

LOOK BEYOND THE CYCLE... TRANSFORMATION CONTINUES

**ANALYST MEET
OCTOBER 2019**

BHARAT FORGE



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STRATEGIC BUSINESS UPDATE

Trends

- Structural shifts in Automobile Industry: Light weighting, EV, emission norms
- Govt's e-Mobility Drive : FAME II.
- Shared Mobility

Strategy

- Support Lightweighting & e-Mobility
- Accelerate progress of technology players rather than big investments
- Increase in Content/vehicle for BFL

BFL investments

- Focus to remain frugal
- To establish vertically integrated companies leading to significant cost advantages
- Improve speed to market capabilities

E-Mobility

DC-DC Converters
 Controllers & Inverters
 Chargers
 VCUs
 BMS
 E- Motors
 Telematics

CLWT

Structural Parts
 Sub-Assemblies
 E-Mobility Systems
 Industrial Components

Transmissions

Components
 Sub-systems
 Complete Systems for EV

Nanotechnology

Waste to wealth
 Ceramics and others
 Nano for batteries

BFL COMPONENTS DIVISION

- Supply to inter companies (Tork, Tevva Motors)
- Supply to global OEMs
- LCC advantage
- Strong Technology Partner support



Al/Mg on same machine
 Thin walled upto 1mm
 Vacuum casting & Jet cooling

Lower Noise/Vibration
 Lower Pitting
 Improved Fatigue Life

In-house innovation and development @ KCTI/Nanotechnology Lab

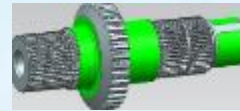
TECHNOLOGY PARTNERS/ADVANTAGES

Our Offerings

Product Lines

Specification Range

Transmission



Drivetrain Components

Integrated system for hybrid Vehicles

1. Pitting Life Improvement
2. Noise Reduction
3. Hybrid Vehicle System

Light Weighting



EV Components Cover

Structural Components

Hydroforming

1. Chassis light weighting through Al/Mg castings, carbon composites

EV Sub-systems



Power Electronics

Traction Motors

Controller Systems

1. E-Motors from 4kW-200kW
2. Inverter-Converter from 3kW-250kW

EV Powertrain for CV



Modular EV Powertrain for commercial vehicles

1. Modular pancake motor & battery
2. System Voltage from 300V

Transmission : Overview of BFL Transmissions Facility, Chakan



Plant @ Mambattu



Machines





EV POWERTRAIN

Tork Motors

- Electric Two Wheelers
- Electric Three Wheelers

Tevva Motors

- Phase I - Electrification of 7T-14T buses and trucks both for intra & inter city applications
- Phase II - Electrification of 14T and above buses and trucks for both intra & inter city applications

- Tevva motors provides complete electric powertrain solutions for Commercial Vehicles & Buses in the 7.5T to 14T category
- Tevva works with major OEMs and logistics providers to build clean freight solutions as well as a compelling business case that offers a substantially lower TCO
- Modular core system that is scalable based on the requirements of OEMs with fully autonomous and patented On-Board Charger technology



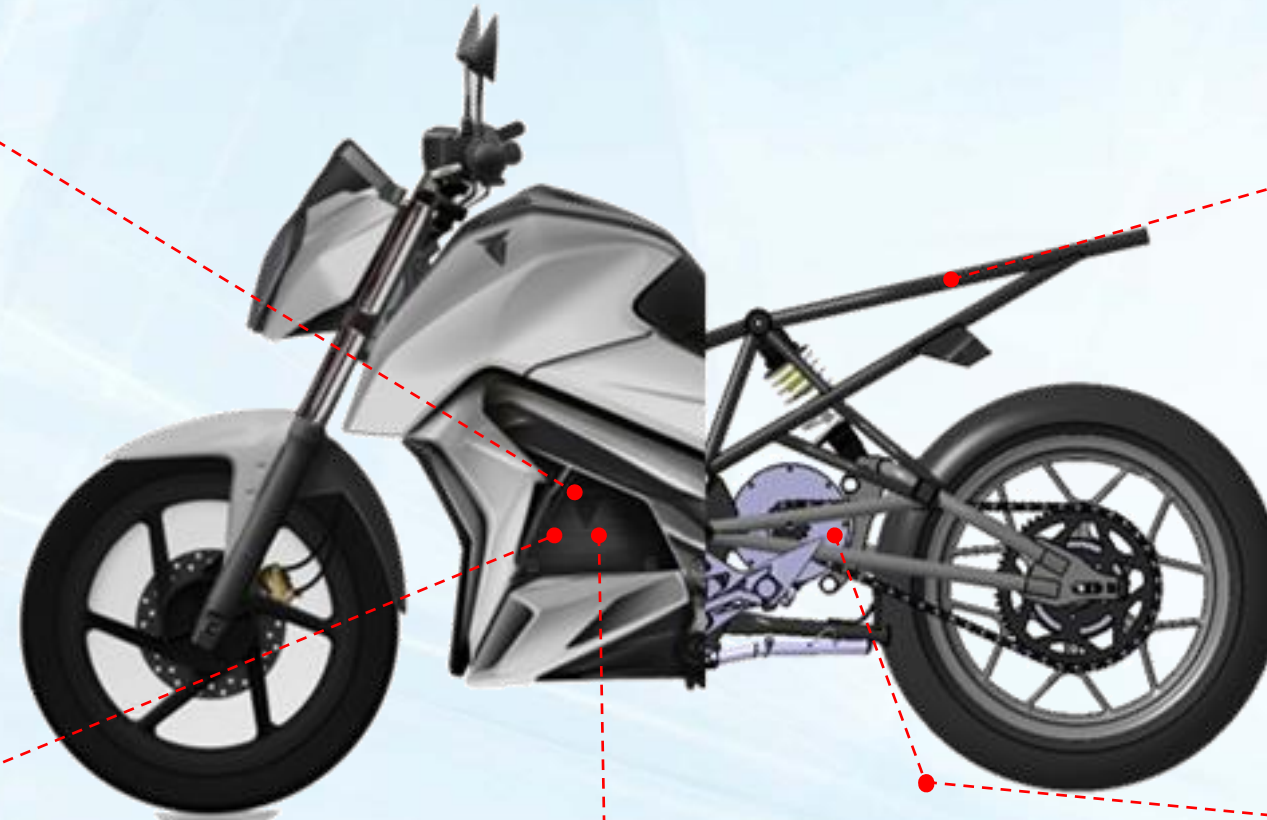
Battery Management Systems

- In house Built Battery Management System
- Cost competitive BMS



Frame

- The frame is a platform which can be used for future versions of motorcycle
- Ultra light weight



Battery Packs

- Compact Design resulting in weight reduction
- Proprietary design with patents for battery packaging and placement

Communication Technology

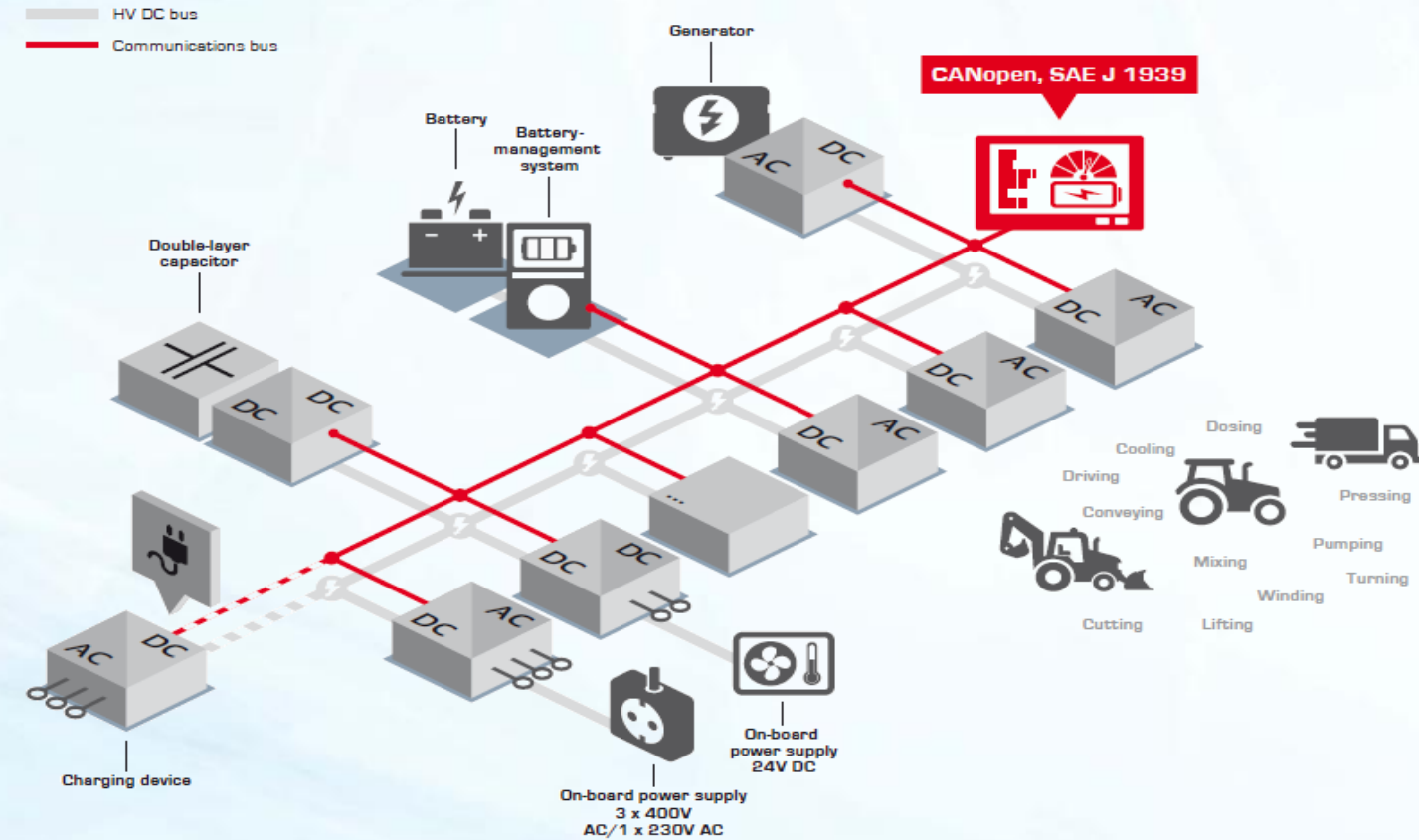
- Built on **TIROS** which enables predictive maintenance, connecting to nearby charging point

Motors

- Efficiency > 90%
- Designed by Tork motors

Catalogue range of products for complete electrification system

- Entire Powerelectronics product portfolio including Inverters, DC-DC Converter, OBC, BMS.
- Products will cater to requirements of Tork and Tevva motors
- Product localization in India to support Indian OEMs and export to Refu and Tevva
- Customisation for high volume application
- Development according to automotive standard ISO 26262
- Caters to hybrid and fully electric vehicle applications



Product Lines

Inverters &
DC –DC
Converters

On-board
Controllers

On-grid
battery
systems

On-board
and Inductive
chargers

Battery
Management
system

Main power
units &
APUs for EV

Products



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KALYANI

BUSINESS UPDATE

Global CV

Current Environment:

- ❑ US: Cl. 7-8 “peaked” in Y 2018 – 19 (330k). “Normal (250k-270k)” levels forecasted in Y 2020-21.
- ❑ EU: Heavy Truck likely within +0 /-10% YOY.
- ❑ Brazil growing. China slowing.
- ❑ IC Engines – MD & HD: will stay: little / low perceived risk
- ❑ Light-weighting= Key Technology Trend
- ❑ Emergence of e-mobility in last mile delivery/public transport

Bharat Forge Actions:

- Aiming for growth using leverage of strong relationship with current customers.
- Sharp focus on VAVE initiatives.
- Aiming to increase content per vehicle with OEMs. Light-Weighting-current products with better technology and new products including via HPDC / allied process.
- Intensify NPI globally – current and new customers, with aggressive technology driven solutions.
- EV Engagement being pursued.
- M&A Opportunities: Supplier delinquencies expected – Opportunity for BFL

India CV

Current Environment

- ❑ Significant MHCV decline YOY basis– any recovery unlikely prior to H2 2020.
- ❑ BS 6 Introduction- Some Challenges but also presents opportunities for growth.
- ❑ Light-weighting= Key Technology Trend – will come in post BS 6 introduction.
- ❑ Emergence of e-mobility in last mile delivery/public transport
- ❑ No medium / long term threat for IC Engines- expect significant upgrades to global standards

Bharat Forge Actions:

- Sharp focus on VAVE initiatives
- Focus on opportunities with vehicle level value proposition – for drivelines, transmissions, emission / after treatment... Engagement for Light Weighting including via HPDC.
- Current OEM solutions BS6 compliance has high dependence on imports. BFL working to present new products and improved value proposition for OEMS'. Strong focus on increasing content per vehicle.
- Intensify NPI – current and new customers, with aggressive technology driven solutions. BFL is the only Indian supplier with long-standing experience from Euro 1-6 product evolution. EV Engagement will be pursued.
- Most Indian Suppliers are highly leveraged- sustainability challenges expected – Opportunity for BFL.

PV India & Global

Current Environment:

- ❑ US: Y 2020 demand likely at normal levels- range between 16.8-17 MLN. Product migration underway from sedans to larger cross-overs & SUVs'.
- ❑ EU: likely de-growth by 8-10%, premium cars forecasted stable.
- ❑ Brazil growth forecasted.
- ❑ De-growth in India (-30%) & China (-13%)
- ❑ E-mobility – becoming high focus area.
- ❑ Light-weighting: Significant Technology Requirement.

Bharat Forge Actions:

- Focus on added-value – supply of forged steel & finish machined products- globally. Good progress with global OEMS'.
- Significant global traction for forged aluminum chassis components made with our self-developed world-class aluminum forging technology. Plants in Germany running at capacity and further expansion underway. Expansion also planned in USA.
- NPI - State-of-Art light-weighting capabilities set-up in Nellore – for HPDC & allied technologies. Will support wide range of products including transition to EV business.
- NPI - Foray into global transmission & driveline products.
- Engaged with Indian & Global OEMS incl. all new entrants.

Agri. Segment : India

Current Environment

- ❑ Good growth over the last 5 years and sector has a robust long-term outlook.
- ❑ Tier-4 Emission norms will apply from H2 2020.
- ❑ 30-50 will remain mass market range, however, higher HP will be introduced progressively, including for global markets from India.
- ❑ Foreign players in India would likely increase content in India for global use.

Bharat Forge Actions:

- Focus on Tier 4 opportunities to grow share of business. BFL has supported introduction of such products for its global customers several years ago.
- Introduction of new products- driveline, transmissions etc. Aim to increase content per tractor.
- Use local product engagement with global OEMS in India for enlarging global engagement.
- Intensify NPI globally – current and new customers, with aggressive technology driven solutions.
- Most Indian Suppliers are highly leveraged- sustainability challenges expected.

Oil & Gas

- In Y 2017 & Y 2018 witnessed strong growth in this segment driven by fracing boom in US. Overall, outlook global demand for oil in Y 2020 is likely to be subdued.
- Y 2019 and Y 2020 are forecasted to have subdued demand for frac products due to increased operating efficiency of frac operations.
- Over the last 10 years, we have developed strong alignment with OEMS' backed up by technology & production efficiency. We have cemented our position as Partner-of-Choice with our core customers.
- We have co-developed new products and acquired new customers. As such, we will continue to grow our presence in O&G space.
- Short to medium term actions will include re-commencement of subsea & surface product engagement with global OEMS's. BFL is fully capable to support this segment with current capability & capacity.

Railways - India

- Growth foray in Railway business was strategized in Y 2013-14. Business with Indian Railways, eventually to also support 'Make in India' was the cornerstone of this growth strategy.
- Till this time, all critical components were imported.
- In a very short span of 2 years, BFL developed and homologated the following products – also, first time right – leading to high potential for significant local content.
 - Finish Machined Crankshafts for 3500 and 4500 HP locomotives.
 - Turbo-charger rotor assembly for 4500 HP locomotives ... with increased efficiency
 - Finished Connecting Rods including carrier assembly
 - Other Structural Parts for 4500 HP engine.
- We are shipping products to Indian Railways

Railways - Global

- Addressing global opportunities for:
 - Finish Machined Crankshafts for 3000 - 5500 HP locomotives – including for latest Tier 4 emission compliance.
 - Connecting Rods.
 - Turbo-charger rotor assembly
 - Other Structural Parts for 4500 HP engine.
- Good traction seen – already executing Contracts with 2 global OEMS’.
- 2 additional major global OEMS’ engagement in advanced stages.

Aerospace

Current Status

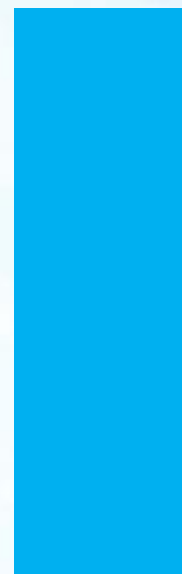
- ❑ AS 9100, NADCAP & OEM certified process & Operations. Robust production process in place
- ❑ Strong capability established for Titanium forgings – for engine fan blades – stationary & rotating, shafts & structural components. Additionally, structural parts and landing gear parts in steel.
- ❑ Strong capability established for machining of highly complex fan blades with a major Global OEM.
- ❑ Precision machining capabilities established for difficult products like Mg castings.

Positives:

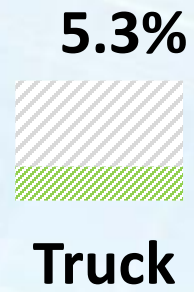
- Strong foundation in Manufacturing & Quality systems in BFL plants to support global growth.
- Good relationships established with major global OEMS'. This will help BFL leverage growth opportunities.
- Several performance awards received over the last 2 years.
- Strong foundation created to qualify for and help BFL address component & product opportunities with HAL.
- Strong manufacturing base & capability for Kalyani Group to bid for “Make in India” localization projects for Defense Aerospace opportunities.

Exports – Growth Roadmap

**Projected
CAGR**



FY 18-19



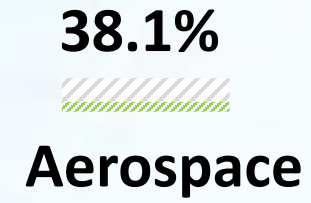
Truck



Pass Car



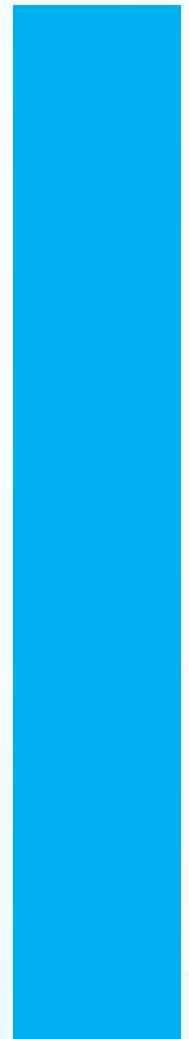
Industrial



Aerospace

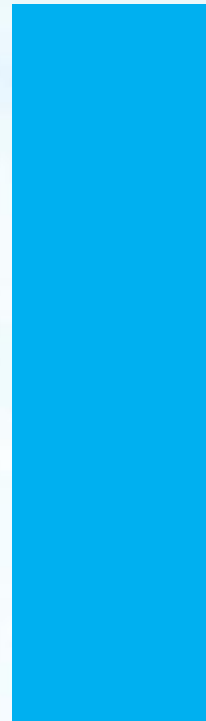


Loco



FY 24-25

**Projected
CAGR**

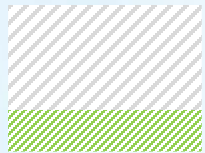


FY 18-19

3%
Truck



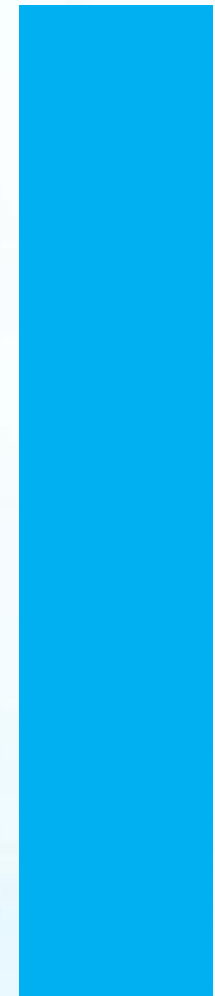
15.1%
Pass Car



7.6%
Agri



39.8%
Aero



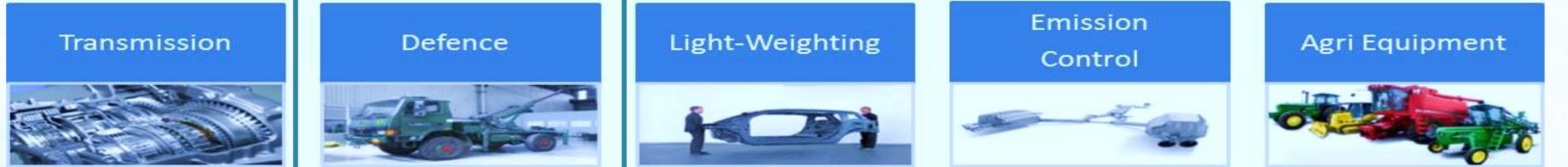
FY 24-25 23

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DEFENCE BUSINESS UPDATE

Journey of BFL Business Transformation



Environment

➤ Favorable change

- Defence Production Policy 2018
- Strategic Partnership Model
- Make II: Suo Moto Proposal
- Thrust on Defence under Make in India and Defence Exports



Leveraging New Technologies

- Organic Technological Developments:
 - KCTI Pune: UGV, RCWS, UAV, Microwave and Radars
 - KCTI Hyderabad: Ku Band RF Seeker, Through Wall Scanners
 - KCTI Bangalore: Jet Propulsion Technologies
- Inorganic Technological Developments (Strategic Investments):
 - Aeron Systems: Guidance Kits and Autonomous Systems
 - Eternus: Composite Materials and Structures
- Inorganic Technological Developments (Acquisitions):
 - KPIT Defence: Embedded and Control Systems
 - ACIL: Defence Electronics and Controls Systems

Growth Strategy

- Organic Revenue Growth
 - Organic Projects / Program based
- Indigenous Development
 - Make I and II programs
 - Problem Statements
 - TDF-DRDO Projects
- Large Programs
- Valuable Opportunities

Product Overview | Defence & Aerospace

ARTILLERY SYSTEMS



Bharat 52 (155 mm)



ATAGS

ARMoured VEHICLES



Mobility Solutions



Fire Power Solutions



Components

TRANSMISSION



JET ENGINE



JET ENGINE COMPONENTS



BLADES



IMPELLER

BLISKS

DISC

AIR DEFENCE



Close-in Weapon Systems (CIWS)

PROTECTED VEHICLES



Armoured Personnel Carrier



Light Specialist Vehicle



Armoured Troop Carrier



Light Bullet Proof Vehicle

DEF ELECTRONICS



ECARS



DTMD

STRUCTURAL



FLAP TRACK



Trailing Arm

LANDING GEAR

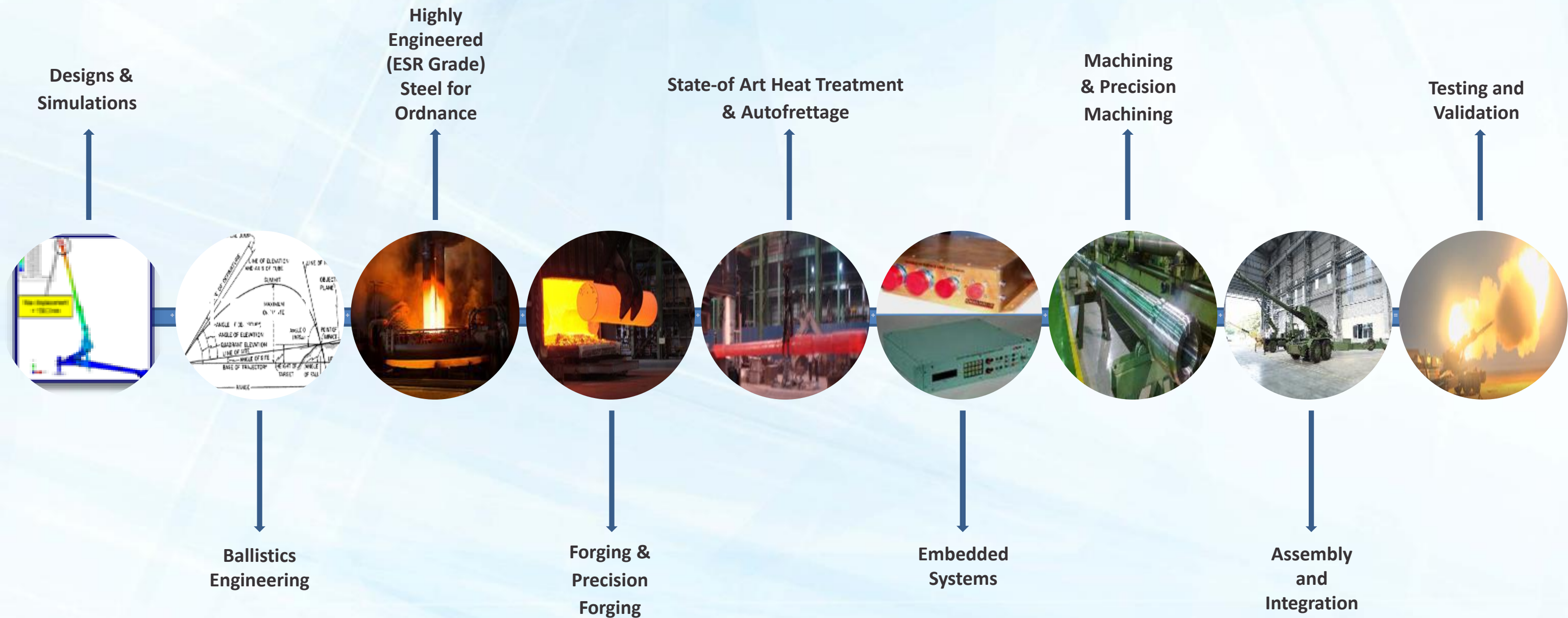


FIXED WING

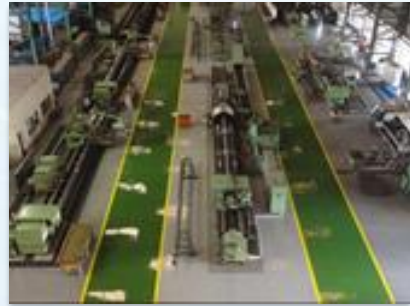


ROTARY WING

All solutions under one roof for Artillery Guns



Our Journey



Acquisition of RUAG Barrel Machining Plant
Feb 2011

BHARAT-52 Development started
Feb 2012



BHARAT-52 Developed
Aug 2013

ATAGS Barrel Production started
Feb 2014

ATAGS Barrel Supplies commences
Dec 2014



BHARAT-45 Developed
Dec 2016

ULH Development commences
Jan, 2016



ATAGS displayed in RD parade
Jan 2017

Acquisition of Gun Facility in UK
Jul 2017



ATAGS Pokhran Trials
Nov, 2017



ATAGS Firing Trials
Apr 2019



ULH Firing
June, 2018



June 2012
Commissioning of Plant & First Barrel Manufactured



Sep 2014
ATAGS Development commences



GARUDA 105 Firing
Nov 2016

Dec 2016
ATAGS Firing Trials commences

Jan 2018
ATAGS Winter Firing Trials



Jun 2019
ATAGS Firing Trials

Dec 2014
GARUDA-105 Developed



Bharat 52 Firing (CPE Itarsi)



Oct-Nov 2018
ATAGS Ballistic, Accuracy & Consistency Trials



Bharat 52

Advanced Towed Artillery Gun System (TAGS)

- 155mm/52 Caliber Gun System
- Firing Range 41 km+
- Steer-by-wire mechanism to turn and drive the weapon system
- Self-propelled capability with a speed of 20 kmph
- Total Weight: 15 Tonnes

SUCCESSFULLY TEST FIRED



Indigenously Designed Developed and Manufactured (IDDM)

Bharat 52

**Advanced Towed
Artillery Gun System
(ATAGS)**

- 155mm/52 Caliber Gun System
- Achieved longest firing range of 48.074 km (HE-ERFB BB) & 38.569 kms (HE- ERFB BT) in the 155mm family
- Zero backlash Electrical drives: Hydro-electric gun system
- System has ability to fire zone 7 charge
- Burst Range of fire: 6 rounds in 30 sec

SUCCESSFULLY TEST FIRED



Ultra Light Strike Vehicle

2015



Successfully Tested
by Indian Army

Unique solution to multiply the futuristic combat operational capabilities of Para Special Forces

Payload of 750 kg with power-to-weight ratio of > 30 kW/ton

Light in weight with excellent off-road capability

Suitably fitted with twin weapon mounts for GPMG & ATGM

Light Specialist Vehicle (STANAG 4569)

2017



Successfully Field & BET Trials
by Indian Army

Unique blend of BFL Engineering and Armoring capabilities designed on most successful HMMWV platform for Indian & Global forces

Designed to carry a crew of (4+2+2) soldiers along with combat load

Payload of 1000 kg with power-to-weight ratio of > 25 kW/ton

360° Rotating Armored turret & modular weapon mounts

Armoured Personnel Carrier Class II (STANAG 4569)

2018



Successfully Tested & delivered
to Indian Army & SL

Designed and built to operate in Mine blast and rough terrain areas

Powered with 280 HP Diesel Engine

Blast Protection: 14 kg TNT under Hull, 21 kg TNT under wheels

Best in its class of 4x4 with Kerb weight of 10-11.5 ton

Payload capacity of 2 ton

360° Rotating Armored Turret with modular weapon mounts

Armoured Troop Carrier (STANAG 4569)

2018



Tested and Delivered to
SL MOD

Designed and built to provide Logistic movements of troops in Peace-keeping missions and forward areas

Powered with 280 HP diesel engine

Capable to carry 12 to 14 crew members with large cargo

Blast protection against 6 kg TNT blast

360° Rotating Armored Turret with modular weapon mounts

Light Bullet Proof Vehicle

2019



Under Trials by Indian
Army

Designed and built for Rashtriya Rifles Ops

Powered with 185 HP diesel engine

Capable to carry 2 + 4 crew members with large cargo

Blast protection: STANAG Level 1

360 Rotating Armored Turret with Modular Weapons Mounts

Payload of 1200 kg with Power to Weight ratio > 30 kW/ton

ECARS

- **Specifications:**
 - Speed: up to 20Kmph (manual drive), up to 10-15 Kmph (autonomous missions)
 - Climbing capability: 45° slope (Max)
 - Operation: up to 48 hours continuous (battery + generator), up to 6hrs continuous (silent mode)
 - Easy to control, Economical & Low Maintenance
 - Multi-functional platform for a 350kg of payload.
 - Optimized chassis structure and precise maneuverable steering capabilities



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OVERSEAS SUBSIDIARIES UPDATE

BFL – Overseas subsidiaries

- In 2004, BFL started its Global acquisition strategy by acquiring companies in EU, US, China
- BFL has Global footprint of its operations:
 - EU:
 - Germany: 3 manufacturing units
 - Sweden: 1 manufacturing unit
 - France: 1 machining unit
 - US: 1 manufacturing unit
 - FY 2019 performance: Revenue US\$ 462 mn, EBITDA US\$ 30 mn (6.6%)

BFL – Overseas subsidiaries

- All subsidiaries cater to marquee customers in CV, PV and non-auto industries
- Currently 85% of revenues are generated from Steel components; bal from Aluminum components
- With shift of OEMs to light weighting of vehicles, focus is now on aluminum growth
- Leveraging our in-house expertise of Aluminum forgings, BFL plans to grow this with planned expansion across different units

BFL – Overseas subsidiaries – Steel Business

- Improvement strategy:
 - Improved product mix with focus on higher margin products
 - Manpower cost optimization – driven by automation/technology
 - Fixed cost reduction
 - Reduction of overall BEP of all companies

BF AT – Aluminum Growth Story

Background

- In 2004, BFL acquired CDP Aluminumtechnik (now Bharat Forge Aluminumtechnik)
- Cost of acquisition: Euro 6.3 million
- Status in 2005:
 - PV focus - aluminum forged chassis components
 - Product portfolio: Lower control arms, Front control arms, 2 point arms, knuckles
 - Operating with 2 forging presses
 - Marquee PV Customers
 - Annual t/o Eur 24 mln, with EBITDA Eur 3.2 mln

BF AT – Growth story

- Milestones:

Implementation of HCM:

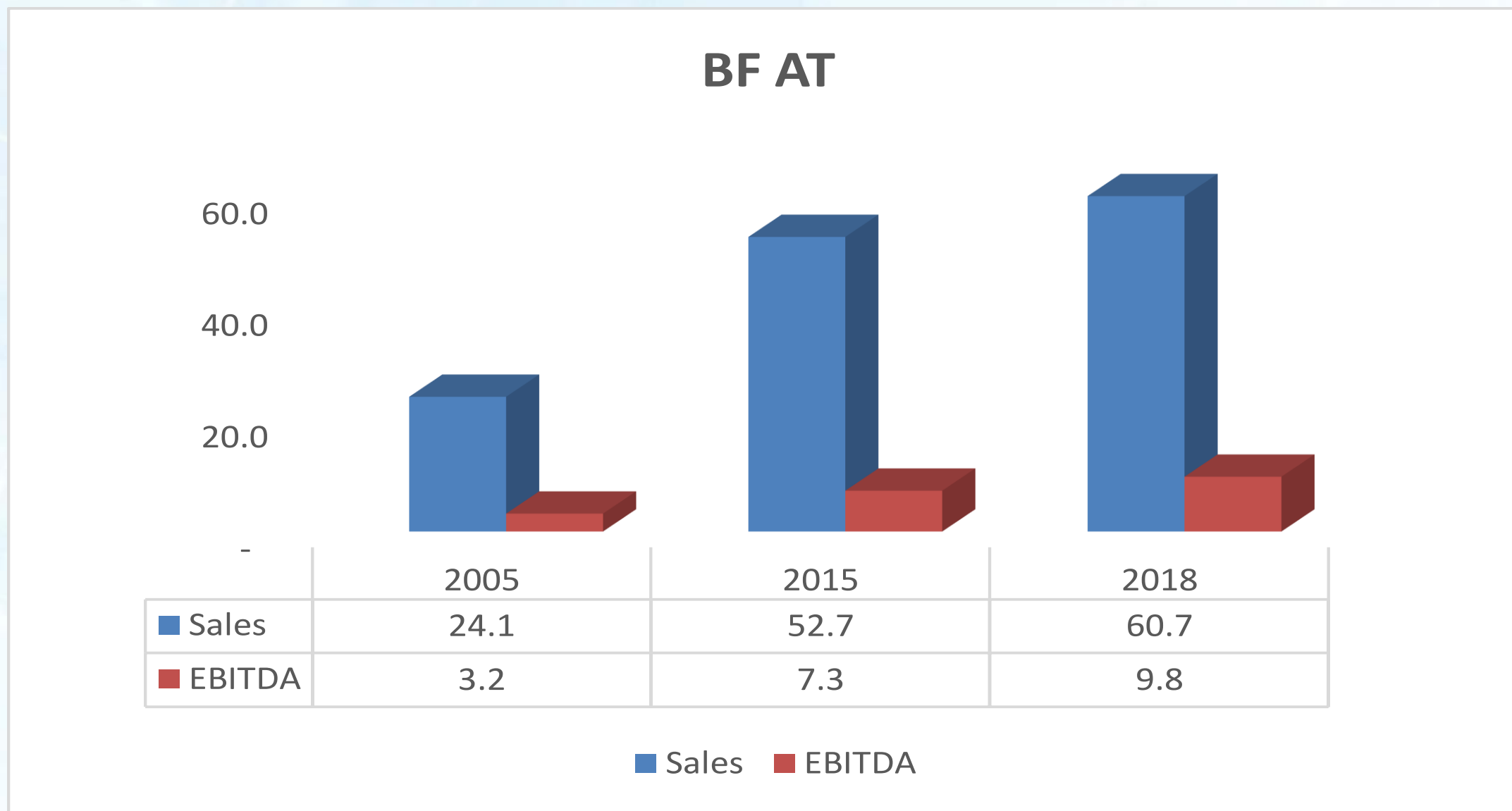
- In 2013, BF AT implemented HCM technology to convert raw aluminum into casted billets which are used for forging
- One of the very few companies which have successfully industrialized this technology with high productivity performance

Expansion – new press line:

- BF AT added new fully automated press line in 2014/15 timeframe with annual capacity of 1.5 mln pcs with capex of Eur 30 mln (BFL invested only Eur 3 mln for this project)
- In 2014, German OEM signed Eur 250 mln multiyear contract with BF AT which is being catered through newly added press line

BF AT Performance

(€ Million)



Aluminum strategy

- Currently aluminum component business is approx. 15% of total turnover of overseas subsidiaries
- BFL group has undertaken expansion of aluminum business in different entities:
 - BF AT: 4th press line dedicated for aluminum business (SOP: 2020)
 - CDP: Conversion of 1 press line from steel to aluminum (SOP: 2020)
 - US: Invest in first aluminum line to cater US/German OEMs (SOP: 2021)
- With this expansion in place, aluminum will contribute approx. 40-45% of revenue of overseas subsidiaries (2024)

Key Messages

- Focus on margin improvement in existing business with specific actions
- Aluminum growth plan to strengthen group's position in PV component market across EU & US
- Sustainable target of double digit EBITDA in overseas subsidiaries

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FUTURE OUTLOOK

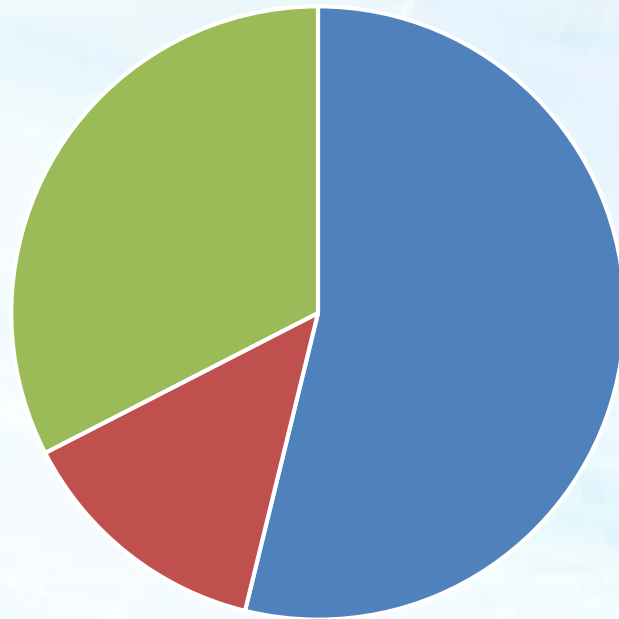
- Reduced dependence on Auto sector
- Diversified Industrials business across geographies

- Strong growth in Export Industrials and Passenger Vehicles

- New initiatives spread over
 - CLWT
 - Transmissions
 - Defence
 - E-mobility
 - Turbochargers / BS 6
- Will provide increased de-risking in all the major business



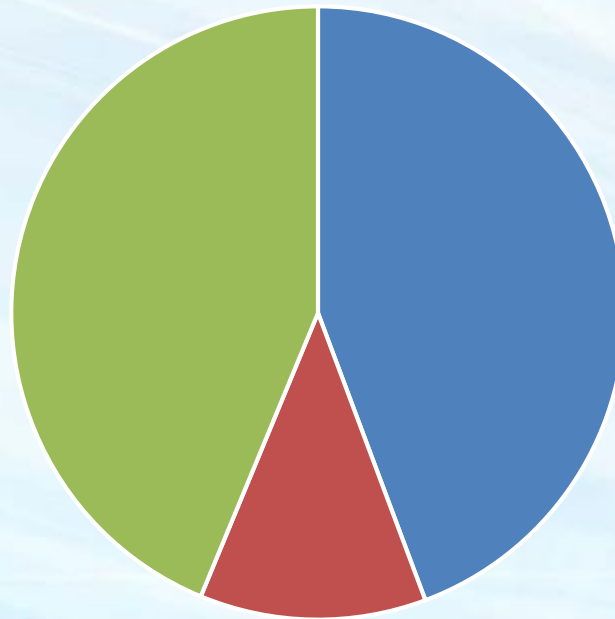
FY 2009



Revenues

FY 2009 : INR 2,059 crores

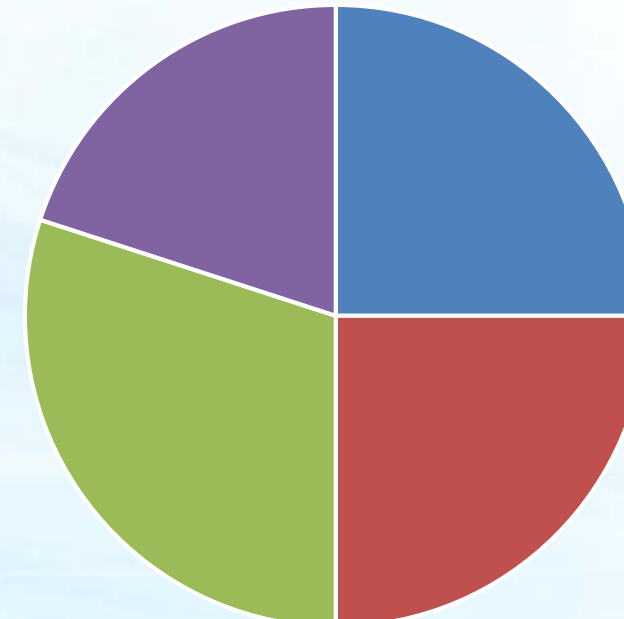
FY 2019



Revenues

FY 2019 : INR 6,520 crores

FY 20XX



Revenues

FY 20XX : INR XX,000 crores

- Commercial Vehicles
- Passenger Vehicles
- Industrials
- New Initiatives

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Thank You