Beckfoot

Engineering Manufacture

Unit R109: Engineering materials, processes and production;
Lo3 – Know About Developments In Engineering Processes

Year 10

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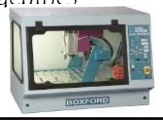
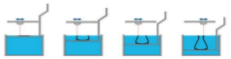
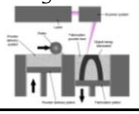
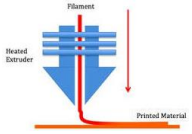
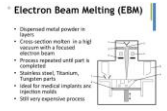
1. Computer Numerical Control (CNC) Machining Processes

This means a computer converts the design produced by Computer Aided Design software (CAD), into **numbers**. The numbers can be considered to be the **coordinates** of a graph and they **control** the movement of the **cutter**.

1	CNC Lathes 	A machine for shaping metal, or other material by means of a rotating drive which turns the piece being worked on against changeable cutting tools.
2	Milling/Router Machines 	Machinery using rotary cutters to remove material by advancing a cutter into a work piece. This may be done varying direction on one or several axes,
3	Multi-axis Machining Centres 	A manufacturing process that involves tools that move in **4 or more directions** and are used to manufacture parts out of materials by milling away excess material.
4	Water Jet Cutting 	A tool capable of cutting a wide variety of materials using a very high-pressure jet of water.
5	Punching Machines	A machine tool for punching and embossing flat sheet-materials.
6	Press Brake Machines	A **machine pressing** tool for bending sheet material.
7	Laser Cutting/ Welding 	The focused **laser** beam is directed at the material, which then either melts, burns, vaporizes away, leaving an edge with a high-quality surface finish.

2. Additive Manufacturing And Rapid Prototyping Processes

A technology that is used in building **3D objects** by adding materials layer by layer.

1	Selective Laser Sintering (SLS);	Uses a laser to **sinter** powdered plastic material into a solid structure based on a 3D model.
2	Stereolithography (SLA) 	A technique for layer by layer structure fabrication, where a **laser beam** is focused to a surface of a **photosensitive liquid** to transform it to a solid.
3	Direct Metal Laser Sintering (DMLS); 	A rapid prototyping or 3D printing designed to use a high power-density laser to **melt and fuse metallic powders together**
4	Fused Deposition Modelling (FDM)/3D printing 	A physical object is created directly from a computer-aided design (CAD) **model** using layer-by-layer **deposition** of a feedstock plastic filament material extruded through a nozzle.
5	electron beam melting 	A type of 3D printing, for **metal parts**. The raw material is placed under a vacuum and fused together from heating by an electron beam.

Key terms and Acronyms

Sintering	**Sintering** is a heat treatment applied to a powder to form a solid
CNC	Computer Numeric Control
CAM	Computer Aided Manufacture
CAD	Computer Aided Design
SLS	Selective Laser Sintering
SLA	SteroLithograAphy
DMLS	Direct Metal Laser Sintering
FDM	Fused Deposition Modelling
EBM	Electron Beam Melting