This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Topic:

3D metal printing
NOTES FOR LECTUERER

15/07/2020

Workshop structure

1) Understanding the process & Difference in approach

2) Pros & Cons

3) Applications

4) 3D printing today vs future

Background

- The workshop is focused on understanding the basic difference between conventional technologies and the process of 3D metal printing
- Furthermore on application of 3D printing and its future

Bring your own 3D printed parts to the workshop!

Understanding the process

The lecturer should be thoroughly familiar with the concept of 3D printing and conventional technologies:

Youtube videos for understanding the basic concept:

- https://www.youtube.com/watch?v=fzBRYsiyxjI

Popular educational articles:

- https://www.3dhubs.com/knowledge-base/introduction-metal-3d-printing/#what
- https://www.metal-am.com/introduction-to-metal-additive-manufacturing-and-3d-printing/background-to-additive-manufacturing/
- https://www.metal-am.com/introduction-to-metal-additive-manufacturing-and-3d-printing/metal-additive-manufacturing-processes/

Scientific articles for diving deep into the topic:

- https://www.sciencedirect.com/science/article/pii/S2405896316325496

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3D metal printing

What is 3D printing

Do you have any ideas?

What the “3D“ stands for?

What is the main difference with conventional technologies?

Why do you think it is useful?

What‘s the principle of this method?

ADDITIVE MANUFACTURING TECHNOLOGIES

Find out more at **www.3dhubs.com/what-is-3d-printing**

3D HUBS

Difference in approach

Conventional technology

AM

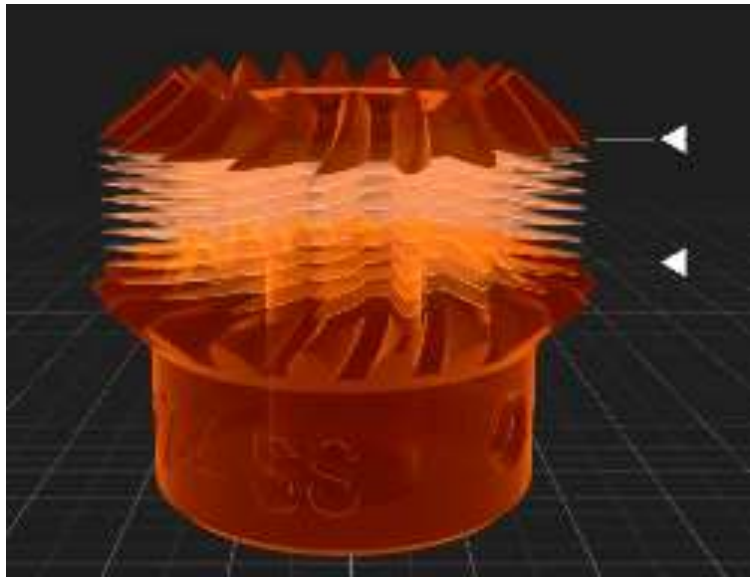
Principle of 3D printing

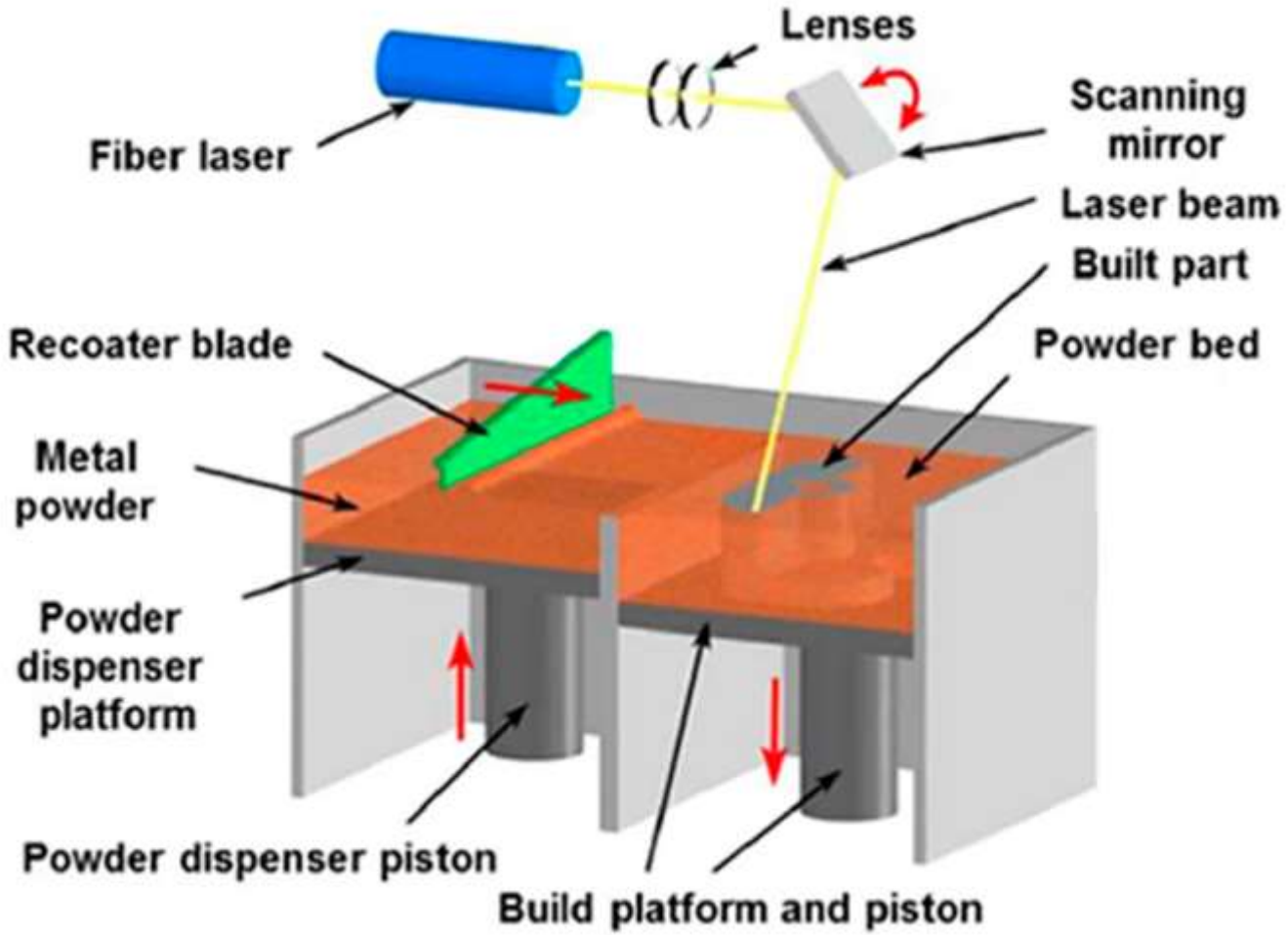
- Building the part from the bottom to the top → additive technology

What we need

- 3D model of the component
- 3D printer
  - High energy source (laser)
  - Metal input material

Principle

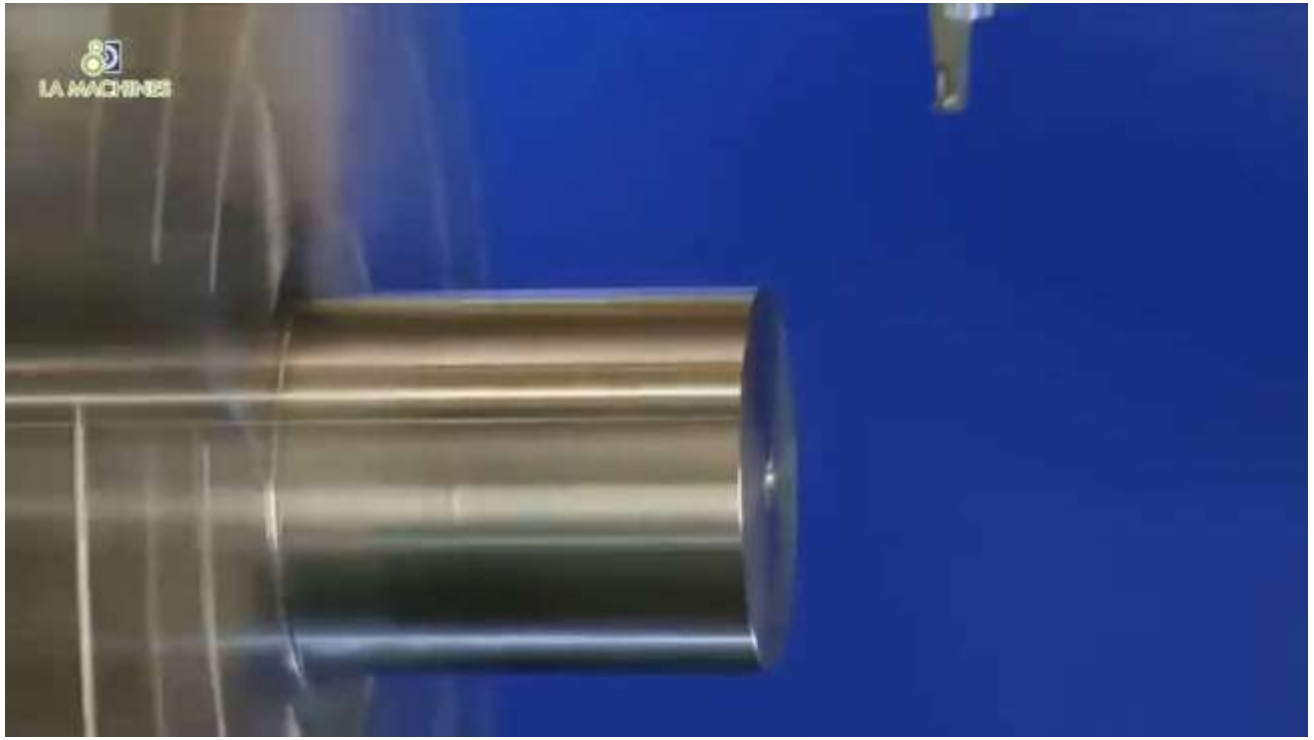



Lenses
Fiber laser
Scanning mirror
Laser beam
Built part
Recoater blade
Powder bed
Metal powder
Powder dispenser platform
Powder dispenser piston
Build platform and piston

Video – Additive Manufacturing

Source: https://www.youtube.com/watch?v=yiUUZxp7bLQ

Video – Machining (turning)



Source: https://www.youtube.com/watch?v=jF4F8Zr2YO8

Metal materials used for 3D printing

- Aluminium alloys
- Titanium alloys
- Stainless steel & tool steel
- Superalloys

Manufacturing the input material

Conventionally vs 3D printing

INOX PLUS
www.inoxplus.md
CALITATE PE VIAȚĂ

Source: https://www.youtube.com/watch?v=p3_YhKwuV-g

Source: https://www.youtube.com/watch?v=zCNWNsZOcaE

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Advantages of 3D printing

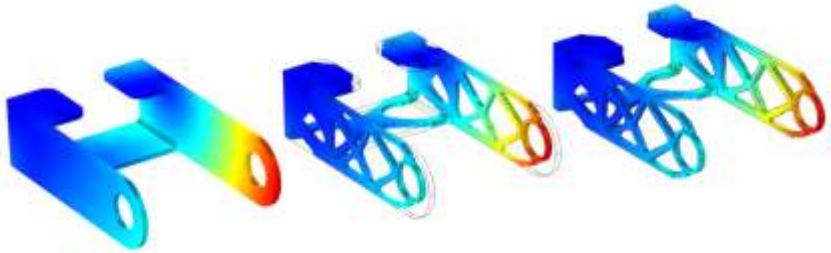
- No need for complex tools and a manufacturing process to produce the part
- Rapid prototyping
- Possibility to produce complex shapes, impossible to made conventionally

Disadvantages of 3D printing

- Anisotropy of the printed object
- Uneconomical and slow in mass production
- The need to use supports and the associated need for further processing
- Lower precision and surface quality
- Need of special design for efficient application of 3D printing

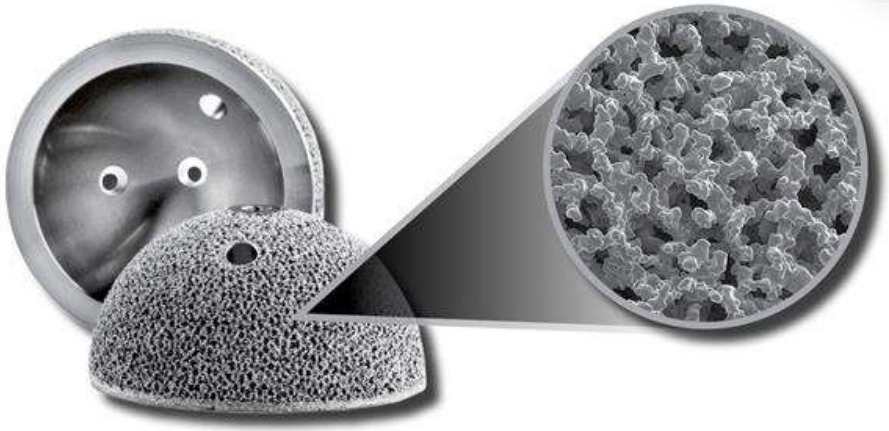
Applications

- Aviation and Energetics
  - Topology optimization
  - Complex shapes



1 2 3

- Medicine
  - Personalization
  - Ability to mimic bone porosity



- Prototyping
  - Faster design and testing process before production begins
- Design
  - Customization
    - eg golf clubs, kitchen sinks
- Automotive
  - Prototyping
  - Car parts at a luxury brand

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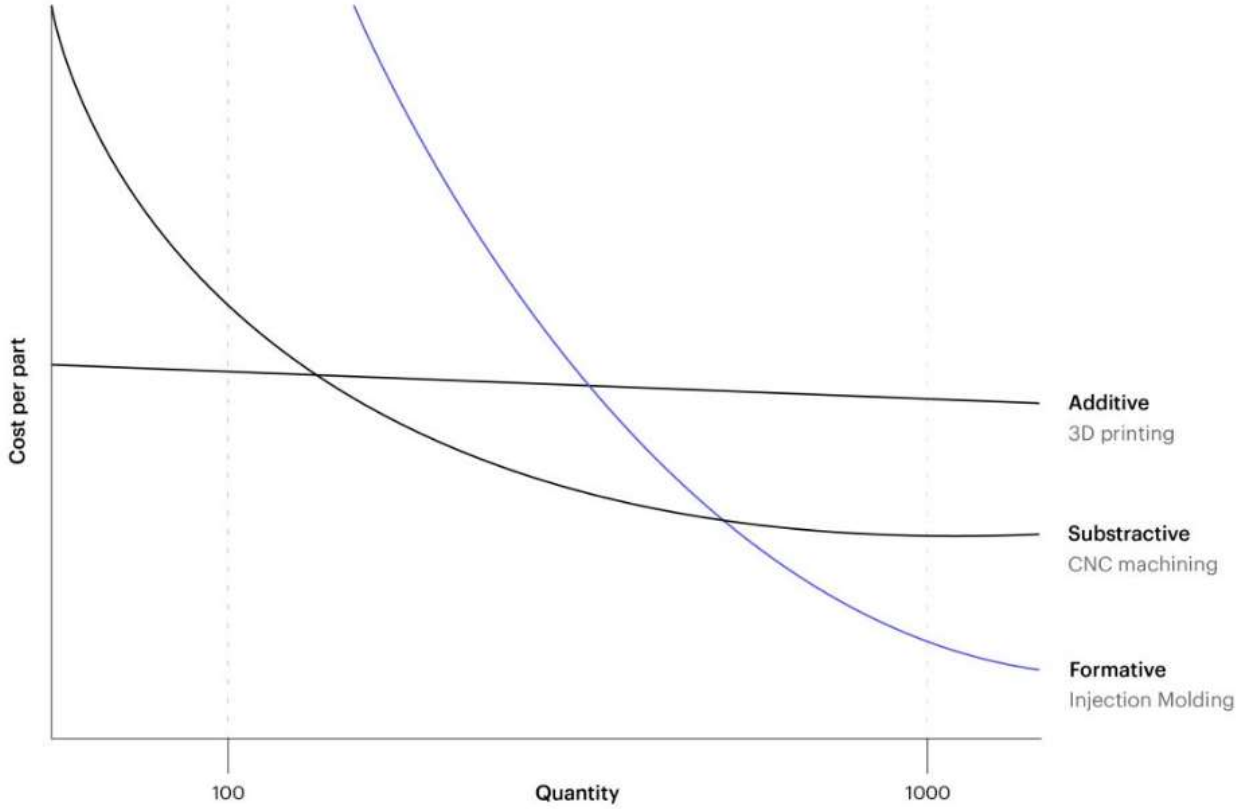
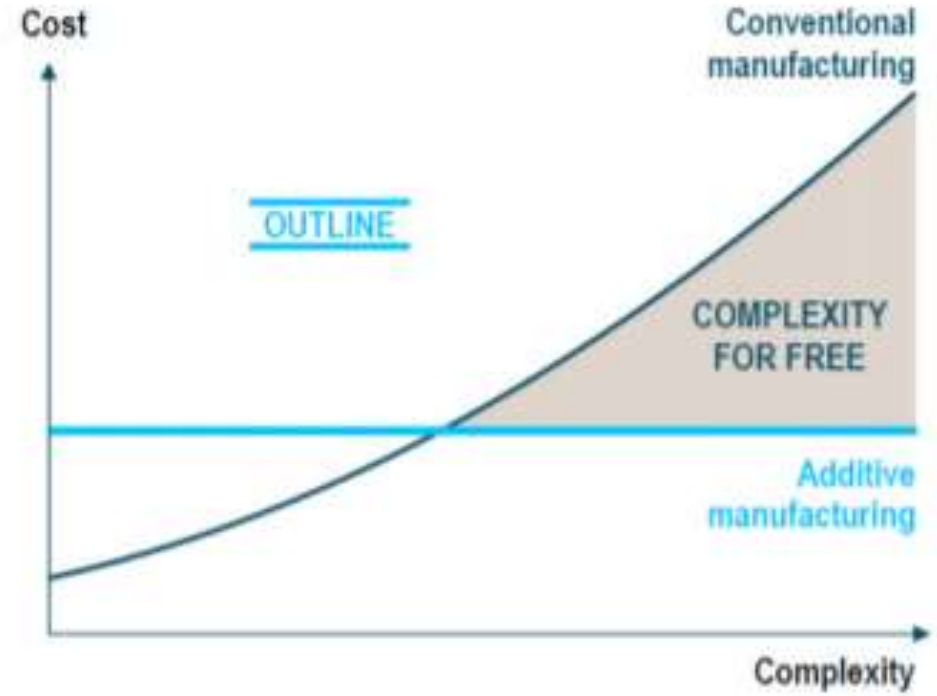
Future of 3D printing

- Part of manufacturing process





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Discussion

- Do you think 3D printing will change the current way of production?
- Do you think that there are jobs that will disappear?
- Do you think that there are new jobs to come?

Sources (images)

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- https://docplayer.cz/6115307-Aplikace-3d-modelu-jako-predloh-sestav-vyrobnich-celku-marek-svestak.html
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