« Construction Equipment in an Agile World »

Session 1„ Innovation in manufacturing processes"
16th October 2014, Crowne Plaza -Antwerp

CECE Congress 2014 - 15, 16, 17 October - Antwerp, Belgium

How does additive manufacturing impact the manufacturing process and the design of construction equipment?

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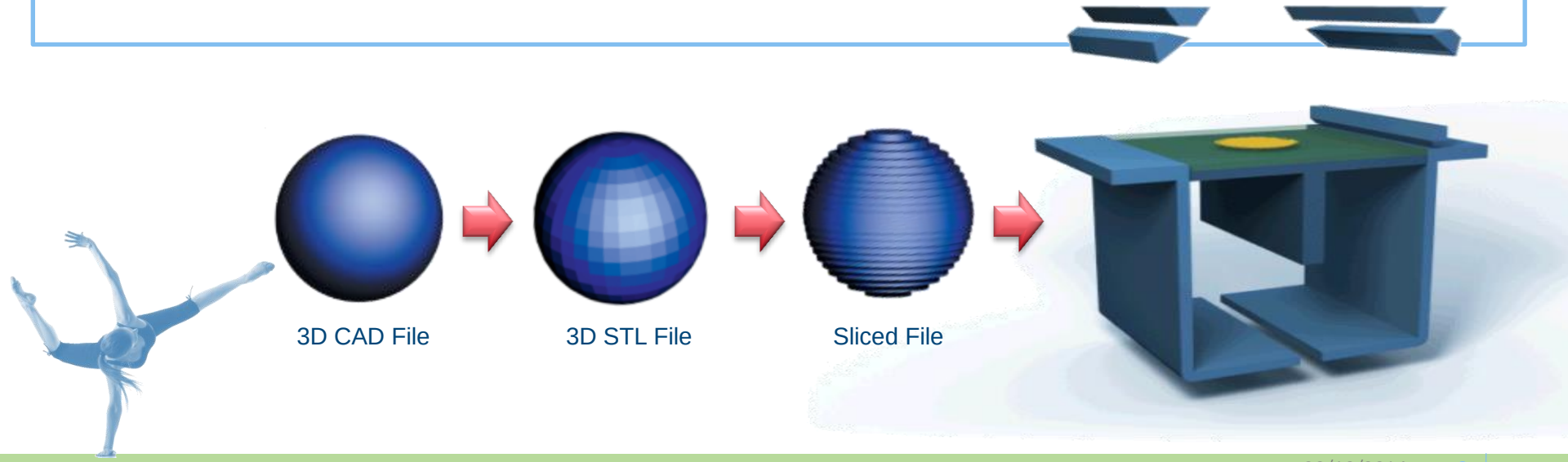
CECE CONGRESS 2014
Antwerp, Belgium

What is Additive Manufacturing?

- Manufacturing by material **additions** ≠ **substractive manufacturing**

- To transform a **3D process to a succession of 2D processes**



What is Additive Manufacturing for you today?

OR ?

Fu… hi… …th

Low cost solution for personal use…

but low performance!

"This type of injector manufactured with traditional processes would take more than a year to make, but with these new processes it can be produced in less than four months, with a 70 percent reduction in cost."

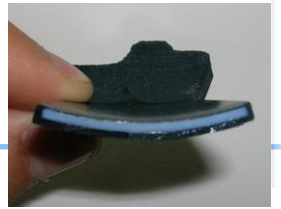
Situation of Additive Manufacturing in the world?

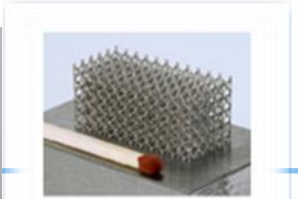
- Technologies : 7 categories of process

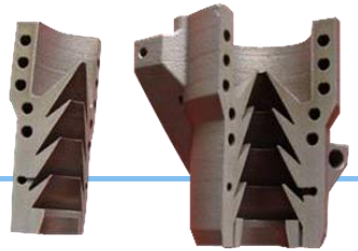
- Materials available:

Polymer | **Metal** | **Ceramics** | **Other…**

- A design revolution of product and process with beneficial effects !
  - Reduction of the time to market and cost optimization
  - Higher complexity of products possible
  - Customization without tooling costs (small series, …)
  - Environmental benefits
  - Localized production
  - …

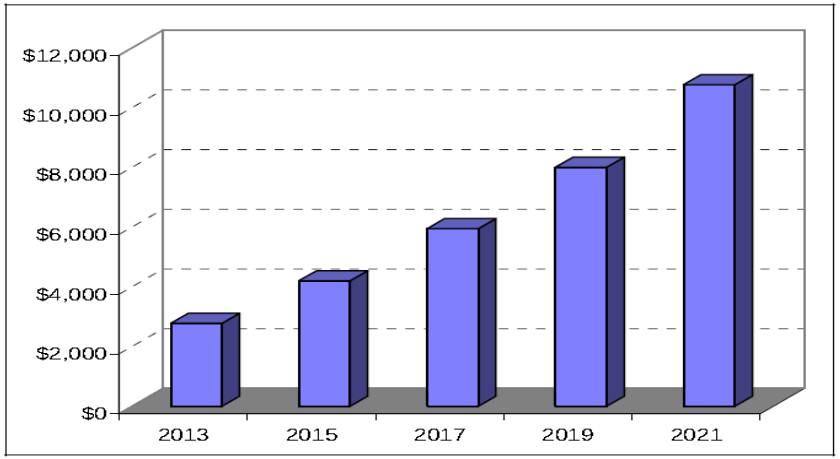




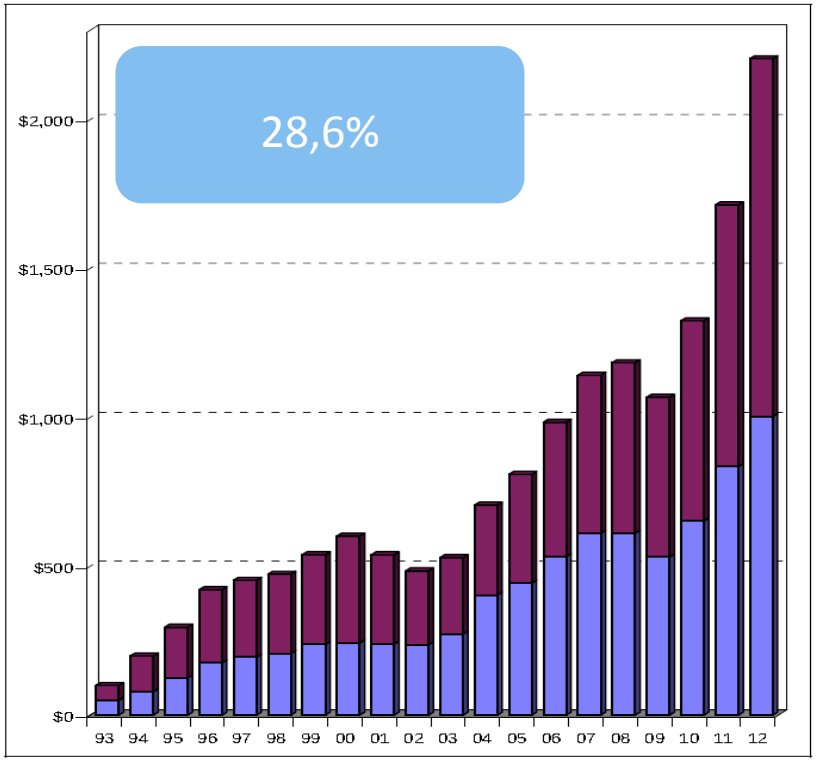


Situation of Additive Manufacturing in the world?

23 years of double digit growth



Source: Wohlers Associates, Inc.



Source: Wohlers Associates, Inc.

AM market expected to continue its double-digit growth:

- $1 billion level took 20 years
- $2 billion level took 5 more years
- $4 billion level is expected by 2015

Flying Cam case study

Unmanned helicopter

Initial Design:

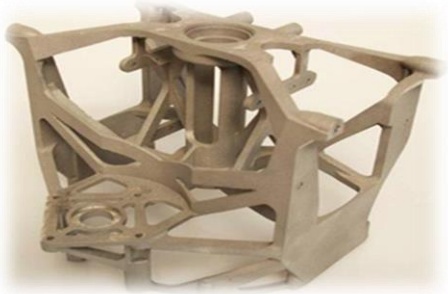
Weight: 530gr

3 materials

Final Design:

Weight: 392 gr

1 material



Technology: LBM (MB Proto)

Topology Optimization

Additive Manufacturing

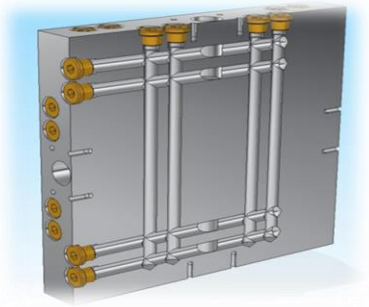
- 20% weight with the same mechanical performance and an easier assembly

Hydrauvision case study

Heat exchanger

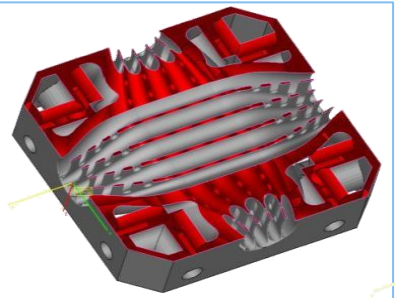
Initial Design:

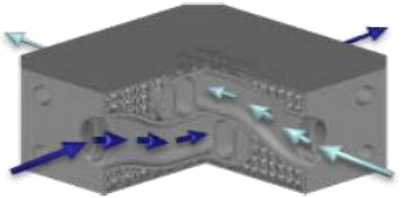
Weight: 19,2 kg
Dimension:
210 x 210 x 70mm
Volume: 2900 cm³



Final Design:

Weight: 0,74 kg
Dimension:
85 x 85 x 38mm
Volume: 244 cm³





AM design

Additive Manufacturing

- 93% weight with the same mechanical performance

- 92,3% pressure drop

Additive Manufacturing in construction equipment?

R&D - Validation, prototypes

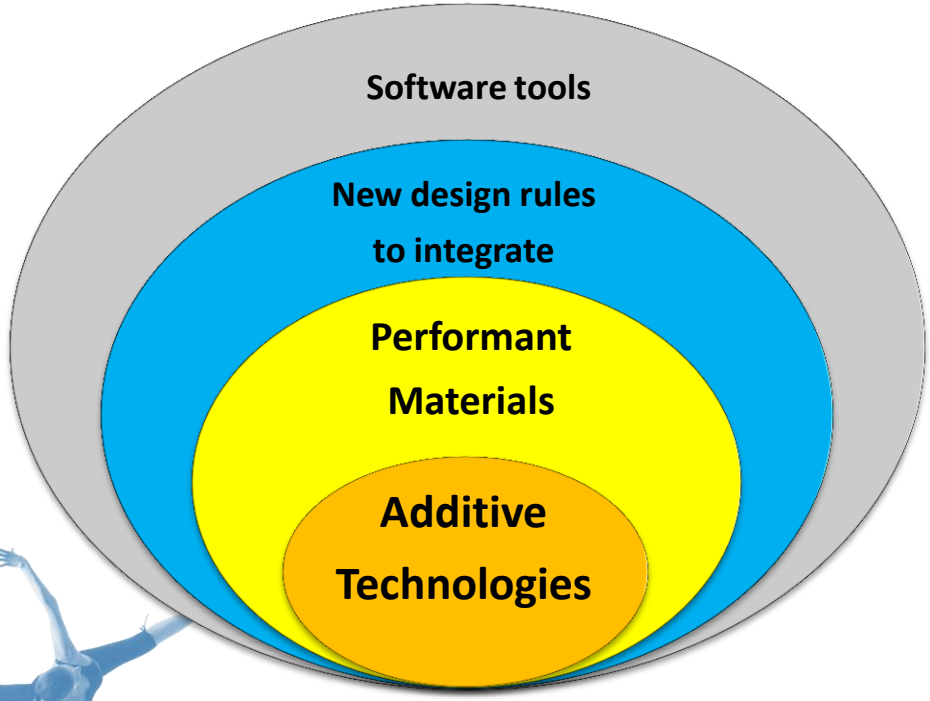
Direct Manufacturing

- Lightweight parts – Lattice structures
- Internal channels (heat exchanger)
- Complex structures (improvement of performance)
- Gradient structures and coating finish
- …

- Wax and lost models by 3D Printing
- Sand tooling (Voxeljet)
- Quick cast models
- …

And … ?

Additive Technologies … a performant tool to increase competitiveness.



Use of software to help R&D

Think AM and you will innovate

A large range of materials (polymer, metal and ceramic)

A large range of available technologies

Thank you for your attention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