

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.

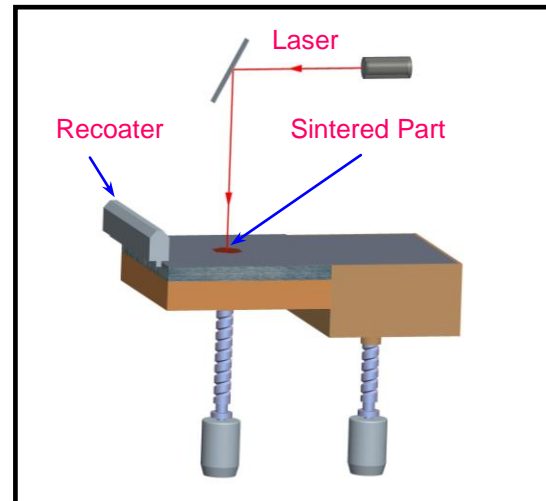
METAL ADDITIVE MANUFACTURING

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

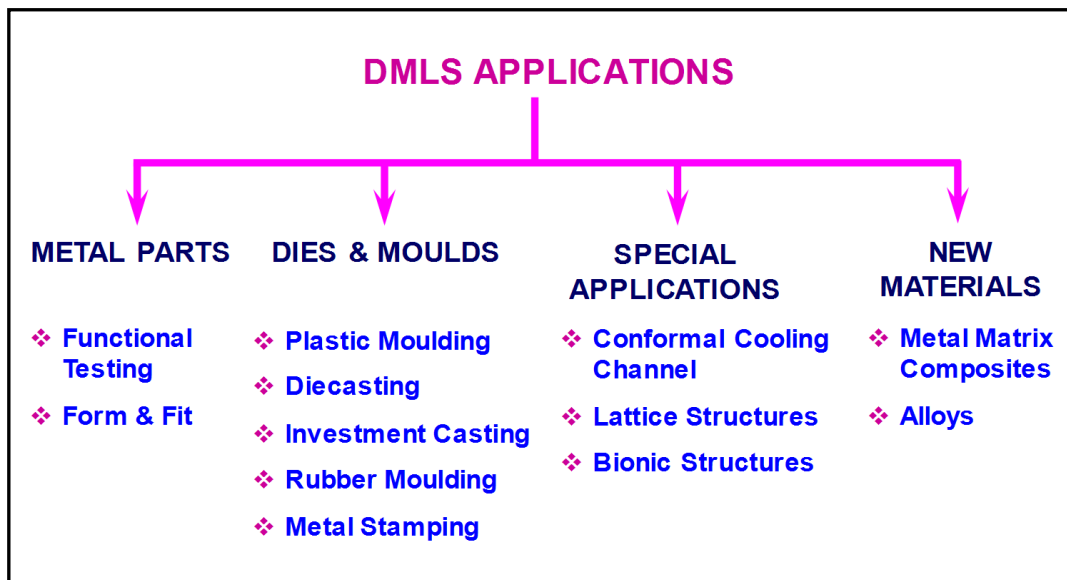


DMLS PROCESS

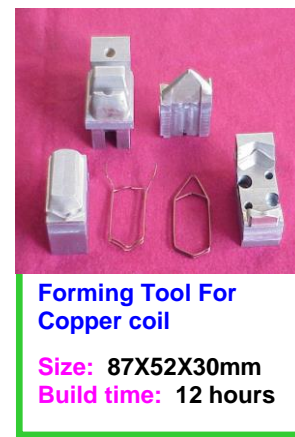
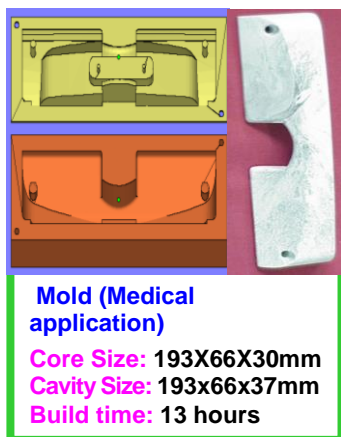
1.1 SALIENT FEATURES OF DMLS MACHINE

- | | |
|-----------------------------------------------------------------------------------|---------------------------------------------------|
| ❖ Make & Model : EOSINT M250 Xtended AM Machine, M/s EOS GmbH, Germany | ❖ Surface Roughness : Ra 10 μ m |
| ❖ Laser : CO ₂ Laser, 240 W | ❖ Dimensional Accuracy : \pm 100 μ m |
| ❖ Build Size : 250 X 250 X 150 mm | ❖ Hardness : 40 – 45 HRC |
| ❖ Metal Powders : Steel, Bronze-Nickel | ❖ Porosity : < 0.5% |
| ❖ Layer thickness : 20 μ m | |
| ❖ 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



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

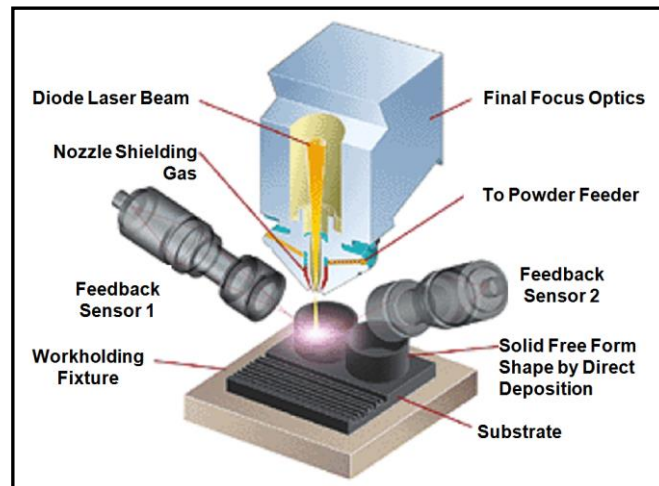
Direct Metal Deposition is an additive manufacturing process that uses a high power laser to fabricate fully dense metal parts by melting metal powders fed through a nozzle.



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.

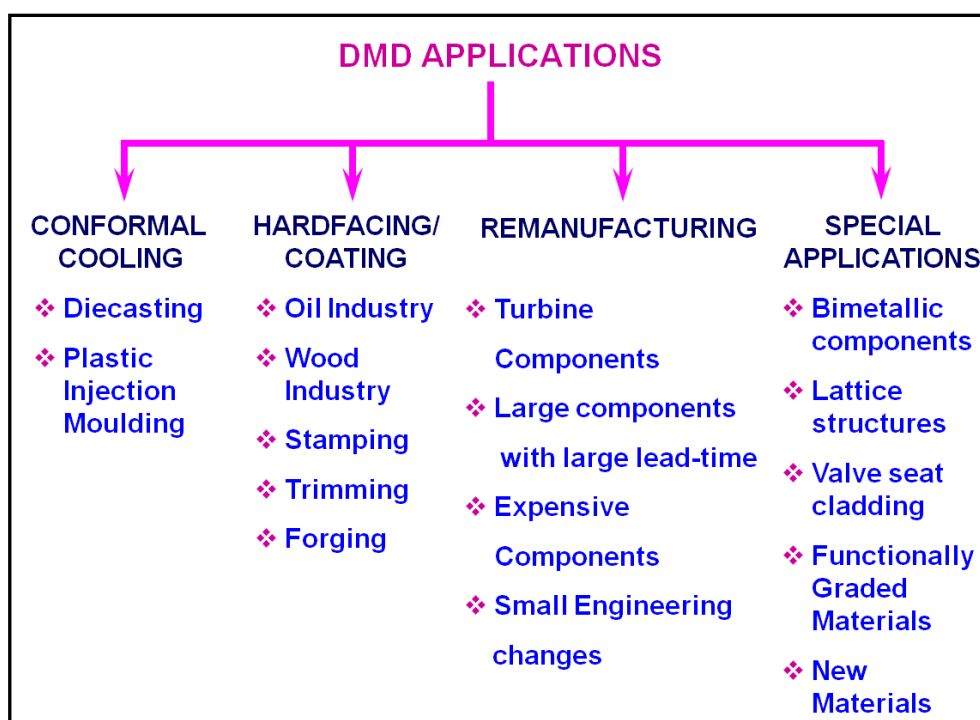
2.1 SALIENT FEATURES OF 5-AXIS DMD 105D MACHINE



DMD PROCESS

- 5- Axis Metal Deposition Capability
- DMD CAM 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



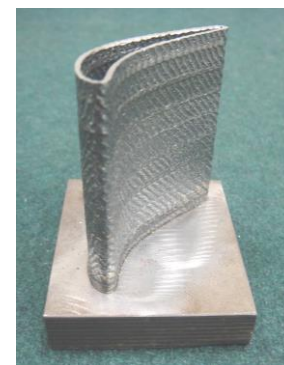
2.3 DMD APPLICATIONS - EXAMPLES



Bimetalllic 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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