CSIR-CMERI's Advance Process in Manufacturing

Austempered Ductile Iron (ADI)

A new class of engineering material which is being manufactured from SG Iron through Austempering process. It will replace forged components.

Application

- Automobile Sector
- Mining machinery
- Agricultural machinery and implements
- Construction equipment

Advantage over other process

- Easy to produce complex geometry components
- Mechanical properties comparable to some grades of steel
- 20% Cheaper than forged steel parts
- Needs less energy than forged steel parts
- Superior wear / abrasion resistance
- 10% lighter than steel

Crank shaft for 35 hp tractor engine, Rotavator blade, Gudgeon pin for compressor piston, Beater head, swing hammer, digger teeth etc.

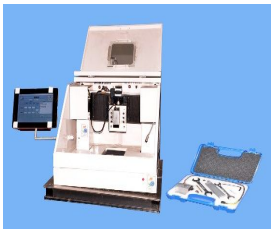
Multi-Material Deposition (MMD) System

For fabrication of near-net-shape functional metal parts directly from CAD model by laser cladding as well as repairing of damaged parts.

CNC based laser micro machining of polymermer

Rheo-Pressure die casting technology

The laser micro machining is conducted using UV diode laser/ IR diode laser with a maximum laser power of 10 W and minimum spot diameter of 30 microns. The machine can engrave primarily on polymers for micro scale pattern generation using dexterous CNC codes. This machine is five times lesser in cost than similar commercially available M/c.



Tooth colored Orthodontic brackets targeting mass usage by Micro Ceramic Injection Molding Process route ((µ-CIM)

µ-CIM is advantageous as compared to the relevant other methods, such as, press moulding, slip casting, conventional CIM etc, which suffers with the problems like lower productivity, lower translucence, poor surface finish, inferior strength of parts and requirement of precision post machining operations to arrive at the final bracket shape.

Rheo-Pressure die casting technology

"**Rheo**" processes the alloy is cooled into a semi-solid state and then is introduced into a **die** without the presence of an intermediate solidification step; semi-solid slurry with non-dendritic solid particles is produced from a fully liquid regular alloy.

Key features

- Material saving of around 20% compare to conventional die casting process
- Semi solid slurry formation by cooling slope Technology.
- Globular grains structure.
- 20% Enhancement of UTS
- 50% Improvement in elongation.
- Enhancement in Fatigue properties.

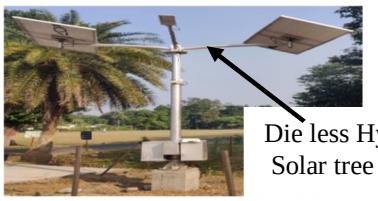
Casting of very complex geometry component using water

Best suitable for casting components having

- Interconnected Channels
- Very Complex internal cavity
- Thin Sections

Hydroforming

The process capability of die-less hydroforming for producing tubular structures of complex geometries



Die less Hydro-formed Solar tree arm

Development of components through Metal Injection molding

Key Features:

a. Manufacturing of intricate shaped components..
b. Less material wastage.
c. Elimination of machining operation.
d. Ultimately low production cost at a higher production rate.