

 CK BIRLA GROUP

AVTEC[®]

Auto
Component



About AVTEC



About Components BU

Components BU is in the manufacturing of high precision automotive components which includes components for engines, driveline and powertrain. We have the capabilities of producing a range of gears for capturing entire On-highway, Off-highway and Railway applications. Our in-house heat treatment facilities adds to our advantage in providing a one stop solution to our customers. We have always kept on expanding our catalogue range to match the industry's pace in meeting the emerging demand. With over three decades of demonstrated manufacturing, one can always be sure of our commitment to precision & quality.

AVTEC is one of the largest independent manufacturers of powertrain and precision-engineered products in India. It is a part of CK Birla Group – a leading global business house, with over 20,000 employees and a combined turnover of USD 1.8 billion.

With years of experience in manufacturing, AVTEC delivers competency across the entire value chain of design & manufacture of engines; transmissions and high precision components like cylinder heads, cylinder blocks, crank shafts, cam shafts, cam rods and transmission gears for Automotive, Off-Highway, Defence, Agriculture and Railway industry, in areas of both proprietary products and contract manufacturing.

The company serves some of the best-known domestic and global Automotive and Off-Highway companies, including global OEMs such as Allison, BEML, Caterpillar, Daimler, Ford, General Motors, Renault-Nissan, Tata-Jaguar and several other established brands.

AVTEC's domestic units comprise of an in-house tech centre in Hosur, R&D facilities in Hosur and Pithampur, and state-of-the-art manufacturing facilities in Hosur, Chennai, and Pithampur. MEPZ, Chennai plant is a completely export oriented unit equipped with modern casting and forging machines to meet expanding global demand of heavy duty transmission components for the Off-Highway industry. All the facilities are TS 16949 and QS 14001 certified and are equipped with high-tech machinery, and manned by experienced personnel.

With its global R&D and manufacturing footprint which includes face gear and innovative drive systems through the Switzerland-based subsidiary ASSAG, AVTEC aspires to reinforce its commitment to customers as a 'one-stop-shop' for Powertrain and Precision Engineered Products, across the globe.

Gear & Family

Description:

A gear is a rotating machine part having cut like teeth which mesh with another toothed part to transmit torque. Transmission uses gears to provide speed and torque conversions from a rotating power source to another device.

Technical specifications of Gears is mentioned below:

Types	: Spur and Helical
Products	: Crown gear, gear sec., sun gear & pinion gear
Module Range	: 1 - 4 & upto 7
Diameter Range	: 30 - 260 mm & upto 500
Type of Finishing	: Shaving, Gear grinding
Class	: DIN 8 - shaving; DIN 6 - gear grinding with bias control
Gear ID	: Plain Bore/ Spline Bore
Material	: Alloy steel (Domestic & International specifications)
Operations	: CNC - Turning, Broaching, Hobbing, Shaping, Tooth chamfering, ID & OD grinding, Gear grinding
Machines	: Liebherr, Gleason, Kanzaki, Mori Seiki, Reishauer

We successfully maintain the following capabilities

Gear Grinding capabilities:

- DIN 6 accuracy
- Twist within 15 micron & +/- 5 micron with the addition of latest software's

Hobbing capabilities:

- Automated 24/7 operation with DIN 8 accuracy

Hard turning capabilities:

- 58-62 HRC gears within +/- 0.006 mm Cp/Cpk > 1.33

Heat treatment:

- Case Carburising
- Gas Nitriding
- Carbo Nitriding



We also have a gear roll testing facility and an in-house shot blasting and shot peening facility to improve the gear strength as per customer requirements.

Application: Gears find application in Automotive and Off-Highway transmissions

Shafts & Hollow Shafts

Description:

Shafts are mechanical components for transmitting torque and rotation and are usually used to connect with other components. In transmission, shaft carries the input power into and out of the gearbox.

Technical specifications of shaft & shaft assemblies profile ranges are mentioned below:

Type	: Rolled Splines (Solid & Hollow) with Gear Teeth
Products	: Cluster Gear Shafts, Hollow Shafts & Shafts with Synchro Cones, Pinion assemblies, Input & output shafts
Module Range	: 0.5 - 1.5 (Rolled Spline) & Upto 4 (Gears)
Length	: 50 - 400 mm (Hobbing/ Shaping): 50 - 600 mm (Spline Rolling)
Type of Finishing	: Hobbing, Shaping, Shaving and Grinding
Material	: Alloy steel (Domestic & International specifications)
Operations OD grinding	: CNC - Turning, spline rolling, Hobbing, Shaping, Shaving, Tooth chamfering, gun drilling, OD grinding, super finishing, Gear grinding
Machines Tsugami	: MAG, Escofier, Liebherr, Gleason, Kanzaki, Reishauer, Tsugami

Gear Grinding capabilities:

- DIN 7 accuracy
- Twist within 15 micron & +/- 5 micron with the addition of latest software

Hobbing capabilities:

- Automated 24/7 operation with
- DIN 8 accuracy

OD Turning/Hard turning capabilities:

- 58-62 HRC gears within +/- 0.006 mm
- OD Turning (+/- 0.004 mm) & Hard turning (+/- 0.006 mm) Cp/Cpk > 1.33

Heat treatment:

- Case Carburising
- Gas Nitriding



Some of the critical processes that add superior value to our value chain are in-house nitriding, case carburizing, through hardening and induction hardening.

Application: Shafts find application in Automotive and Off-highway transmissions.

Ring Gear

Description about Internal Gear & Ring Gear:

Internal gear has its teeth cut in the internal surface of a cylinder and meshes with spur gears. Its most common use is the planetary, where an internal gear engages with planet gears. These gears are massively used in the automotive gearboxes where compactness is critical.

Ring gears are gears of large diameter whose primary function is to transfer torque to and from the smaller pinion/planetary gears. Depending on the applications, ring gear can have teeth cut on inner or outer surface.

Technical specifications of internal gear and ring gear are mentioned below:

Module Range	: 1 - 7
Diameter Range	: Upto 600 mm (External) : 100 - 500 mm (Internal)
Height	: upto 150 mm (ring gears)
Material	: Alloy steel (Domestic & International specifications)
Operations	: Turning, Broaching, Hobbing & Shaping
Heat Treatment	: Through hardening, Nitriding, Nitro carburizing
Machines	: Mori Seki, Crane bell, Gleason, Liebherr

Some of the critical parameters that help us stand out in the industry are:

- Deep shaping operation
- DIN 8 accuracy after heat treatment
- Specially developed Nitro carburizing process with all gas flow and temperature monitoring facility to achieve post heat treatment accuracies on gear parameters (DIN 8)



Application:

Internal gears are used in applications involving planetary gear drives and gear couplings. Similarly ring gears are used in the transmission and engines of Automotive as well as Off-highway applications.

Sleeves

Description about Sleeves:

Shift sleeve is one of the components in the synchronizer assembly. It connects/disconnects the main gears to the output shaft in a manual gearbox.

The main challenge in machining shift sleeves is usually to obtain good process security to allow for high productivity and tight tolerances. Our manufacturing & capability range for sleeves fit across the industry and currently we are supplying sleeves to many domestic and global players.

Technical specification of sleeves is mentioned below:

ID range	: 110 mm Max.
Types	: Shifter sleeves
Material	: Alloy steel (Domestic & International specifications)
Operations	: CNC Turning, Broaching, Hobbing, Taper forming, Shifter stop milling & forming/ Tooth rounding & Tooth pointing Plug quenching
Heat Treatment	: Case Carburizing & Carbo Nitriding, Plug - quenching
Machines	: Liebherr, Profilator, PICCO, TAL

Our profilator line (from Germany) automates pointing, shifter stop milling and tooth grinding operations smoothly and effortlessly in turn providing us with benefits of cost, time, efficiency and quality over our competition.



Application:

Sleeves find application in Automotive transmissions / transaxles

Housings

Description about Housing:

It is a casing that surrounds the mechanical components of a gear box. It provides mechanical support for the moving components, a mechanical protection from the outside world for those internal components.

Technical specification of differential case and assembly is mentioned below:

Segment	: Off-highway & Oil Rig applications (Large)	Passenger Cars, SUVs (Automotive)
Material	: Cast Iron	Aluminium (HPDC & LPDC)
Range	: Weight up to 250 Kg, Turning range - 1500 mm, Prismatic Size - Parts with swing of 1500 mm on dia, Height - 1000 mm	Weight
Critical Processes	: Castings with complex cores (making castings with 23 cores), Part reference Qualification, Precision Turning, Precision Machining Center operations, Keyway milling, Pressure Testing.	HPDC/ CPDC casting, Precision Machining center operations, Pressure Testing.
Types	: Main housings, Converter housings, Retarder housings, Covers.	Main Housings, Front & Rear Housings & Covers.
Machines	: Main housings, Converter housings, Retarder housings, Covers.	HMCs (Mori Seiki, DMG, Hyundai, Makino), VMCs (Mori Seiki, Makino).



Application:

Housings find application in Automotive and Off-highway transmissions

Planetary Carrier

Description:

One of the highly complex and precision component that we manufacture is the planetary carrier & assemblies including sun & planet gears. The Planetary Carrier Assembly consists of Planetary carrier & Gears (Internal, sun and planetary/pinion gears).

The specifications of planetary carrier is mentioned below:

Diameter Range	: 100 - 450 mm
Height	: 100 - 400 mm
Material	: Ductile Cast iron, steel forging
Types	: Single deck/ Double deck construction Single piece, fastened design & Welded design, With shafts integrated
Operations	: Through Hardening, Precision Turning, Internal Broaching, Surface Broaching of pockets, Milling, precision fine boring, planetary gear seating pocket finishing, Grinding, Nitriding, hard part finishing, balancing
Machines	: Mori Seiki, Liebherr, Gleason, Makino, Special pocket finishing machines.

The specifications of gears range as below:

Parameters	Internal Gear	Sun & Planetary Gears
Module range	1.0-7.0	1.0-7.0
Diameter range	30-500 mm	50-630 mm (Ex), 80-500 mm (In)
Class	DIN 6 (Gear grinding)	DIN 6 (Gear grinding)

Some of the critical parameters, processes and equipment that add superior value to our carriers are:

- Maintaining critical position accuracies of 0.005 mm true position
- Heavy duty special purpose milling machines
- Side & face milling
- High precision VMC machines to maintain very tight true position requirements (0.005 mm)
- Controlled gas nitriding facility which helps in controlling gear parameters post heat treatment
- In-house Heat Treatment facility for nitriding, through hardening, nitro carburizing
- Special processes such as internal taper shaping



Application:

Carrier assemblies find application in Automotive and Off-highway transmissions

Differential Case & Assembly

Description:

Differential case and assemblies are amongst the latest product offerings from Component BU. It allows the outer drive wheel of a vehicle to rotate faster than the inner drive wheel during a turn. This is necessary when the vehicle turns, making the wheel that is traveling around the outside of the turning curve roll farther and faster than the other.

The complete assembly consists of the below sub-components:

Segment	: Passenger Cars
Material	: Ductile Cast Iron
Heat Treatment	: Normalizing, Iso -Thermal Annealing
Critical Processes	: Precision Turning, Mounting Holes Drilling & Tapping, Precision VMC of Pin Hole & Bore Honing
Machines	: LMW, Hwacheon, Precision VMC, Tsugami, Honing machine, Renishaw Equator (Inspection).

Successfully maintained critical quality requirements:

- Position of sphere - 0.08 mm
- Cross hole axis position - 0.05 mm
- Perpendicularity - 0.05 mm

We have always invested in developing our capabilities, for it is our DNA and these capabilities set us apart in the industry. Some of these capabilities are:

- Indigenously developed in-house tool design capability
- Full Sphere turning capability (360 degrees)



Application:

Differential cases and assemblies find application in Automotive and Off-highway industry.

Skid Steer Axle

Description:

Skid steer axle is one of our many solution offerings for off-highway sector. Our Skid steer axles are specialized induction hardened and precision machined. The spindle wheel is assembled to axle housing in our state of the art dedicated assembly lines, followed by in-house painting. They are serving trouble free at the toughest working environments for nearly over a decade.

The complete assembly consists of the below sub-components:

Major Sub-components	: Axle Housing, Axle Spindle, Bearings and Oil Seals.
Material	: Housing- Ductile Iron, Axle Spindle- Forged Alloy Steel
Heat Treatment & Surface Coating	: Through Hardening & Induction Hardening with complex profiles and varying case depth, PU Painting of assemblies.
Critical Processes	: Precision Turning, Precision Milling, Precision Grinding, Hobbing, Drilling & Tapping, Induction Hardening, Painting.
Machines	: Hyundai, LMW, Mori Seiki, Liebherr, EFD, Makino, Paint Plant (CQI 12 compliant)

The complete process includes assembly of the spindle and axle housing followed by painting.



Application:

Skid steer axle finds application in the skid steer loader for construction industry.

Clutch Drive Assembly

Description:

Clutch Drive Assembly is one of our many offerings to Railways. A Clutch Drive Assembly is fitted on the HHP engine assembly and provides a mechanical connection between the turbocharger to the engine gear train during the start-up, light load operation and rapid acceleration.

The complete assembly consists of the below sub-components:

Major Sub-components	: Central Support Drive, Plate Cam, Turbo Gear, Clutch Dowel assy, Upper Idler Gear.
Material	: Forged Alloy Steel, PB Bushing, HT Fasteners
Heat Treatment & Surface Coating	: Case Hardening (case depth 2.5mm), Super Cooling (to achieve less than 2 percentage), Through Hardening, Hard Chrome & Electroless Nickel coating.
Critical Processes	: Precision Turning, Precision Gear Grinding, Precision Bore & OD grinding, Wire-cutting, Bush Pressing & Assembly, Rollers Assy.
Machines	: Hyundai, LMW, Mori Seiki, Liebherr, Sodic, Hofler, ID & OD grinder, Spl. Assy. equipment

We are specialist in some of the critical processes such as **carbo-cooling and sub-zero treatment** and are equipped with highly specialized machines for **wire cut plate-cam** and **high precision ground gears** that complete the assembly.

Clutch drive assembly is made of special grade steel forgings in our dedicated precision machining facility and heat treated in our in-house state-of-the-art specialized heat treatment. All our processes are equipped to ensure high standards of product quality and reliability. Our Clutch Drive Assemblies have been time tested on tracks, and are enhancing life of Indian railways fleet locomotives.



Application:

Used on Diesel Locomotive Engine Turbo Chargers and subject to very high speed and load applications.

Synchromack

Description:

Our synchromack offers comfortable gear shifts, great performance and is easily integrated into manual and automated manual transmissions.

A synchronizer, or "synchro," lets the collar and gear synchronize their speeds while they're already in contact but before the dog teeth engage. A cone on one gear will fit into a cone-shaped depression on the collar. The gear and collar synchronize their speeds thanks to the friction between the cone and collar. Then the outer part of the collar moves out of the way so that the gear can be engaged by the dog teeth.

Our capability to design and manufacture synchromack reinforces the strength of our expertise and our commitment to provide a range of precision-engineered solution to the industry.

Technical Specification of Synchromack is mentioned below:

Types	: Single & Multi cone (double & triple cone)
Sub-components	: Sleeve, Hub, Inner ring, Intermediate ring, Outer ring, Dog crown, Synchro ring, Inserts
Material	: Synchro ring – Brass, Steel
Coating	: With and without carbon coating
Diameter Range	: 70 to 100 mm



Application:

Automotive and Off-highway transmissions





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