ADDITIVE MANUFACTURING TECHNOLOGY

Central Manufacturing Technology Institute (CMTI), Bangalore has established facilities for Additive Manufacturing (AM). It offers total solution for Additive Manufacturing and consultancy.

CMTI is equipped with

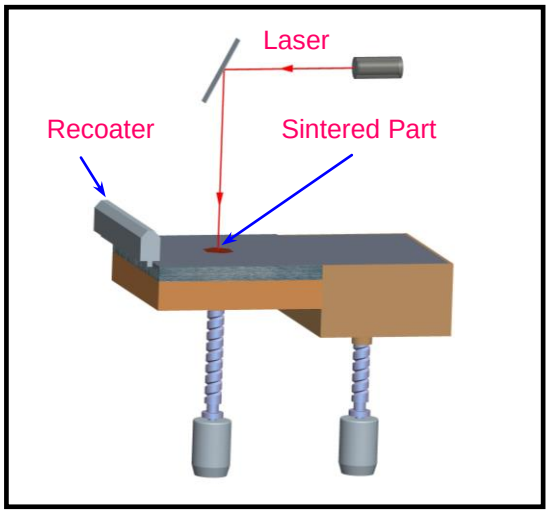
- **Direct Metal Laser Sintering (DMLS) AM machine** - EOSINT M250 Xtended from M/s Electro Optical Systems, Germany (Build size: 250 X 250 X 150 mm).
- **5-Axis Direct Metal Deposition (DMD) AM machine** - DMD 105D from M/s POM, USA (Build size: 300 X 300 X 300 mm).
- **Magics software** for preprocessing of CAD models.
- **CAD/CAM software** - Unigraphics & DMDCAM.

METAL ADDITIVE MANUFACTURING

1. DIRECT METAL LASER SINTERING (DMLS) AM TECHNOLOGY

Direct Metal Laser Sintering is an additive manufacturing process that uses a laser beam to fabricate metal parts by sintering of metal powders, smeared on a substrate with a recoater system.

DMLS MACHINE



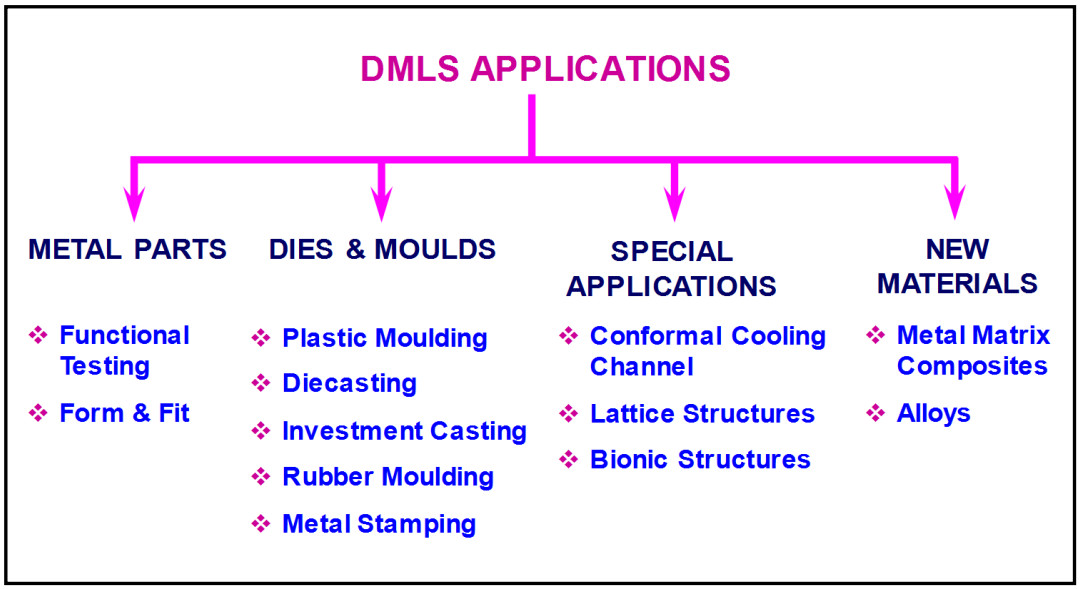
DMLS PROCESS

1.1 SALIENT FEATURES OF DMLS MACHINE

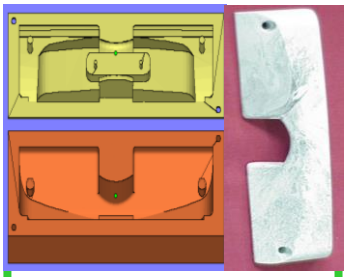
- **Make & Model** : EOSINT M250 Xtended AM Machine, M/s EOS GmbH, Germany
- **Laser** : CO_2 Laser, 240 W
- **Build Size** : 250 X 250 X 150 mm
- **Metal Powders** : Steel, Bronze-Nickel
- **Layer thickness** : 20 µm
- **Surface Roughness** : Ra 10 µm
- **Dimensional Accuracy** : ± 100 µm
- **Hardness** : 40 – 45 HRC
- **Porosity** : < 0.5%

- **Tooling for Plastic Moulds** : Tool life upto 10 lakh parts
- **Tooling for Diecasting** : Tool life upto 5000 parts

1.2 DMLS APPLICATIONS

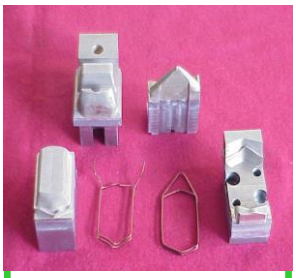


1.3 DMLS APPLICATIONS – EXAMPLES



Mold (Medical application)
Core Size: 193X66X30mm
Cavity Size: 193x66x37mm
Build time: 13 hours

1:30 Scale Aircraft Model
Size: 500X200X300mm
Build time: 100 hours



Forming Tool For Copper coil
Size: 87X52X30mm
Build time: 12 hours

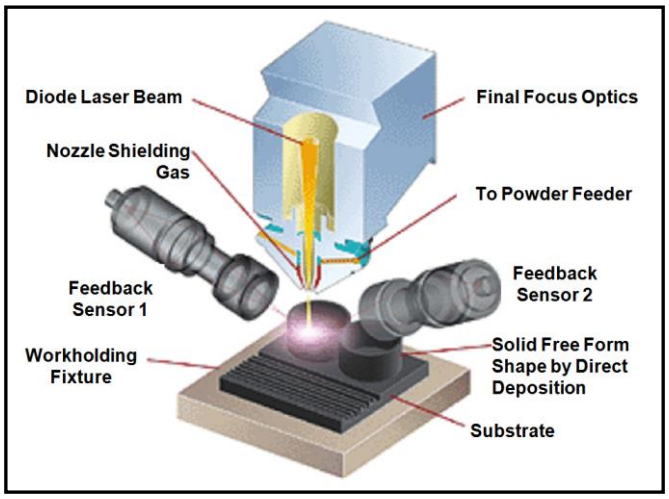
2 5-AXIS DIRECT METAL DEPOSITION (DMD) AM TECHNOLOGY

Direct Metal Deposition is an additive manufacturing process that uses a high power laser to fabricate fully dense metal parts by melting metal powders fed through a nozzle.

5-AXIS DMD 105D MACHINE

- Make & Model : 5-Axis DMD 105D AM Machine, M/s POM Inc., USA
- Laser : Diode Laser, 1000 W
- Build Size : 300 x 300 x 300 mm
- Metal Powders : Stainless Steel, Inconel, Titanium, Cermet, Nickel, Iron Super alloys etc.

2.1 SALIENT FEATURES OF 5-AXIS DMD 105D MACHINE



DMD PROCESS

- **5- Axis Metal Deposition Capability**
- **DMDCAM Software for 5-Axis Deposition Path Generation**
- **Closed Loop Feedback System to monitor layer thickness**
- **DMD Vision System for image capturing and automatic NC tool path generation**
- **Integrated DMD Technology Database for process parameters**
- **Pyrometer for melt pool temperature measurement**

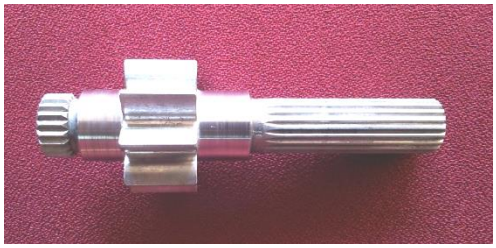
2.2 DMD APPLICATIONS

DMD APPLICATIONS

CONFORMAL COOLING	HARDFACING/ COATING	REMANUFACTURING	SPECIAL APPLICATIONS
❖ Diecasting	❖ Oil Industry	❖ Turbine Components	❖ Bimetallic components
❖ Plastic Injection Moulding	❖ Wood Industry	❖ Large components with large lead-time	❖ Lattice structures
	❖ Stamping	❖ Expensive Components	❖ Valve seat cladding
	❖ Trimming	❖ Small Engineering changes	❖ Functionally Graded Materials
	❖ Forging		❖ New Materials

2.3 DMD APPLICATIONS - EXAMPLES

Bimetallic Component: Steel on Aluminium-Bronze substrate



Refurbishment of Aircraft Pump Gear Shaft

Refurbishment of Turbine Blade

3. ADVANTAGES OF ADDITIVE MANUFACTURING

- Quick design iteration for product finalization.
- Drastic reduction in lead-time for product development.
- Direct tooling for mass production/ pilot batch.
- Rapid manufacture of prototypes with complex shapes impossible to manufacture by conventional methods.
- Enables full customization in prototypes along with higher freedom of design.
- Rapid manufacture of prototypes for conceptualization, analysis and testing.

4. SERVICES OFFERED BY ADDITIVE MANUFACTURING TECHNOLOGY

- Additive Manufacturing & Rapid Tooling for realization of prototype components, moulds, etc.
- Applied Research opportunities in Additive Manufacturing for industries and academia.
- Training programmes in Additive Manufacturing for personnel from industries and academia.

5. BENEFICIARY INDUSTRIES

Aerospace, Automobile, Medical, Defence, Nuclear, Oil & Gas, Tooling, Electrical, Electronics, Architecture, Paper & Pulp, Watch, Toy industries, etc.

For Specific Queries, Please Contact:

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