

Participants



www.marcam.de



www.tno.nl



www.hydrauvision.com



www.dti.dk



www.sirris.be



FJ-SINTERMETAL

www.fji.dk



www.ifam.fraunhofer.de



www.mbproto.com



www.flying-cam.com



www.microsisteme.ro



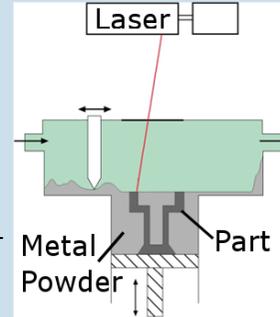
www.open-engineering.com



www.ehp.be

Background

Rapid Manufacturing (RM) is the production of parts in various materials directly from a 3D CAD file. RM is a so-called *Layer Additive Process*, which means that the parts are constructed with micrometer thin layers. This layer-by-layer production approach provide designers with unprecedented geometrical freedom when optimizing properties and functions of their products. Furthermore, RM supports batch sizes down to a single part, since no special tools are needed.



<http://rm-platform.com>

Further Information

Please take a look at:

<http://compolight.dti.dk>

Project coordinated by the Danish Technological Institute, Olivier Jay:
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Funding

CompoLight is funded by the European Union within the 7th Framework Programme.



Project period: 11/2008 — 11/2011
Budget: 4.6 M€

COMPOLIGHT



Rapid Manufacturing
of
Lightweight Metal Components



Objective

The purpose of CompoLight is to develop processes and methods which improve the design and manufacturing of three types of lightweight metal components:

- Parts with interior canals.
- Parts with cavities .
- Porous parts.

CompoLight will:

- Gain new knowledge about RM produced light metal items.
- Ease the introduction of RM concepts in the production.
- Increase the use of RM in the industry.
- Reduce the interval between idea and product.
- Reduce the costs and error output of RM.

Parts with Cavities

Internal structure: Geometrically defined and repeating.

Goal: Parts with reduced weight due to internal structure, hollow zones or otherwise without unnecessary material.

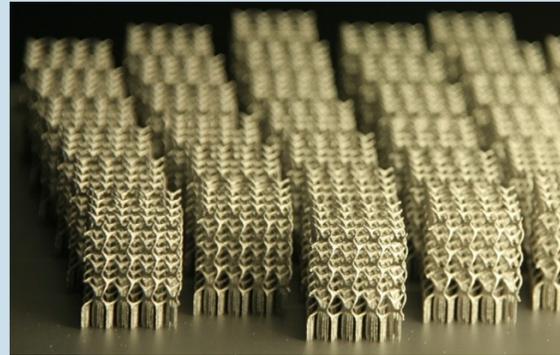
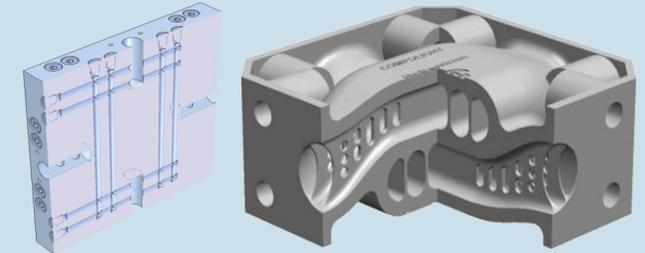


Figure: Examples of repeating structures

Case: (Im)possible Crossing



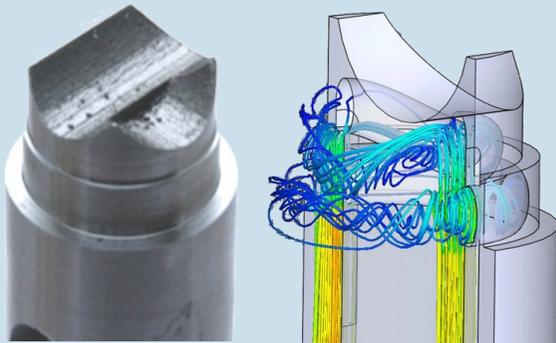
Left: Old design. Right: New design.

Two hydraulic lines cross each other in limited space. In the redesigned RM part, the geometric freedom allowed the constructors to avoid right angles in the pipe layout, resulting in a 75 % improvement of pressure loss, while simultaneously lowering the weight from 20 kg to 1 kg and the volume from 2900 cm³ to 320 cm³.

Parts with Interior Channels

Internal structure: Geometrically defined but not repeating.

Goal: Parts with complex internal channels providing thermal optimization, mechanical or hydraulic functions, lubrication, i.e.

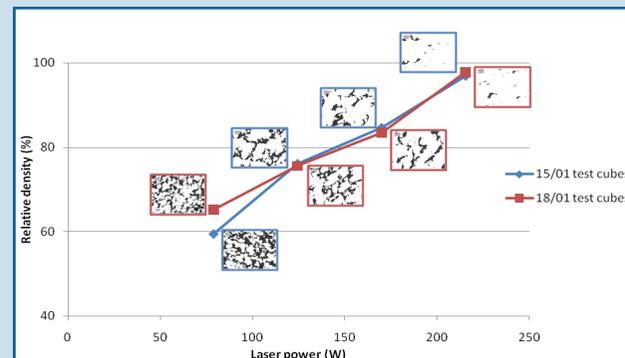


Left: Tool with embedded cooling channels produced by RM. Right: Flow simulation.

Porous Parts

Internal structure: Geometrically undefined and statistically distributed.

Goal: Porous parts used in air or water filtering, fluid flow control, noise reduction or specific tool components.



Graph: Relationship between production parameter and porosity

Case: Lightweight Arial Vehicle



Left: Flying-Cam helicopter. Right: Sketch of optimized frame.

Five steps to lighten an unmanned helicopter frame, so that more equipment can be carried:

1. Define outer constraints.
2. Remove unnecessary material by topology optimization.
3. Inspired by step 2, redesign the frame.
4. Verify that the redesign meet the requirements regarding weight, stiffness etc.
5. Produce the part with RM technology.