SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF AUTOMOBILE ENGINEERING

19AUT303 – Additive Manufacturing and its applications

III YEAR / V SEM

UNIT – 4 POWDER BASED ADDITIVE MANUFACTURING SYSTEMS

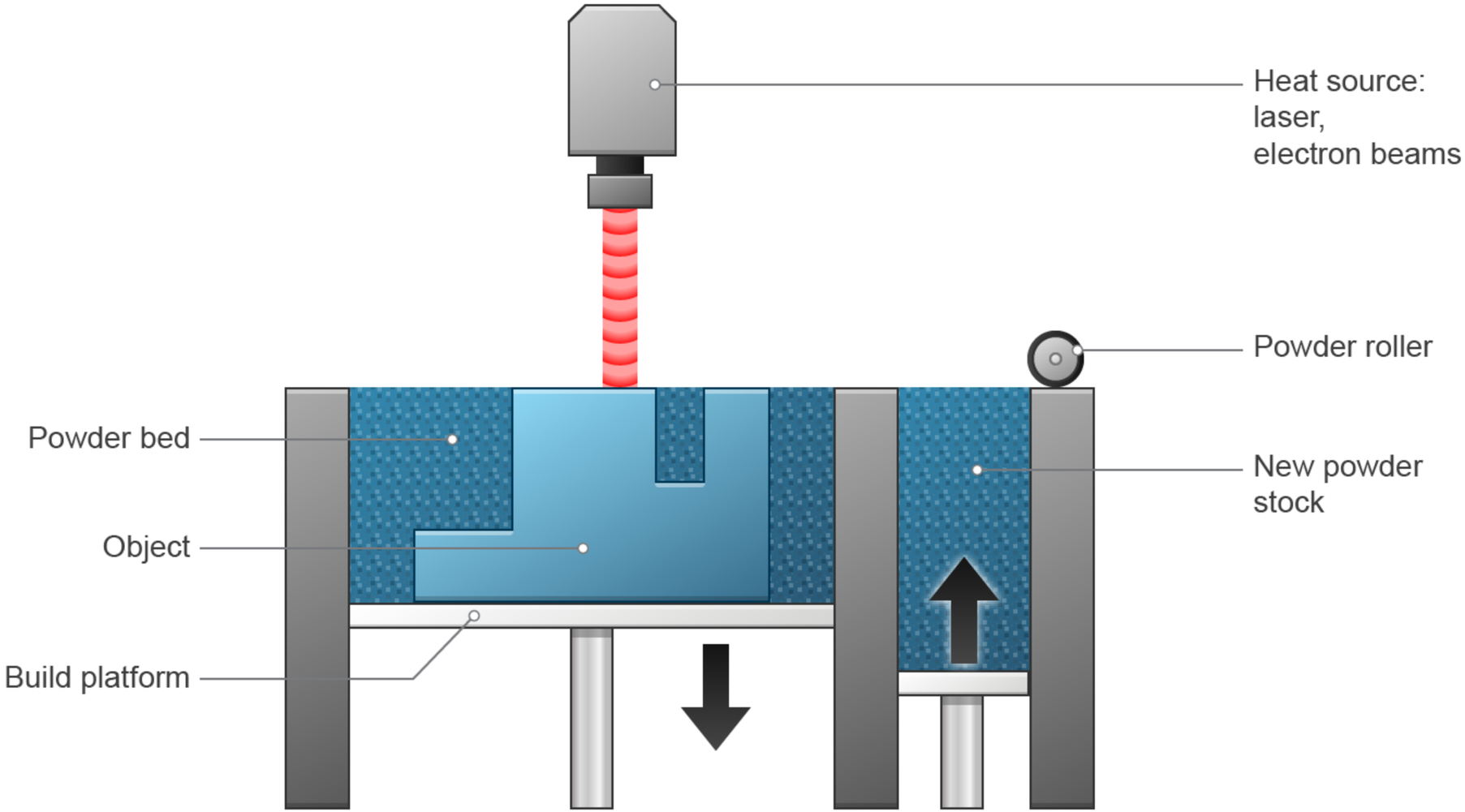
Topic – Powder Bed Fusion

Powder Bed Fusion (PBF)

Definition

Powder bed fusion (PBF) methods **use either a laser or electron beam to melt and fuse material powder together**. Electron beam melting (EBM), methods require a vacuum but can be used with metals and alloys in the creation of functional parts.

Working



Working (Contd.,)

A layer, typically 0.1mm thick of material is spread over the build platform.

A laser fuses the first layer or first cross section of the model.

A new layer of powder is spread across the previous layer using a roller.

Further layers or cross sections are fused and added.

The process repeats until the entire model is created. Loose, unfused powder is remains in position but is removed during post processing.

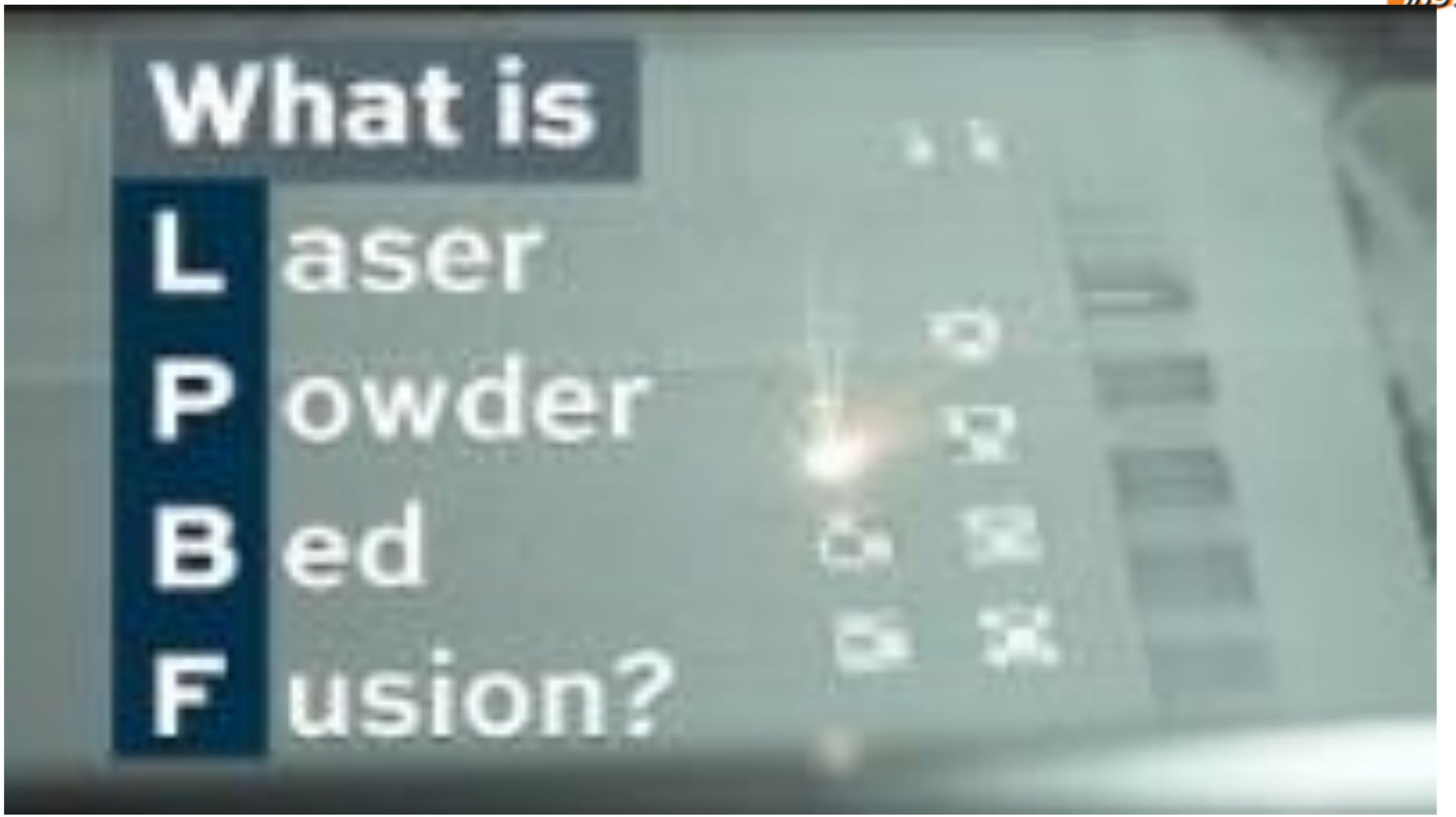
Materials

The Powder bed fusion process uses any powder based materials, but common metals and polymers used are:

SHS: Nylon DMLS, SLS, SLM: Stainless Steel, Titainium, Aluminium, Cobalt Chrome, Steel

EBM: titanum, Cobalt Chrome, ss, al and copper (Materials Arcam, 2014).

Working (Video)



Advantages

- Relatively inexpensive
- Suitable for visual models and prototypes
- (SHS) Ability to integrate technology into small scale, office sized machine
- Powder acts as an integrated support structure
- Large range of material options

Disadvantages

- Relatively slow speed (SHS)
- Lack of structural properties in materials
- Size limitations
- High power usage
- Finish is dependent on powder grain size

PDBF - types

- Selective laser sintering (SLS)
- Selective Laser Melting (SLM)
- Selective Heat Sintering (SHS)
- Direct Metal Laser Sintering (DMLS)
- Electron Beam Melting (EBM)

Thank You