Evolution of the Aluminium High Pressure Die Casting in India
INDIA - A VIBRANT ECONOMY

- World’s Largest Democracy - 1.3 billion people with Growing Middle Class
- 3rd Biggest economy in terms of PPP (Purchasing Power Parity)
- 2nd largest pool of Certified Professionals & Highest number of Qualified Engineers in the world
- 3rd Largest Investor base in the World
- India’s average GDP growth rate: 7.3% over past 10 years
INDIA - A VIBRANT ECONOMY

Political Stability under the Leadership of Prime Minister Mr. Narendra Modi

India’s ranking has improved by over 30 places in past one year in ‘Ease of Doing Business’

Target is to break into Top 50 by 2020

Implementation of GST Regime

Protection of minority investors

‘Make in India’ not merely a slogan but a driving force for economic development.
INDIA - A VIBRANT ECONOMY

FDI Inflows in India for the past 3 yrs

- Singapore: 29 Bn USD
- Japan: 9 Bn USD
- USA: 8 Bn USD
- Germany: 3 Bn USD

Source: Quarterly Fact sheet Govt Of India
INDIA - A VIBRANT ECONOMY

Infra - Development National Highway

17.2 KM Roads per day were built in 2015-16.

22 KM Roads per day were built in 2016-17.

Now the target is to go to 40 km/day.
History of Indian Die Casting Industry

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>First PDC machine installed (at Jalandhar, North India)</td>
</tr>
<tr>
<td></td>
<td>Make: POLAK (Czech)</td>
</tr>
<tr>
<td></td>
<td>Hydraulic System: Water Hydraulics</td>
</tr>
<tr>
<td></td>
<td>Company: Graem &amp; Co.</td>
</tr>
<tr>
<td></td>
<td>Parts Made: Castings for Loudspeakers</td>
</tr>
</tbody>
</table>

Exactly 20 years later, in 1974, the first indigenous PDC machine was built at Delhi.
HMT - a government of India undertaking started manufacturing of PDC machines with license from Buhler-Switzerland.

HMT was using design which was already 10-15 years old.

The government declared liberalisation of Indian economy and made sweeping changes in policies.
Liberalization

1991 - opening up of The Indian Economy
- Production capacity restrictions removed
- Manufacturing Activities given fillip
- Private enterprises got incentives for new projects
- Foreign Exchange Restrictions minimised
- Imports delinked from Export commitments
Effects of Liberalization

- Creation of competitive Market Economy
- Manufacturers create newer & better parts to acquire & sustain new customers
- Rapid up-gradation in manufacturing competence
- Improved utilization of capacity
History of Indian Die Casting Industry

Largest Size of Machine in Use

- 1974: Buhler 800 T - Jaya Hind Industries - (Crankcase)
- 1989: Buhler 1100 T - Jaya Hind Industries - (Cylinder Block)
- 1994: HMT 660 D - First machine retrofitted with Real Time Controls (2 Wheeler Crank Case)
- 1996: Buhler 840 T Evolution - First machine with built in Real Time controls (LH Engine Housing Scooter)
- 2000: Buhler 1400 T Evolution - Transmission Housing - Maruti & Sunbeam Auto
- 2008: Buhler 2800 T - Jaya Hind Industries
- 2010: Buhler 3200 T - Jaya Hind Industries & Sundaram Clayton

It took 26 years for Machine Tonnage to increase from 800T in 1974 to 1400T in 2000.
It took only 10 years to increase from 1400T in 2000 to 3200T in 2010.
History of Indian Die Casting Industry

- Till 1990 only 2 machine builders were in India. Imports were difficult due to policy restrictions.
- Today we can freely import from the World’s Best Manufacturers.

Prominent Machine Makers:
- Germany
- Italy
- Japan
- Taiwan
- China
- Switzerland
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The Indian Die Casting industry has now matured and is catering to both global and domestic customers. Machines and Equipment built with latest technologies are being used. India is now producing critical parts like engine blocks, bed plates / ladder frames & other thin wall castings.

Availability of educated & skilled labour and a large and growing domestic market. Support services and material suppliers have also kept pace with die casting process in India. Companies like FOSECO International, Magmasoft, Buhler and many others played prominent role in development of die casting industry in India.
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CUSTOMER EXPECTATIONS

TECHNOLOGY IN INDIAN DIE CASTING INDUSTRY TO MEET CUSTOMER EXPECTATIONS

FUTURE OF DIE CASTING IN INDIA

ABOUT ALUCAST
**AUTOMOTIVE - THE LARGEST CUSTOMER**

### INTERNATIONAL MANUFACTURERS

- BMW
- Volkswagen
- Skoda
- Renault Nissan
- Mercedes Benz
- Ford
- Toyota
- Honda
- GM
- Fiat
- Hyundai
- Maruti Suzuki

### DOMESTIC MANUFACTURERS

- Tata Motors
- Mahindra
- Hindustan Motors
- Premier
- Force Motors
- Ashok Leyland

### INTERNATIONAL MANUFACTURERS

- BMW
- Volkswagen
- Skoda
- Renault Nissan
- Mercedes Benz
- Ford
- Toyota
- Honda
- GM
- Fiat
- Hyundai
- Maruti Suzuki

Source: ACMA

<table>
<thead>
<tr>
<th>Year</th>
<th>1990</th>
<th>2000</th>
<th>2011</th>
<th>2017</th>
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<td>Maruti Suzuki</td>
<td>7</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Tata Motors</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Hindustan Motors</td>
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<tr>
<td>Premier</td>
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<td>0</td>
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<tr>
<td>Force Motors</td>
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<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Ashok Leyland</td>
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<th>1990</th>
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<tr>
<td>Ashok Leyland</td>
<td>0</td>
<td>0</td>
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<td>0</td>
</tr>
</tbody>
</table>

Source: ACMA
Automotive Clusters in India

**NORTH**
- Eicher
- Escorts
- Hero Moto Corp
- Honda Motorcycle
- Honda SiELCars
- ICML
- JCB

<table>
<thead>
<tr>
<th>Company</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eicher</td>
<td>Maruti Suzuki</td>
</tr>
<tr>
<td>Escorts</td>
<td>New Holland</td>
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<tr>
<td>Hero Moto Corp</td>
<td>Mahindra</td>
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<td>Honda Motorcycle</td>
<td>Suzuki Motorcycles</td>
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<tr>
<td>Honda SiELCars</td>
<td>Swaraj Mazda</td>
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<tr>
<td>ICML</td>
<td>Tata Motors</td>
</tr>
<tr>
<td>JCB</td>
<td>Yamaha</td>
</tr>
</tbody>
</table>

**NEW HUB: SANAND**
- Tata Motors
- Maruti
- Ford India

**WEST**
- Bajaj Auto
- Fiat
- Force Motors
- GM
- John Deere
- Mahindra
- MAN

<table>
<thead>
<tr>
<th>Company</th>
<th>Company</th>
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</thead>
<tbody>
<tr>
<td>Bajaj Auto</td>
<td>Mercedes Benz</td>
</tr>
<tr>
<td>Fiat</td>
<td>PSA</td>
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<tr>
<td>Force Motors</td>
<td>Skoda</td>
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<tr>
<td>GM</td>
<td>Tata Hitachi</td>
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<tr>
<td>John Deere</td>
<td>Tata Motors</td>
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<tr>
<td>Mahindra</td>
<td>Volkswagen</td>
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<tr>
<td>MAN</td>
<td>Volvo Eicher</td>
</tr>
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</table>

**SOUTH**
- Ashok Leyland
- BMW
- Caterpillar
- Daimler
- Ford
- Hindustan Motors
- Hyundai
- Nissan
CUSTOMER EXPECTATIONS

Quality Management System

Inventory & Just-in-time Supply

Near Zero PPM

Concurrent Engineering

Prototype to final Subassembly

Process Control through latest technology
Die Casting Technology in use

Tool Design and Engineering

**CAD SYSTEM**

<table>
<thead>
<tr>
<th>3D CAD SYSTEMS</th>
<th>2D CAD SYSTEMS</th>
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<tbody>
<tr>
<td>UNIGRAPHICS NX</td>
<td>AUTOCAD</td>
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<tr>
<td>SDRC NX I-DEAS</td>
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<tr>
<td>AUTOCAD INVENTOR</td>
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<td>PRO-E</td>
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<td>CATIA</td>
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**COMPUTER SIMULATION**

- PROCAST FLOW and SOLIDIFICATION
- MAGMA FLOW ANALYSIS
- MAGMA SOLIDIFICATION ANALYSIS
- FEA ANALYSIS: I-DEAS, ANSYS and NASTRAN
**Die Casting Technology in use**

<table>
<thead>
<tr>
<th><strong>UPGRADATION</strong></th>
<th><strong>AUTOMATION</strong></th>
<th><strong>ENHANCEMENT</strong></th>
<th><strong>QUALITY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Die Casting Units invested adequately in modern machines and equipment with latest technologies.</td>
<td>High degree of automation of machines for production, inspection, material handling and traceability.</td>
<td>Enhanced manufacturing capacity. Capability to meet customer’s requirements well established.</td>
<td>Quality Management Systems in place, duly certified by International Agencies.</td>
</tr>
</tbody>
</table>
The automobile and electrical industry in India consumes 70% of die cast Aluminium parts.

The recent past has seen the birth of many alternate sources of power to propel vehicles.

Most of these involve disruptive technologies and are in a nascent stage.

The future will demand lighter materials as compared to Steel & Cast Iron to compensate for the additional weight of lithium ion batteries.

Thus increasing the percentage of use of Aluminum and other composite materials.

The future is still unclear on the way forward, if it is electric or hybrid and this will significantly change the dynamics of the Aluminum High Pressure Die Casting Industry.
AGGREGATE TURNOVER* (USD Billion)

CAGR 12.08%

- The Auto Components sector has recorded robust growth over the years.
- Exports will account for as much as 26% of the market by 2021.
- The auto-component industry accounts for almost 7% of India’s GDP and Employs as many as 19 million people.
- Global companies are now looking at India for Components & Part Designing.
- Almost all major Auto Companies have made India as their Design and backend Engineering works.

Source: ACMA, TechSci Research
Notes: CAGR - Compound Annual Growth Rate
Turnover data covers supplies to OEMs, aftermarket sales and exports.
E - Estimates
FUTURE OF DIE CASTING IN INDIA

Robust Macro-Economic Indicators

- Fiscal Deficit down to 2.6%
- 7% GDP growth Rate is expected
- Forex Reserves up to 400 Bn USD
- Inflation down to 3%
GROWTH OF AUTOMOBILE INDUSTRY

Auto Industry growing consistently

- 2016-2017: 218 Lakh units
- 2015-2016: 204 Lakh units
- 2014-2015: 197 Lakh units
- 2013-2014: 184 Lakh units
- 2012-2013: 179 Lakh units
- 2011-2012: 173 Lakh units

SIAM Data
CONCLUDING REMARKS

- Small scale single machine manufacturer to large scale multi-machine manufacturer.

- Indian players have matured to International levels in terms of process, quality, systems & management.

- Global OEM’s are now looking at India as a manufacturing hub especially for small compact cars.

- Have developed in-house capability to design and manufacture dies for complex parts also.
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ALUMINIUM CASTERS ASSOCIATION OF INDIA (ALUCAST)

- An Industry association and largest registered body representing Aluminium Die Casters in India.
- An interactive forum to acquire knowledge and expertise in die casting technologies.
- All activities channelizes towards creating programs where knowledge sharing is an integral part.
- Organizes training courses, workshops and seminars.
- Organizes every year national and international conferences and exhibitions.
- Collaboration with Nuremberg Messe for the International Events.
# ALUMINIUM CASTERS ASSOCIATION OF INDIA (ALUCAST)

## ALUCAST 2018

UPCOMING INTERNATIONAL CONFERENCE AND EXHIBITION

<table>
<thead>
<tr>
<th>VENUE</th>
<th>India Expo Mart (IEML), Greater Noida, Delhi-NCR, India</th>
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<tbody>
<tr>
<td>Dates</td>
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<tr>
<td>Theme</td>
<td>Emerging Trends in Aluminium Casting Technology</td>
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<tr>
<td>Conference</td>
<td>Technical Papers, Product Presentations and Panel Discussions</td>
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<tr>
<td>Exhibitors</td>
<td>150 (National and International)</td>
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<tr>
<td>Visitors Expected</td>
<td>3500+</td>
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Thank You!