries of these schemes.

Demand in Western and Southern geographies of the country have been extensively driven by urban water supply schemes, power sector and the chemical industries.
13.5 INDUSTRY STRUCTURE

**Key Industry Clusters for Pumps and Valves**

![Map showing key industry clusters for pumps and valves]

**Region wise market Share**

![Map showing region wise market share]

---

**Indicative List**

- BHEL
- Kirloskar Brothers
- KSB
- Grundfos
- WPIL
- Mathers & Platt
- Sulzer
- Flowerserve
- BP & CL
- Kirloskar Ebara

- Sam Turbo
- Beacon
- BE Pumps
- Jyoti
- Cast & Blower

- Bareja
- Flowing Pumps
- CRI Pumps
- SU Motors
- Varat Pumps

---

**Classification**

<table>
<thead>
<tr>
<th></th>
<th>Large</th>
<th>Medium</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Sales in FY 14 (US$)</td>
<td>&gt;20</td>
<td>2-20</td>
<td>Less than 2</td>
</tr>
<tr>
<td>Number of Player</td>
<td>10</td>
<td>30-35</td>
<td>250+</td>
</tr>
</tbody>
</table>

** Few Players**

- BHEL
- Kirloskar Brothers
- KSB
- Grundfos
- WPIL
- Mathers & Platt
- Sulzer
- Flowerserve
- BP & CL
- Kirloskar Ebara

- Sam Turbo
- Beacon
- BE Pumps
- Jyoti
- Cast & Blower

- Bareja
- Flowing Pumps
- CRI Pumps
- SU Motors
- Varat Pumps

---

**Products**

- **Large**
  - Offer High capacity pumps in specific technology or offer a range of all types of pumps across various user segments

- **Medium**
  - Offer Small to medium capacity pumps various applications

- **Small**
  - Offer small capacity pumps for Non-critical applications

---

**Presence**

- **Large**
  - National Presence

- **Medium**
  - National Presence

- **Small**
  - Regional Presence

**Market Share**

- **Large**
  - 65%

- **Medium**
  - National Presence

- **Small**
  - 35%
## 13.6 KEY PLAYERS

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Company Overview</th>
<th>HQ</th>
<th>Revenue</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BHEL</strong></td>
<td>BHEL is an integrated power plant equipment manufacturer and one of the largest engineering and manufacturing companies in India.</td>
<td>Delhi</td>
<td>2014-15: US$ 4,839.0 million</td>
<td>Boiled Feed Pumps, Boiler Feed Booster Pumps, Condensate Extraction Pumps, Circulating Water Pumps</td>
</tr>
<tr>
<td><strong>BP &amp; CL (Bharat Pumps &amp; Compressors Ltd.)</strong></td>
<td>Bharat Pumps and compressors Ltd. (BPCL) is engaged in the manufacture and supply of heavy duty pumps &amp; compressors and high pressure seamless and CNG gas cylinders / cascades to cater the needs of oil exploration &amp; exploitation, refineries, petro-chemicals, chemicals, fertilizer and downstream industries.</td>
<td>Allahabad</td>
<td>2013-14: US$ 20 million</td>
<td>The company manufacturers both Centrifugal and Reciprocating Pumps for different applications</td>
</tr>
<tr>
<td><strong>Kirloskar Brothers Limited (KBL)</strong></td>
<td>Kirloskar Brothers Limited (KBL) is a world class pump manufacturing company with expertise in engineering and manufacture of systems for fluid management</td>
<td>Pune</td>
<td>2014-15: US$ 268.1 million</td>
<td>End Suction Pump, Monobloc Pumps, Split Case Pumps, Submersible Pumps, Multistage Pump, Sump Pumps, Vertical Turbine Pumps, Special &amp; Engineered Pumps</td>
</tr>
<tr>
<td><strong>WPIL Limited</strong></td>
<td>WPIL Ltd., formerly known as Worthington Pump India Ltd., has been manufacturing pumps of international class and quality to cater to water pumping needs across the globe.</td>
<td>Kolkata</td>
<td>2014-15: US$ 38.2 million</td>
<td>Vertical Turbine Pumps, Vertical Mixed Flow &amp; Axial Flow Pumps, Submersible Pumps (Borewell Application), Submersible Pumps (Sewage Application), Horizontal Centrifugal Pumps (Worthington and own Design)</td>
</tr>
</tbody>
</table>
13.7 KEY MARKET TRENDS

Increased energy crisis and government regulations are motivating water pump manufacturers to develop energy efficient products. Gujarat, Tamil Nadu and Maharashtra which have a strong industrial base, lead the demand for industrial pumps. Punjab and Uttar Pradesh which are primarily agriculture-based states account for the largest demand of agricultural pumps in the country.

Changing end-user requirements have contributed to an overall shift in market trends. Increased privatisation in the core segment of power and new entrants in the power plant equipment sector have also impacted this industry immensely.

The new entrants in the power plant equipment sector that have had a significant impact in the pumps industry include Alstom SA and Bharat Forge Ltd, Toshiba Corp. and JSW Group, Larsen and Toubro Ltd (L&T) and Japan’s Mitsubishi Heavy Industries Ltd (MHI).

India has attained near self-sufficiency in pumps for nuclear power,

complete self-sufficiency in captive power generation, pulp & papers, energy efficient pumps in utilities & in agriculture sector.

Other factors impacting the market trends include:

- The concept of Build-Own-Operate-Transfer (BOOT) has steadily gained importance in the water and waste-water sectors
- Demand for energy efficient products
- Demand for better products with higher efficiency across all segments (leading to the introduction of low-lifecycle cost pumps)
- New segments emerging with significant growth potential like the desalination, Effluent Treatment Plants (ETP) and Sewage Treatment Plants (STP) sectors

13.8 GROWTH TRENDS IN THE LAST 4 YEARS

The total share of the Indian pumps industry in global exports is less than 3 per cent. Exports registered a drop during 2009-10 due to recessionary pressures. It has picked up since and today exports are estimated to contribute to about 11 per cent of the total market in 2014.

The Middle East has emerged as an attractive export destination with low-priced Indian pump sets having an advantage over their European and American counterparts. The Middle East lacks a domestic manufacturing base, with a higher dependency on imports. Here, most sales are part of a package of products meant for large EPC projects, and the entry of Indian EPC players acts as a catalyst for future exports.

By 2030, urbanisation is expected to cater to 70 per cent of India’s US$ 15 trillion projected GDP. The allocation of huge amount of funds by the government to various urbanisation and industrialisation projects is expected to bring opportunities for pumps. The focus on farm sector will revive the agricultural production, which in turn creates greater demand for agro pumps and solar water pumping systems.

The key changes the industry has witness in the last 3-4 years:

- New government initiatives of cleaning of all major rivers and connecting identified rivers through man-made canals
- Greater transparency in processes of government projects and improved payment cycles
- Development programmes like JNNURM (Jawaharlal Nehru National Urban Renewal Mission) and NWM (National Water Mission) have accelerated project completion cycles [10 years ago, the project completion cycle was 6 – 8 years (from announcement to completion), today it has reduced to 3 – 4 years]
13.9  FUTURE PROSPECTS

The Centrifugal market is expected to grow from US$ 809 million in 2014 to US$ 1.6 billion in 2019 (at a CAGR of 14.7 per cent). The Positive Displacement Market is expected to grow from its current US$ 147 million to US$ 240 million in 2019 (at a CAGR of 10.3 per cent).

The growth trajectory of the pumps segment is expected to be focused on Infusion Pumps catering to Bio-Pharma field in the near future.
13.10 COMPRESSOR MARKET OVERVIEW

13.10.1 MARKET SIZE
The industrial compressors industry in India is currently valued at US$ 0.55 billion (2014) with top players Atlas Copco and Ingersoll Rand. Other key players include Elgi Equipments and Kirloskar Pneumatic. The market is expected to grow at a CAGR of 9 per cent to reach US$ 0.83 billion by 2019. Almost 85 per cent of the overall industrial compressors market is comprised of large firms.

13.10.2 TYPES OF COMPRESSORS

<table>
<thead>
<tr>
<th>Compressors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Compressors</td>
</tr>
<tr>
<td>Axial Flow Compressors</td>
</tr>
<tr>
<td>Centrifugal Compressors</td>
</tr>
<tr>
<td>Gas &amp; Linear Compressors</td>
</tr>
<tr>
<td>Mixed Flow Compressors</td>
</tr>
<tr>
<td>Reciprocating Compressors</td>
</tr>
<tr>
<td>Rotary Screw Compressors</td>
</tr>
<tr>
<td>Variable Speed Compressors</td>
</tr>
<tr>
<td>Motor Compressors etc.</td>
</tr>
</tbody>
</table>
### 13.10.3 KEY PLAYERS

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Sub- Segment</th>
<th>Products</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlas Copco</td>
<td>Compressor</td>
<td>Air and Gas Compressors, Portable Air Compressors, Centrifugal Compressors, High Pressure Compressors, Oil-free Air Compressors</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>ELGI Equipments Limited</td>
<td>Compressor</td>
<td>Oil Free Compressors, Electric Lubricated Screw Compressor, Electric Oil-Free Screw Compressor, Portable Compressor, Railway Compressor</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Ingersoll Rand (India) Limited</td>
<td>Compressor</td>
<td>Air Compressor</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Pneumatic Company Ltd</td>
<td>Compressor</td>
<td>Centrifugal Air Compressors, Screw Air Compressors, Reciprocating Air Compressors</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Paras Compressors</td>
<td>Compressor</td>
<td>Single Stage Compressor, Two Stage Compressor, Oil free Air Compressor, Multi stage High Pressure Air Compressor, Heavy duty Water Cooled, Single / double acting lubricated / Non Lubricated Compressor</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Gajjar Compressor</td>
<td>Compressor</td>
<td>Reciprocating Piston Air Compressors, Lubricated and Non lubricated Water Cooled air compressor, Screw Compressors, Reciprocating Dry Vacuum Pumps, Oil Free Dental Compressor, Single And Two Stage Dry Vacuum Pumps, Air Compressor Compressor Air Pumps</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Fouji Industries</td>
<td>Compressor</td>
<td>Air Compressor</td>
<td>Manufacturer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dental Compressor</td>
<td></td>
</tr>
</tbody>
</table>
13.11 ELECTRIC MOTOR OVERVIEW

MARKET SIZE
The motor market industry in India is valued at US$ 939 million and is expected to reach US$ 1,375 million by 2018, growing at a 10 per cent CAGR during the period 2014-18. Electric motors have a wide area of applications in numerous industries and functions such as motor vehicles, household appliances, industrial machinery, aerospace and other transportation equipment, High Voltage Alternating Current (HVAC) equipment and the commercial industry.

13.11.1 TYPES OF MOTORS
13.11.2 KEY PLAYERS

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Sub- Segment</th>
<th>Products</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marathon Electric Motors (India) Ltd</td>
<td>Motors</td>
<td>AC Motors</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Kirloskar Electric Company Ltd</td>
<td>Motors</td>
<td>AC Motors, High Voltage Motors, Low Voltage Motors, DC Motor</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Hindustan Motor Mfg. Co</td>
<td>Motors</td>
<td>High Efficiency Standard Motors, Brake Motors, Flame Proof Motors, Multi Speed Motors, Crane Duty Motors, Cooling Tower Motors, Inverter Duty Motors, Energy Efficient Motors, Torque Motors, Textile Motors, Special Application Motors, Explored Geared Motors</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>NBE MOTORS PVT. LTD.</td>
<td>Motors</td>
<td>AC and DC Motors, Single Phase AC Motors, Electric AC Motor, AC &amp; DC Motor , DC Motor, AC Servo Motors and Drives, Gear Motor &amp; Helical Gear Motor, Air Blower, Electric Motors</td>
<td>Manufacturer</td>
</tr>
</tbody>
</table>

13.11.3 KEY TRENDS

The agriculture and industrial sectors are the main consumers of electric motors in India accounting for more than 75 per cent of consumption. Though this segment is driven primarily by small and medium enterprises using low technology, a significant market segment is owned by large national and international players.

As a developing nation, significant industrial growth is expected in India over the next 5 to 10 years. With the government investing more on infrastructure activities such as power, steel, cement and construction, demand for electric motors is expected to get a major fillip in the near future.

13.12 GOVERNMENTS REGULATIONS (PUMPS, MOTORS AND COMPRESSORS SECTOR)

The Pumps, Motors and Compressor sector is of strategic importance to the economy owing to its tight integration with other industry segments. Several government associations are involved in the industrial pump market.

The first among them is the Indian Pump Manufacturers Association (IPMA). The IPMA plans and undertakes various activities to promote this sector. These include hosting regional, national and international conferences, seminars, workshops, meetings, trade fairs and exhibitions; submitting recommendations, representations and memoranda to Central and State governments on issues affecting the pump industry; taking steps to promote exports; spreading awareness and extending participation of the industry at national energy concern forums.
The Department of Industrial Policy and Promotion (DIPP), under the Ministry of Commerce & Industry, Government of India, is the nodal agency for the development of light engineering industries. It monitors the progress at regular intervals and suggests possible policy incentives as per requirement.

The Engineering Exports Promotion Council (EEPC) is another premier trade and investment promotion organisation in India. Sponsored by the Ministry of Commerce & Industry, Government of India, it caters to the Indian engineering sector. The Department is also responsible for the formulation and implementation of promotional and developmental measures for the growth of the entire industrial sector.

The Bureau of Energy Efficiency (BEE) is also a key nodal agency for the regulation and implementation of the “Star” labelling programme launched in 2006. The Star labelling programme is a part of the Energy Conservation Act 2001 which is vested with specific powers.

Some initiatives by the Government of India include:

- Assigning minimum energy standards for equipment and appliances, and fixing energy consumption labels on the same.
- Banning the production or sale of imported units that do not meet the requisite standards.
- Launching the ‘pump-set energisation programme’ financed by the Rural Electrification Corporation (REC).

The PMC sector has been de-licensed and enjoys 100 per cent FDI. With an aim to boost the manufacturing sector, the government has relaxed excise duties on factory gate tax, capital goods, consumer durables and vehicles. It has also reduced the basic customs duty from 10 per cent to 5 per cent on forged steel rings used in the manufacture of bearings of wind operated electricity generators.

Other major initiatives by the Government of India (GoI) to support the PMC sector include:

- 15 per cent investment allowance for manufacturing undertakings situated in notified backward areas of state of Andhra Pradesh and Telangana (Union Budget 2015-16)
- Providing an investment allowance at the rate of 15 per cent to a manufacturing company that invests more than US$ 4.17 million in any year in new plant and machinery (Union Budget 2014-15)
- The government has also taken steps to improve the quality of technical education in the engineering sector by allocating a sum of US$ 78.8 million towards skilling to Industrial Training Institutes (ITIs).
- Strategic steps have also been taken to encourage companies to perform and grow faster. The EIL for instance, was recently conferred the Navaratna status after it fulfilled the criteria set by the Department of Public Enterprises, Ministry of Heavy Industries and Public Enterprises, Government of India. The conferred status would give the state-owned firm more financial and operational autonomy.
- The “Make in India” campaign has got the attention of several infrastructure and engineering multi nationals including GE and ThyssenKrupp, who are now considering investing in India.

**13.12 FUTURE PROSPECTS**

Solar Pump market in Asia Pacific has witnessed an upward growth trend due to an increasingly strong demand from India and China, especially from the agriculture sector. In India, Haryana government plans to provide subsidies to farmers for the usage of solar pumps, thereby stimulating the demand further.
VALVES
14.1 MARKET OVERVIEW

Valves segment contributes significantly to the growth of the Indian economy. It has proved highly critical for the productivity in core sectors of the economy. The market size of valves in India was worth US$ 1.5 billion in 2013-14. India constitutes 2.5 per cent of the global market. Pumps and valves exports were worth US$ 1.8 billion in 2014-15, representing an annual growth of 20 per cent from US$ 1.5 billion in 2013-14.

Indian Industrial Valves Market

(US$ billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value (US$ billion)</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-14</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>2018-19</td>
<td>1.9</td>
<td>7%</td>
</tr>
</tbody>
</table>

14.1.1 INDUSTRY STRUCTURE

The Indian valve industry is highly fragmented, with about 600 valve manufacturers, of which more than 95 per cent fall in the micro, small and medium enterprise (MSME) category. Top 10 players service 40 per cent of the market. Most of the sales are through the direct sales channel. As far as demand from end use sectors is concerned, Oil & Gas downstream is the biggest end use sector with 26.1 per cent of total demand, followed by Power, PCF, Oil & Gas (midstream) and Oil & Gas (upstream) sectors.
14.1.2 PRODUCT CLASSIFICATION

Industrial valves market is divided into two segments - On-Off valves and Control valves.

On-Off valves account for 98 per cent of the valves market by volume and 90 per cent by value. On-Off valves market is further segmented into seven types of valves of which Ball, Butterfly and Gate valves are the top three types by value. About 88 per cent of the demand is from projects, while 12 per cent is replacement demand.

Control valves account for only 2 per cent of the industrial valves market by volume and 10 per cent by value. Control valves with sizes up to 6 inches constitute about 60 per cent of the total volume in the Indian control valves market. Globe valves, a type of control valve, enjoys more than 65 per cent share of the total control valve market. About 85 per cent of the demand is from projects and 15 per cent from replacements.
On-Off Valves: Value Split of demand

- Ball: 38%
- Gate: 29%
- Butterfly: 17%
- Plug: 5%
- Diaphragm: 5%
- Globe: 4%
- Knife Gate: 3%

Control Valves: Value Split of demand

- Globe: 66%
- Butterfly: 15%
- Angle: 8%
- Ball: 6%
- Choke: 6%
- Diaphragm: 1%
- Knife Gate: 3%

On-Off Valves: Volume Split of demand

- Gate: 31%
- Butterfly: 31%
- Ball: 24%
- Plug: 6%
- Globe: 4%
- Diaphragm: 2%
- Knife Gate: 1%

Control Valves: Volume Split of demand

- Globe: 76%
- Butterfly: 14%
- Ball: 6%
- Angle: 3%
- Choke: 1%
- Diaphragm: 1%
14.2 KEY INDUSTRY CLUSTERS

Few major Pumps & Valves industry clusters are:
- Coimbatore
- Belgaum
- Batala & Jalandhar
- Kolhapur
- Rajkot
- Ahmedabad
- Hyderabad
### 14.3 KEY PLAYERS

Some of the major players engaged in offering industrial valves in the Indian market are:-

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Background Information</th>
<th>Plants in India</th>
<th>Revenues</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&amp;T Valves Limited</td>
<td>L&amp;T Valves is a leader in flow-control solutions for critical services. The company manufactures valves for key sectors of the economy such as oil &amp; gas, power, petrochemicals, chemicals, fertilizers and pharmaceuticals</td>
<td>• Manapakkam (Chennai), Tamil Nadu • Coimbatore, Tamil Nadu • Kancheepuram,</td>
<td>2014-15: US$ 9,713.4 million</td>
<td>• Gate, Globe &amp; Check Valves  • Valves for Power  • Trunnion-mounted Ball Valves  • Process Ball Valves  • Triple-offset Butterfly Valves  • Flanged &amp; Wafer-type Butterfly Valves  • Double Block and Bleed Plug Valves  • Automated &amp; Control Valves  • Customised Solutions</td>
</tr>
<tr>
<td>NSSL Limited</td>
<td>NSSL is a leading manufacturer and exporter of valves and has one of the largest plants of its kind in India. The major customer base for NSSL include Oil &amp; Gas, Refinery, Fertilizer, Steel sectors, Water Desalination plants, Power plants, etc</td>
<td>• Chennai, Tamil Nadu • Nagpur, Maharashtra</td>
<td>NA</td>
<td>• Gate Valves  • Globe Valves  • Check Valves  • API 6D Valves  • High Pressure Valves  • Ball Valves  • Double Block and Bleed Valve  • Lubricated Plug  • Dual Plate Check  • Forged Steel Valves  • Critical Valves</td>
</tr>
<tr>
<td>Company Name</td>
<td>Background Information</td>
<td>Plants in India</td>
<td>Revenues</td>
<td>Products</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------</td>
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<td>----------</td>
</tr>
</tbody>
</table>
| Microfinish Valves Pvt. Ltd. | Microfinish Valves is a well-established valves manufacturing company in India, which specialises in Ball Valves. It also manufactures Globe and Knife Edge Gate Valves | Hubli, Karnataka | NA | • Floating Ball Valves  
• Trunnion Mounted Ball Valves  
• Bellows Sealed Globe Valves  
• Globe Valves for Chlorine Service  
• Knife Edge Gate Valves  
• Chemical Process,  
• Sanitary and Slurry  
• Pumps |
| CRI Valves | CRI Valves is a part of CRI Pumps; they design, manufacture and supply valves in special materials, such as Carbon Steel, Stainless Steel. Their valves are delivered worldwide and cater to meet various customer demands across industries including Power plants, Distillery, Paper and Pulp Industry, Sugar Industry, HVAC, Water treatment plants, Construction Industry, Chemical and Pharmaceutical Industries | Coimbatore, Tamil Nadu | NA | • Butterfly Valve  
• Gate, Globe and Check Valve  
• Ball Valve  
• Forged Gate, Globe  
• and Check Valve  
• Wafer Type and & Dual Plate Check Valve |
| Kirloskar Brothers Limited (KBL) | KBL is one of the pioneers in manufacturing various types of valves in India. KBL valves are suitable for various applications like water, waste water, raw water, steam, oil & gas, processed liquids and slurries | Kirloskarwadi, Maharashtra, Dewas, Madhya Pradesh, Kondhapuri, Kolhapur, Maharashtra, Coimbatore, Tamil Nadu, Ahmedabad, Gujarat | 2014-15: US$ 268.1 million | • Butterfly Valve  
• Sluice valve  
• Non Return Valve  
• Kinetic Air Valve  
• Foot Valve  
• FM Approved Gate Valve  
• Valve  
• Suction Diffuser and  
• Triple Duty Valve  
• Cast Steel Gate Valve  
• Cast Steel Check Valve  
• Ball Valve  
• Steam Trap Device  
• Forged Steel Gate,  
• Globe, Check Valve |
14.4 CURRENT TRENDS

- **Consolidation:** There is ongoing consolidation in the valve industry globally and the Indian industry has not remained untouched. Most of the global valve majors are already present in India and Indian valve industry is moving outwards. There have been many acquisitions of valve manufacturing assets or companies outside India by Indian companies.

- **Global Opportunities:** To overcome competition and achieve growth, Indian manufacturers are increasingly focusing on export markets. Increasing recognition of Indian valve manufacturers in the international markets has opened doors for global opportunities.

14.6 INNOVATIONS AND NEW DEVELOPMENTS

- The latest innovation, which is from L&T Valves, is Aquaseal Plus Class 150 Butterfly Valve, specifically designed to address the higher line pressures that modern high-rise building systems demand. Reliability is ensured while creating the valves by using a world-class quality management system. Aquaseal Plus has successfully completed over 10,000 test cycles, living up to its fit-and-forget reputation.

- In May 2015, IMI CCI, Sri City successfully manufactured turbine bypass valves for a 1050 MW supercritical power plant first time in India.

- Automation and new material requirements are now changing the whole face of the business. Increasing expectations of the end use sectors (in order to improve their plant’s performance) is driving the valve manufacturers to upgrade their technology.

- **Remote Monitoring:** End users are increasingly using remote control technology for valves to help plan preventive maintenance, monitoring of critical parts and better use of their assets.

- **Emission control through valves:** Valves are expected to cause 60 per cent of the total fugitive emission of a refinery or chemical plant. New requirements on emission control are being added by buyers.

14.7 FUTURE PROSPECTS

- **Planned development of oil & gas pipelines:** Public sector companies in oil & gas sector plan to increase their gas pipeline network. More than 15,000 kms of natural gas pipeline is planned over the next few years. Indian Oil Corporation Limited (IOCL) alone invested US$ 1.5 billion to increase its natural gas pipeline network from 10,900 km to 15,000 km by 2015. The overall pipeline infrastructure for crude oil & natural gas is expected to double during the 12th five year plan. This is going to boost the demand for valves.

- **Expected power generation capacity addition:** More than 50 GW of thermal power generation capacity is expected to be added over the next 5 years. Thermal power plants are a major end use sector for industrial valves and this will be a big opportunity. The Restructured Accelerated Power Development and Reforms Programme (R-APDRP) and the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), along with the 12th five year plan, will impact key investments.

- **Development of 100 smart cities:** The building of 100 new smart cities, as planned, will lead to increased investment in water and sanitation infrastructure, which in turn will increase the demand for industrial valves.

- **Growing export opportunities:** With the recovery of the global economy, especially the developed world and MENA region, and rising brand awareness of Indian manufacturers, Indian players can tap the market for future growth.

- **Modernization of Process plants:** The drive for efficiency improvements in process plants will drive the demand for actuated valves in new installations as well as retrofitting in the Brownfield installations.
15 **GLOSSARY & ACRONYMS:**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>FTA</td>
<td>Free Trade Association</td>
</tr>
<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
</tr>
<tr>
<td>BRIC</td>
<td>Brazil, Russia, India &amp; China Nations</td>
</tr>
<tr>
<td>SEZ</td>
<td>Special Economic Zones</td>
</tr>
<tr>
<td>NIMZ</td>
<td>National Investment and Manufacturing Zones</td>
</tr>
<tr>
<td>DMIC</td>
<td>Delhi Mumbai Industrial Corridor</td>
</tr>
<tr>
<td>SME</td>
<td>Small &amp; Medium Scale Enterprises</td>
</tr>
<tr>
<td>MENA</td>
<td>Middle East and North Africa</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>KVA</td>
<td>Kilovolt-ampere</td>
</tr>
<tr>
<td>JV</td>
<td>Joint Ventures</td>
</tr>
<tr>
<td>T&amp;D</td>
<td>Transmission and Distribution</td>
</tr>
<tr>
<td>HVDC</td>
<td>High Voltage Direct Current</td>
</tr>
<tr>
<td>KVA</td>
<td>Kilovolt-ampere</td>
</tr>
<tr>
<td>RGGVY</td>
<td>Rajiv Gandhi Grameen Vidyutikaran Yojana</td>
</tr>
<tr>
<td>AT&amp;C</td>
<td>Aggregate technical and commercial</td>
</tr>
<tr>
<td>LV</td>
<td>Low Voltage</td>
</tr>
<tr>
<td>MV</td>
<td>Medium Voltage</td>
</tr>
<tr>
<td>HV</td>
<td>High Voltage</td>
</tr>
<tr>
<td>CT/MT</td>
<td>Combined units, also called metering units</td>
</tr>
<tr>
<td>BTG</td>
<td>Boiler Turbine Generator</td>
</tr>
<tr>
<td>IBR</td>
<td>Indian Boiler Regulations</td>
</tr>
<tr>
<td>EPC</td>
<td>Engineering Procurement Construction</td>
</tr>
</tbody>
</table>
16 INFORMATION SOURCES

RBI: Reserve Bank of India – Official website
Make in India – Official website
Vibrant Gujarat – Official website
Government Ministry’s website
EEPC: Engineering Export Promotion Council, India – Official website
Ministry of Heavy Industries – Official website
Ministry of Commerce and Industry– Official website
DIPP: Department of Industrial Policy & Promotion, Government of India – Official website
Zauba: Indian import & export data directory – Official website
SIA: Secretariat for Industrial Assistance – Official website
NIC: National Information Centre – Official website
ICEMA: Indian Construction Equipment Manufactures – Official website
ITMA: Indian Transformer Manufacturers Association – Official website
TMMA: Textile Machinery Manufacturers Association – Official website
Moneycontrol – Official website
IMTMA: Indian Machine Tool Manufacturers’ Association
ITME: Indian Textile Machinery – Official website
PPMAI: Indian Process Plant & Machinery Industry – Official website
NSDC: National Skill Development Corporation – Official website
IPSOS, website
Economic Times – Official website
Bloomberg Business week – Official website
Business Standard- Official Website
CCI: Competition Commission of India – Official website
NDTV (profit): New Delhi Television – Official website
SIEMA: The Southern India Engineering Manufacturers – Official website
ICA: India Compressor Association – Official website
PMT Machine Tools
HMT Machine Tools
Lakshmi Machine Works
Volts Ltd.
Premier Looms Manufacturers Private Limited
NOTA Industries
GoG – AMA: Industries Commissionerate, Government of Gujarat – official website
Hoovers: official website
Livemint: official website

TOI: Times of India – official website
Yahoo Finance: official website
Market Watch: official website
Government Ministries websites
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Fastener Manufacturers Association of India – Official website
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Article on electrical motors
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PM Control Equipment Pvt. Ltd
Extreme Automation Pvt. Ltd.
India Note website
Larsen & Toubro website
India Core website
Business Wire website
DNB cluster series