

# ***Progress in Direct Metal Laser Sintering for the Jewellery & Watch Industry***

By David Fletcher





## Topics

- Abstract
- DMLS – An Introduction
- eManufacturing
- User Interface
- File Cleaning
- File Encryption
- Part Orientation on the Build Platform
- Automated Build Structures
- Automated Light Weighting
- Customization of Parts
- Automated Costing and Quotation Models
- Education
- Conclusion



## Abstract

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Rapid prototyping techniques such as 3D printing for waxes are indirect processes and can require several steps and a long lead-time.

Recent advances in direct precious metal laser sintering coupled with eManufacturing methods, use automated tools to minimize weight and optimise design to take full advantage of the process.

Producing quality parts that are otherwise unattainable with conventional manufacturing techniques.

# DMLS – An Introduction

Drawing



3D CAD Design



DMLS production



Polishing

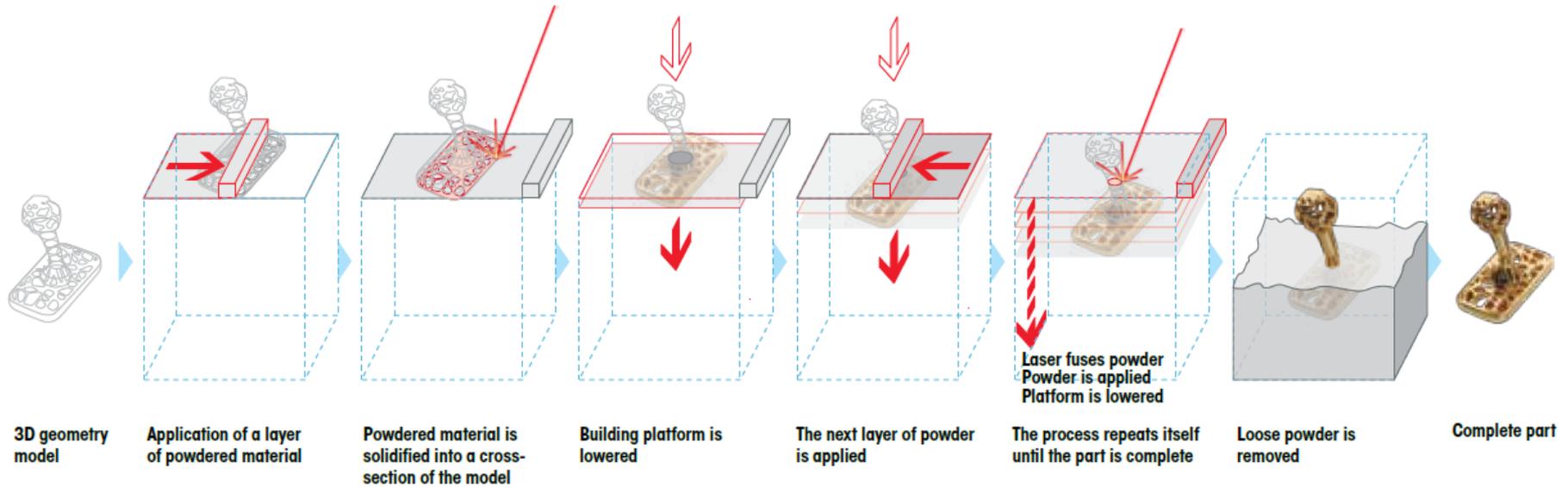


Finished piece



# DMLS – An Introduction

## Concept to Creation





**Cooksongold**

Heimerle + Meule Group

# DMLS – An Introduction

## Mission Possible

The process inside the PRECIOUS M 080

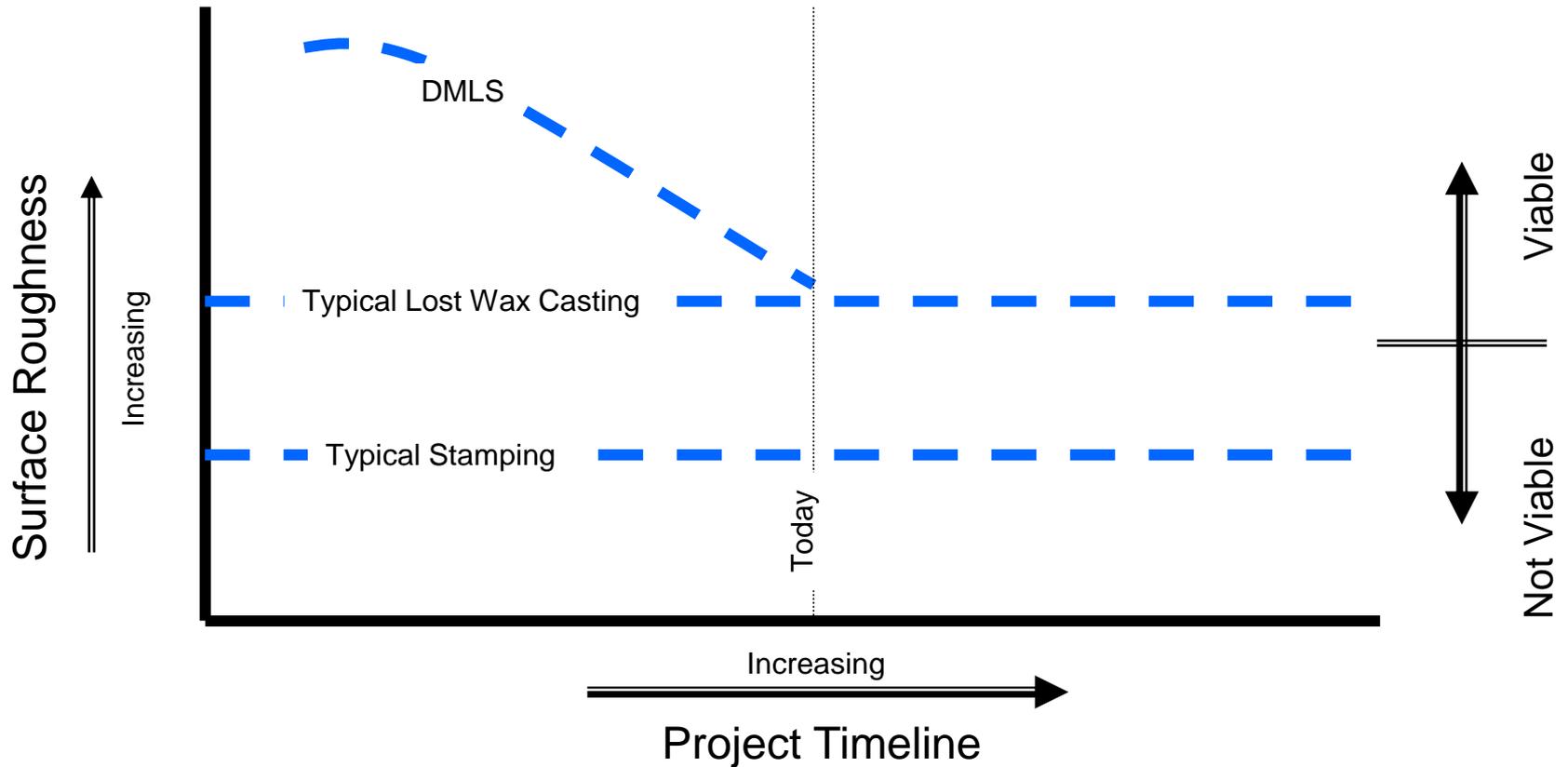
## DMLS – An Introduction

The build platform is raised revealing the final part. The powder is then removed, sieved and reused.



# DMLS – An Introduction

## Surface finish/roughness



## DMLS – An Introduction

Parts requiring support during the build phase – Hoptroff London No 3



## eManufacturing

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- DMLS will not replace existing mature production methods.
- Parts designed for traditional process capabilities will be difficult to produce from in a cost effective manner using DMLS.
- Designers are beginning to understand the new rules and lack of constraints associated with DMLS.
- New watch and jewelry designs will evolve to fully exploit the new found capabilities.
- When this happens eManufacturing will define itself and bring a wide variety of digital tools to the jewelry and watch manufacturing industries.

# eManufacturing

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The eManufacturing solution will focus on six key areas:

1. The removal of tooling costs—in particular for the preparation of master models for casting.
2. The light weighting of product—intricately supported lattice or hollow structures can be produced to drastically reduce weight.
3. Customization—the ability to rapidly individualize and customize designs for customers and to include security features that can't be reproduced.



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## eManufacturing

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4. Fast lead times—production from a digital file to a finished part within hours.
5. Cost effective – eManufacturing is extremely cost competitive when applied to designs that take full advantage of the strengths of the DMLS manufacturing process.
6. Very high design flexibility—parts that cannot be easily produced by other methods such as the 18K mesh.

# eManufacturing

Parts that cannot be made easily by other production methods



## eManufacturing

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The areas believed to be vital for the continued growth and success of DMLS as driven by an eManufacturing business model are as follows:

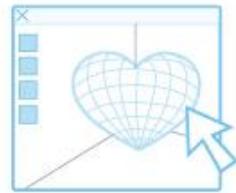
- User interface
- File cleaning
- File encryption to protect intellectual property rights
- Part orientation on the build platform
- Automated build structures
- Automated light weighting
- Customization of parts
- Automated costing and quotation models
- Education

# User Interface

A smooth customer design, upload and amend experience is vital.....



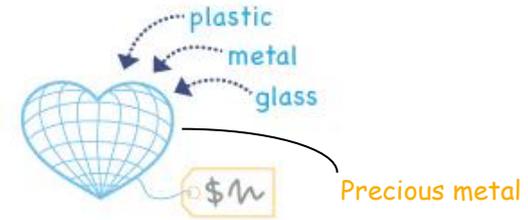
Idea!



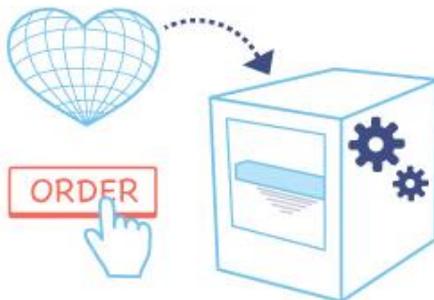
Model your design.



Upload to Shapeways.



Choose materials  
& get instant pricing.



We'll fabricate your order with  
3D printing awesomeness...



...and ship it  
anywhere in the world.



Your idea made real!

# File Cleaning

Analyze



Clean



Repair



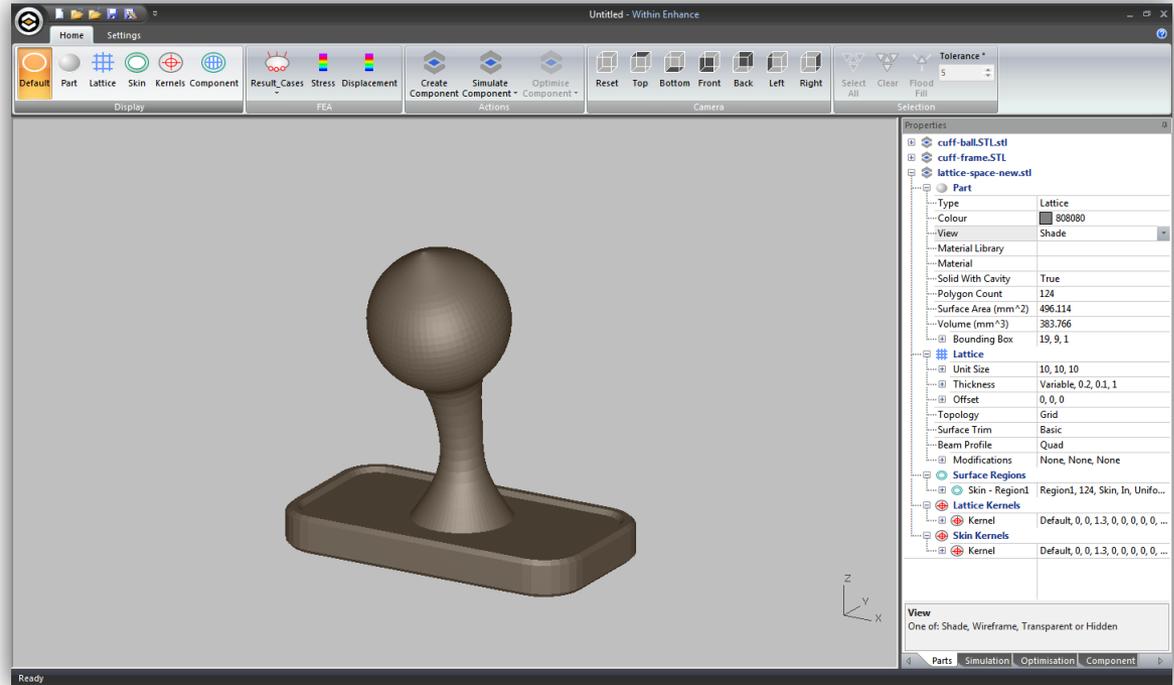
Prepare



Report



Accept



# File Encryption

Secure



Encrypt



Compress



Owner Instructions



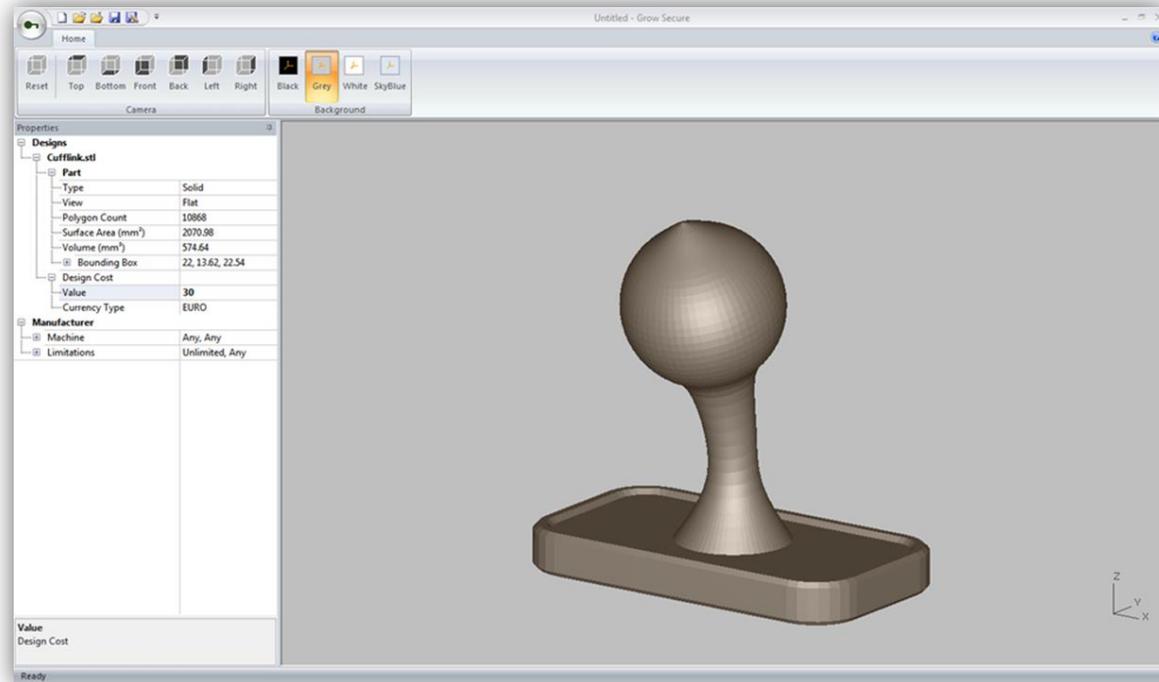
Control materials



Control Quantities

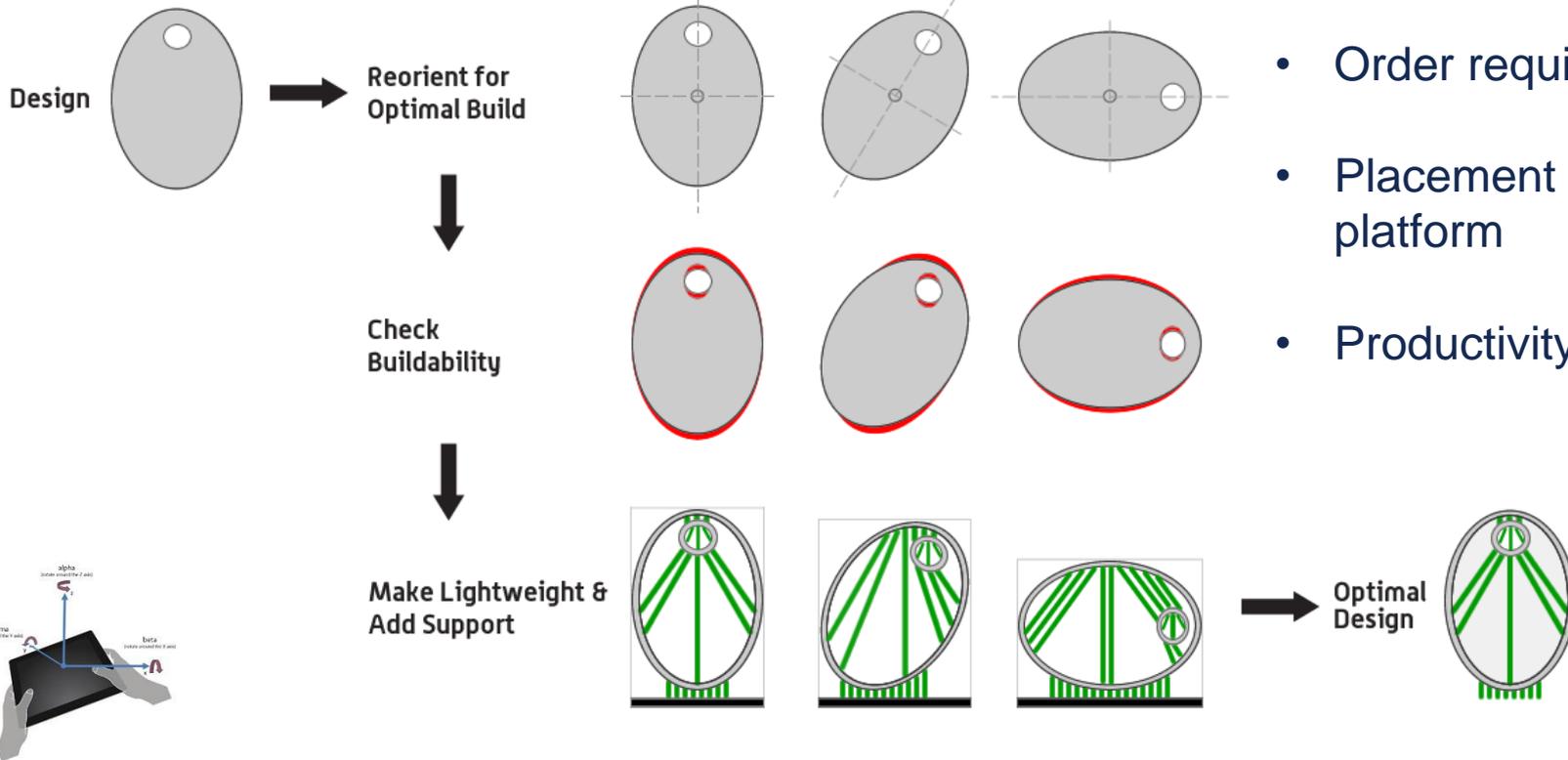


Restrict production



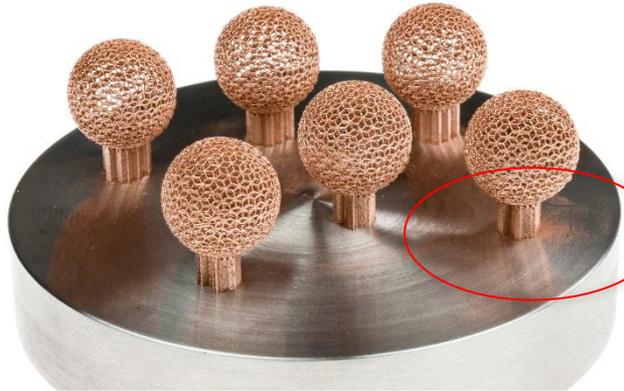
# Part Orientation on the Build Platform

Orientation automated to take into account .....

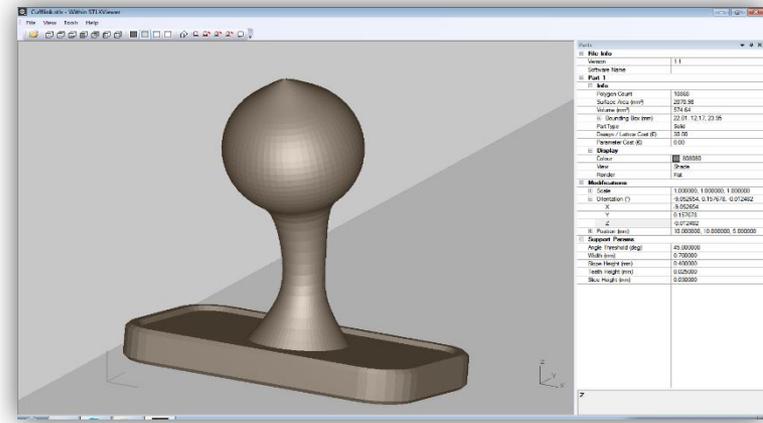
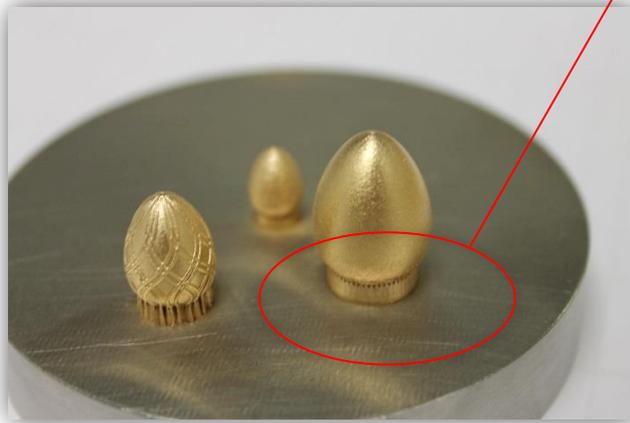


- Part geometry
- Support structure
- Order requirements
- Placement on build platform
- Productivity

# Automated Build Structures



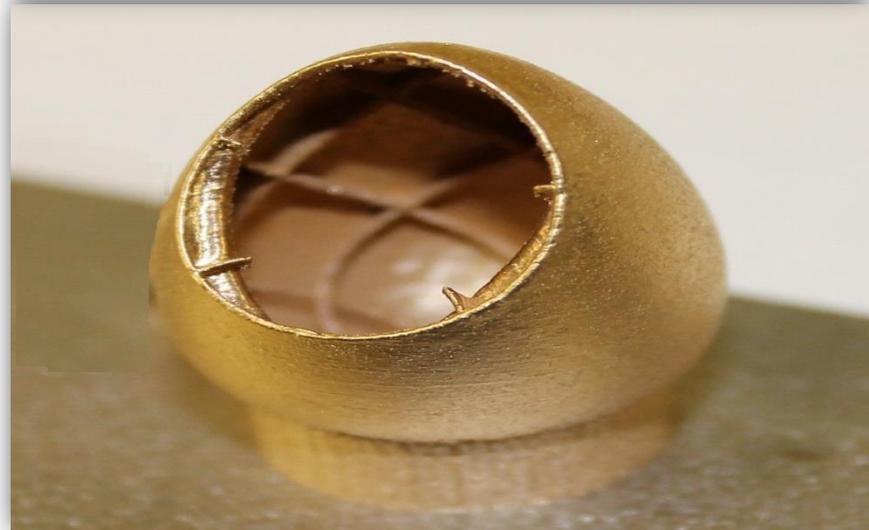
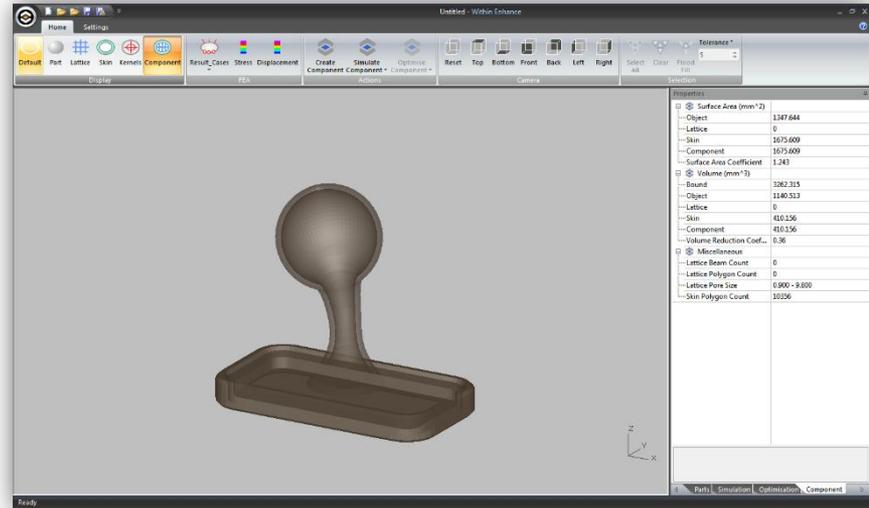
- Used with the orientation software
- Optimizing the support structure
- Reducing the amount of support
- Increasing yield
- Minimising contact with the part



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# Automated Light Weighting

- Assessment
- Area selection
- Lattice structures if required
- Hollowing
- Light weight
- Appearance unchanged



# Customization of Parts

*Aria Gold*

To customize just type your name  
on the keyboard.  
To delete characters use DEL.

[www.digitalforming.com](http://www.digitalforming.com)



POWERED BY Digital Forming 

## Customization of Parts

No tools of moulds required – increasing the cost efficiency of each design.

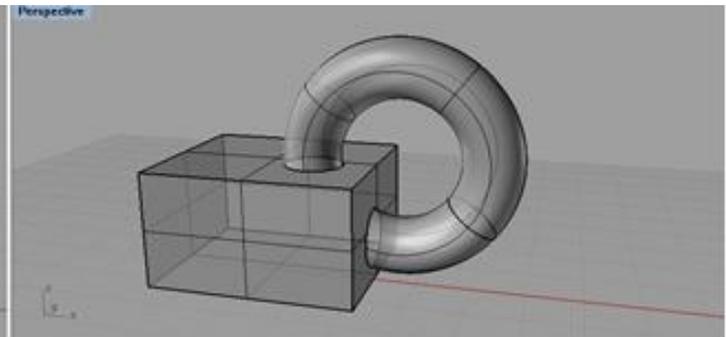
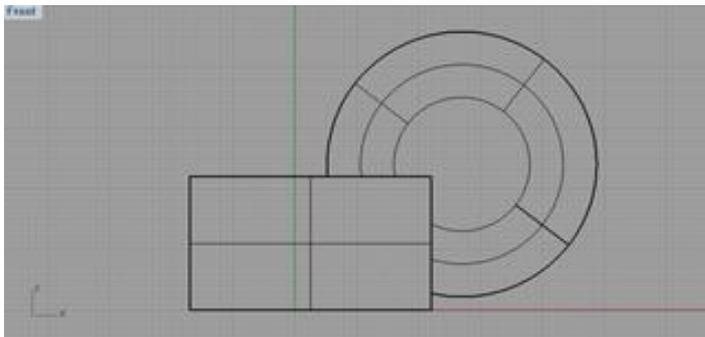
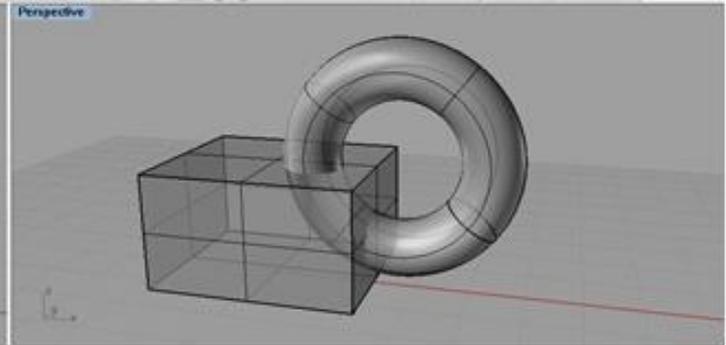
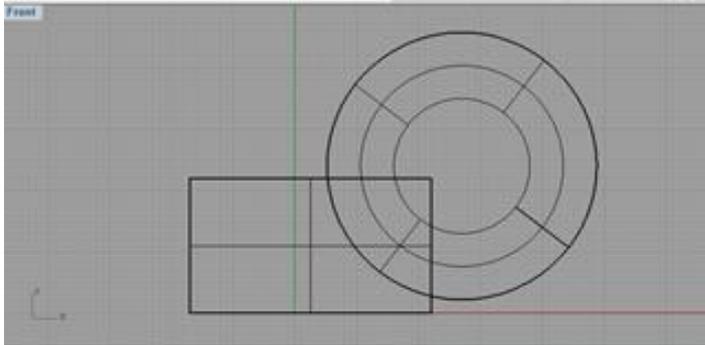




*“as with any new technology, educating designers, manufacturers, technicians and the end user is essential in order for the DMLS process to become widely adopted”*

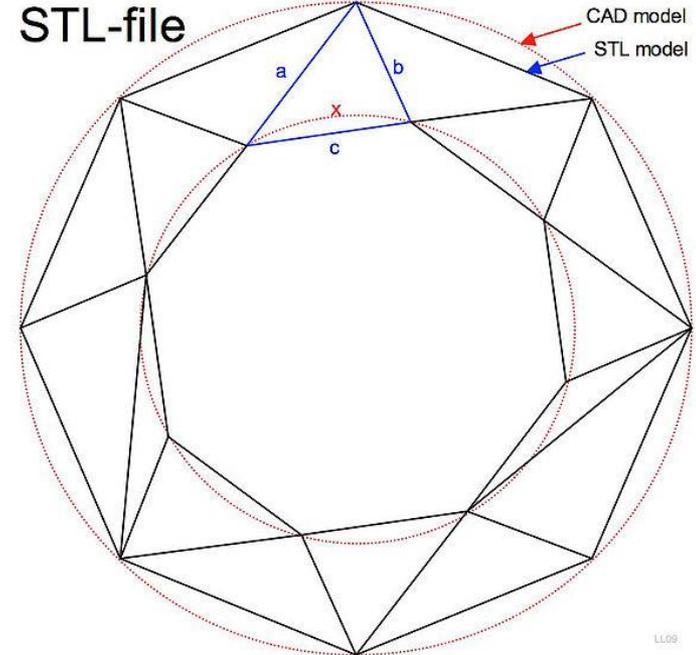


## Internal surfaces



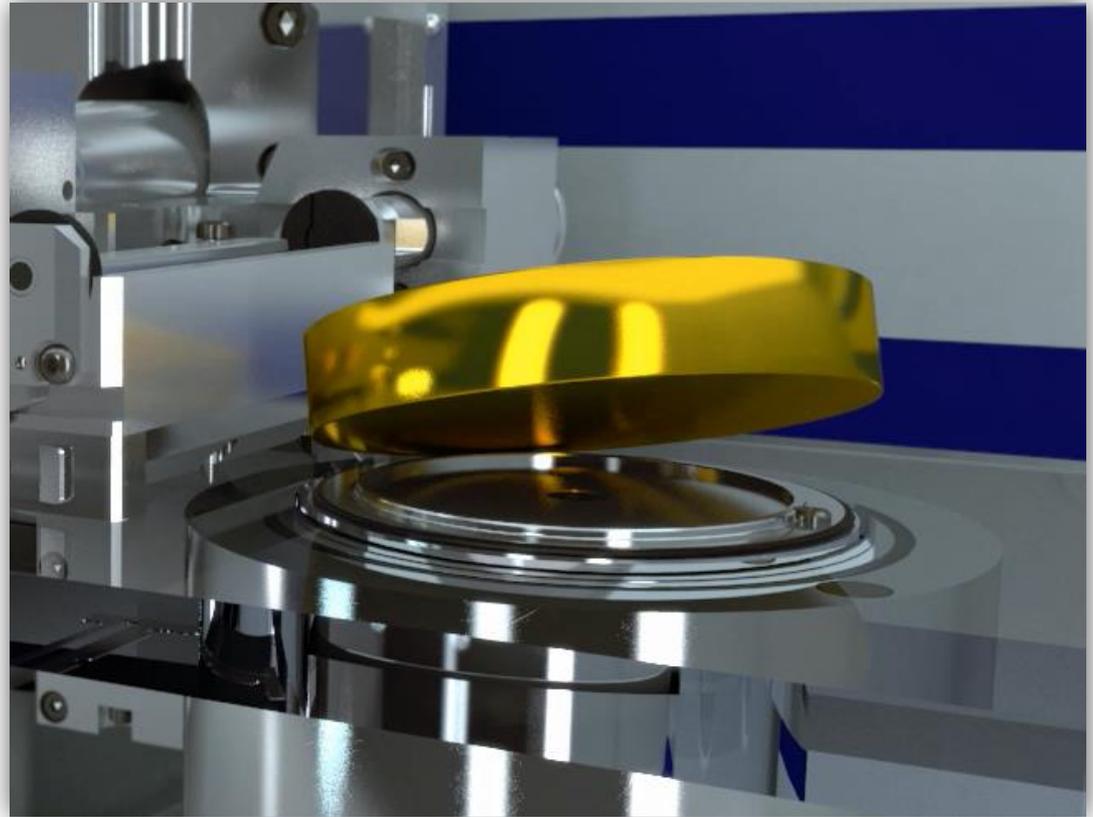
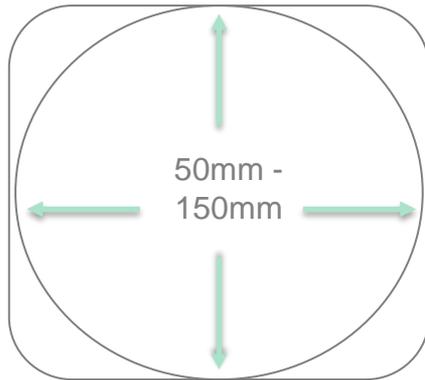
## CAD format

# STL

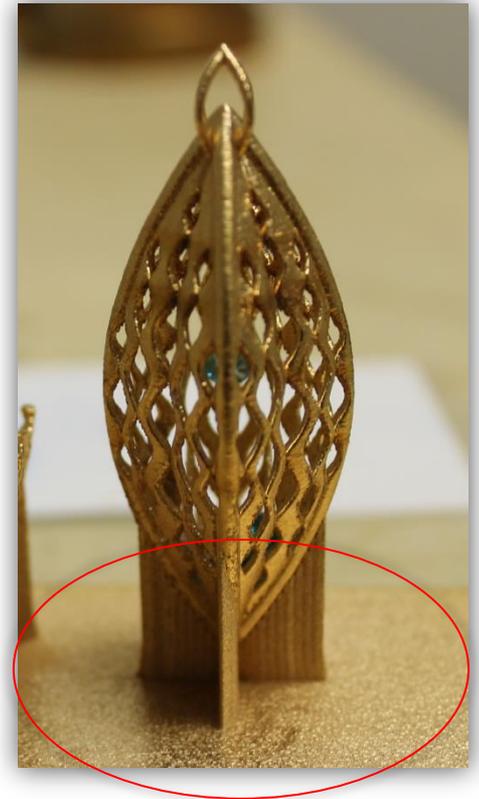
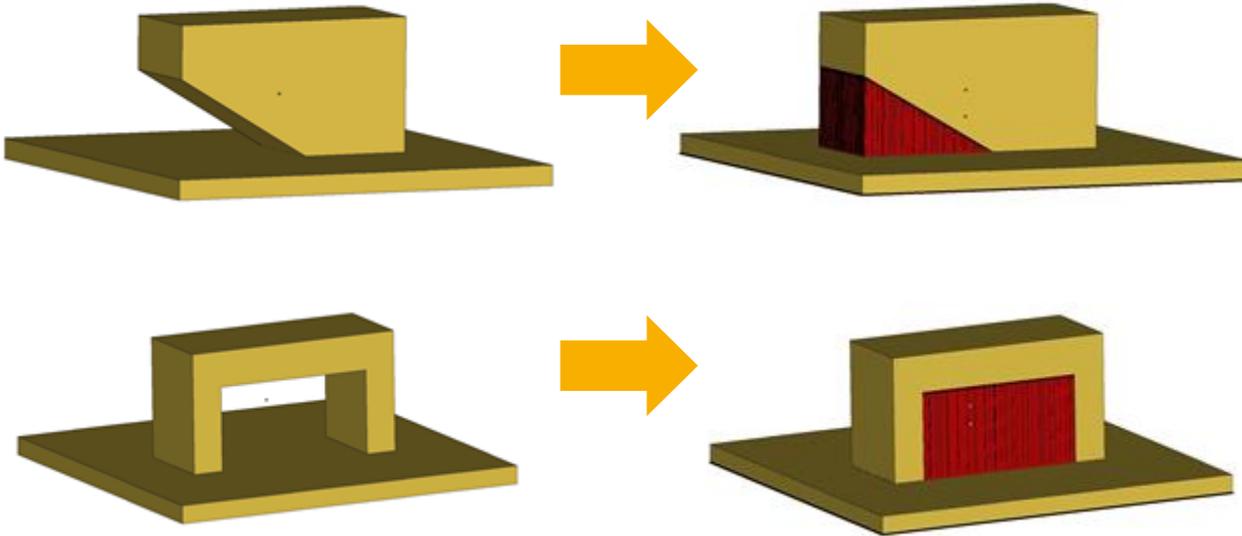
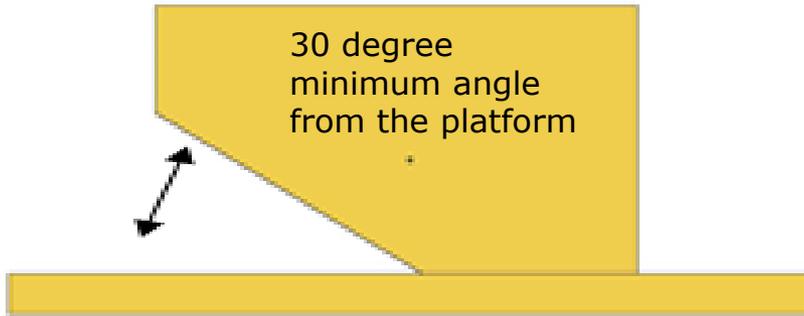


STL (STereoLithography) is a file format native to the stereolithography CAD software created by 3D Systems. STL is also known as Standard Tessellation Language. This file format is supported by many other software packages; it is widely used for rapid prototyping and computer-aided manufacturing. STL files describe only the surface geometry of a three-dimensional object without any representation of color, texture or other common CAD model attributes. The STL format specifies both ASCII and binary representations.

## Platform



## Supports



## Conclusion

- The design freedoms and benefits that DMLS has to offer will continue to mature and develop.
- DMLS will become a standard accepted tool for the designer and manufacturer.



## Conclusion

- The eManufacturing model will act as the critical interface between designers, manufacturers and consumers.
- eManufacturing solutions must be designed with careful planning and a willingness to explore non-traditional manufacturing solutions.



## Conclusion

- As we move into a digital world the jewelry and watch industry needs to consider the new production techniques eManufacturing will bring.
- eManufacturing and DMLS will play an important role in the future growth and success of our industry.



Thank you for Listening

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