



Third Industrial Revolution Reality?

Dr Ir Bart Van der Schueren
Executive Vice President

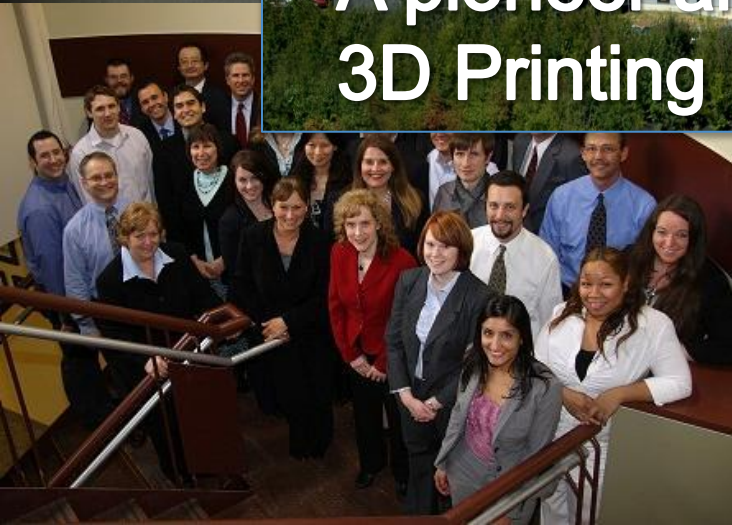




INTRODUCTION

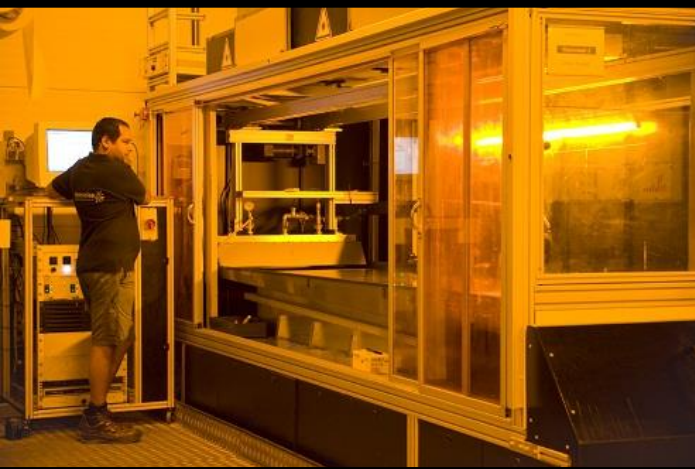


- Founded in 1990
- Over 850 employees worldwide and growing
- HQ in Leuven, Belgium - offices all over the world
- A pioneer and world leader in the field of 3D Printing



Three Core Competences

- 1 3D Printing – also known as Additive Manufacturing
 - Machine park of 80+ machines



Three Core Competences

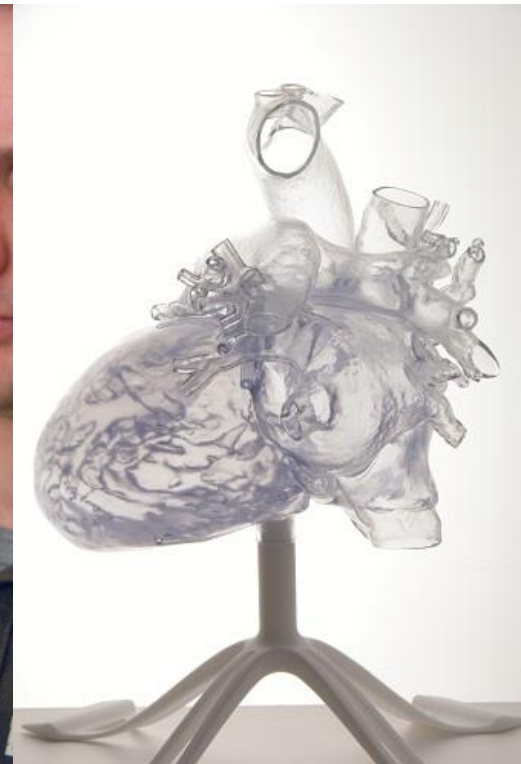
2 Digital CAD



- Represent 3D volume by triangles
- Design automation

Three Core Competences

③ Medical Image Based Engineering and Manufacturing



From CT/MR images

...to anatomical engineering

...to physical models

AMS ADDITIVE MANUFACTURING SERVICES



SAM SOFTWARE for ADDITIVE MANUFACTURING



CMF CRANIO-MAXILLO FACIAL



.MGX .MGX by Materialise



RF+

RAPID FIT+



ORTHO

ORTHOPAEDICS



BME

BIOMEDICAL ENGINEERING



i.MAT

I.MATERIALISE



AMS ADDITIVE MANUFACTURING SERVICES



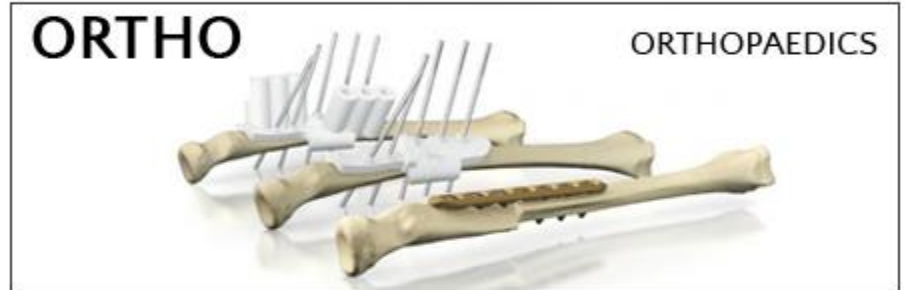
RF+ RAPID FIT+



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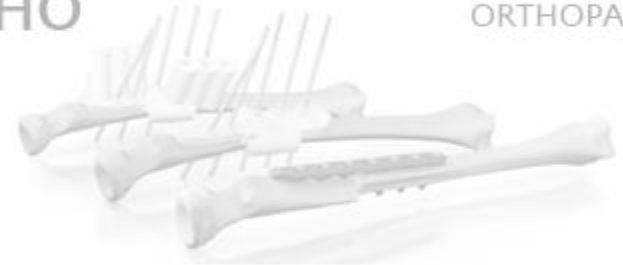


SAM SOFTWARE for ADDITIVE MANUFACTURING



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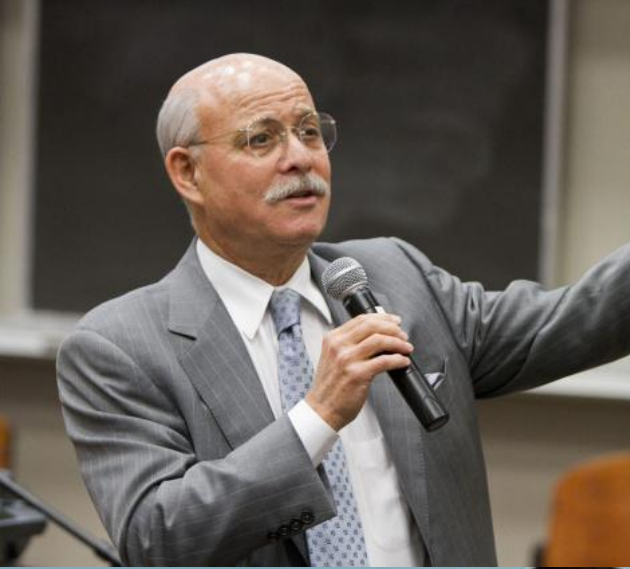


i.MAT

I.MATERIALISE



3RD INDUSTRIAL REVOLUTION?

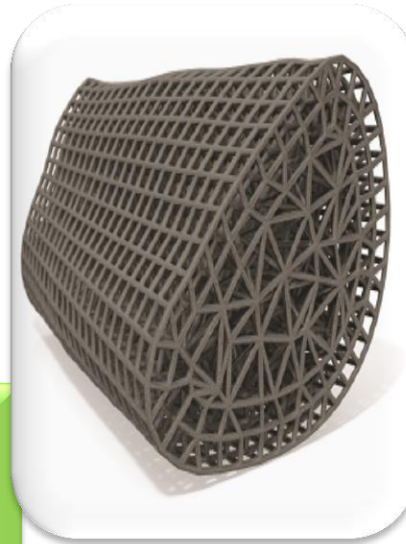


Third Industrial Revolution?



WHY ARE PEOPLE CHOOSING FOR 3D PRINTING?

To leave a smaller carbon footprint



To make great things happen



Bromley Technologies

To reduce costs

Bangle and ring set by Electrobloom



To create something unique



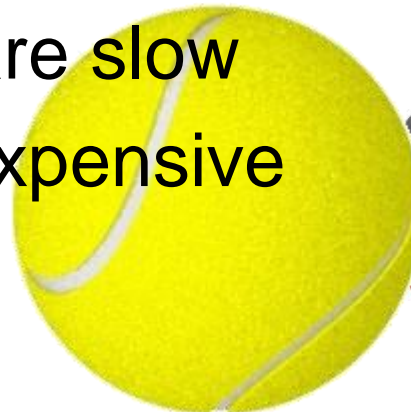
Iris van Herpen © Michel Zoeter

Strengths of the Technology

- Toolless production
 - No upfront investment
 - Design changes are for free
 - Need for correct 3D CAD file
- (Almost) unlimited freeform
 - Limitation is mainly in mind of designer
 - Too simple products are not competitive
- Technologies are slow
- Materials are expensive

Strengths of the Technology

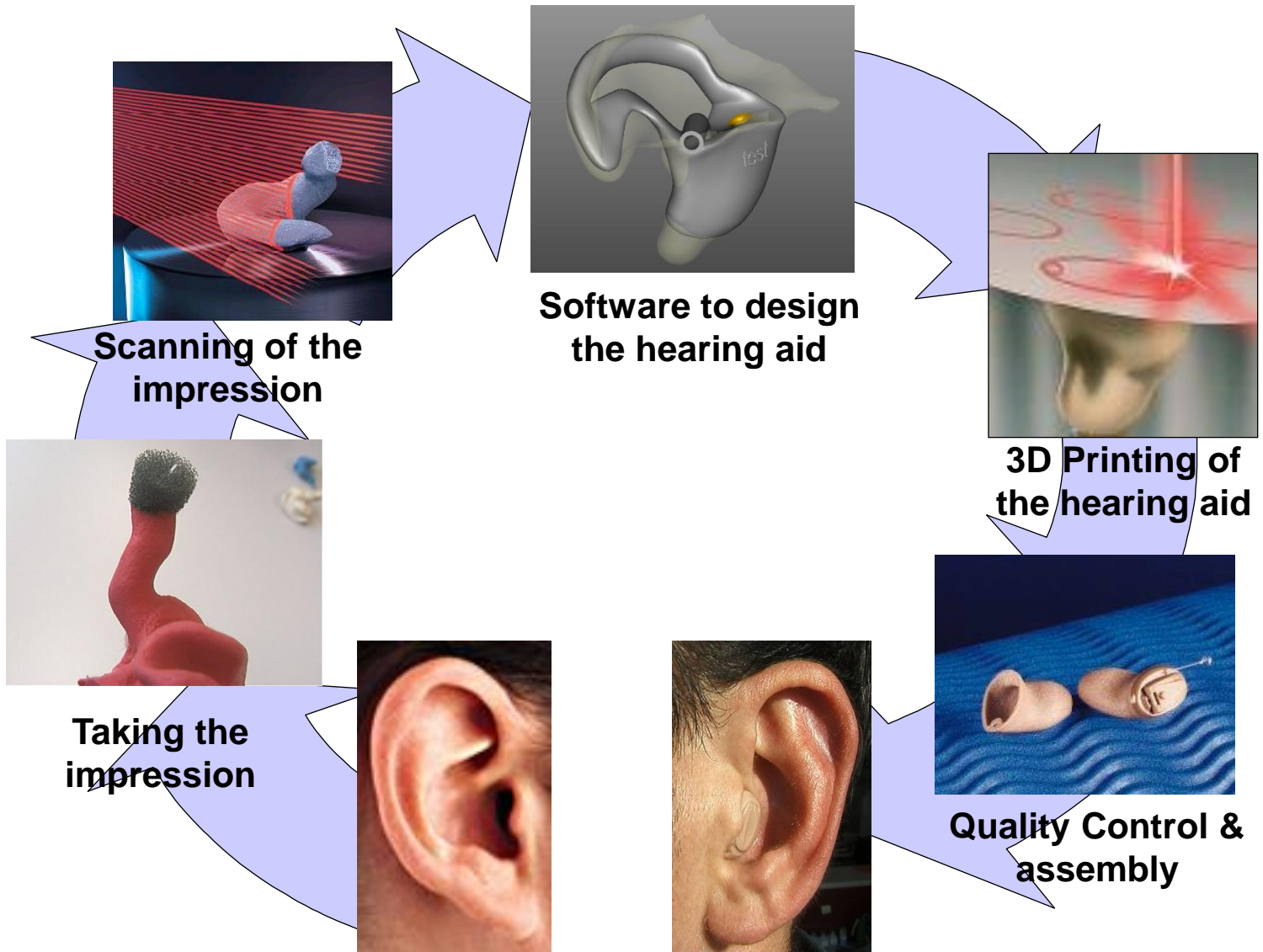
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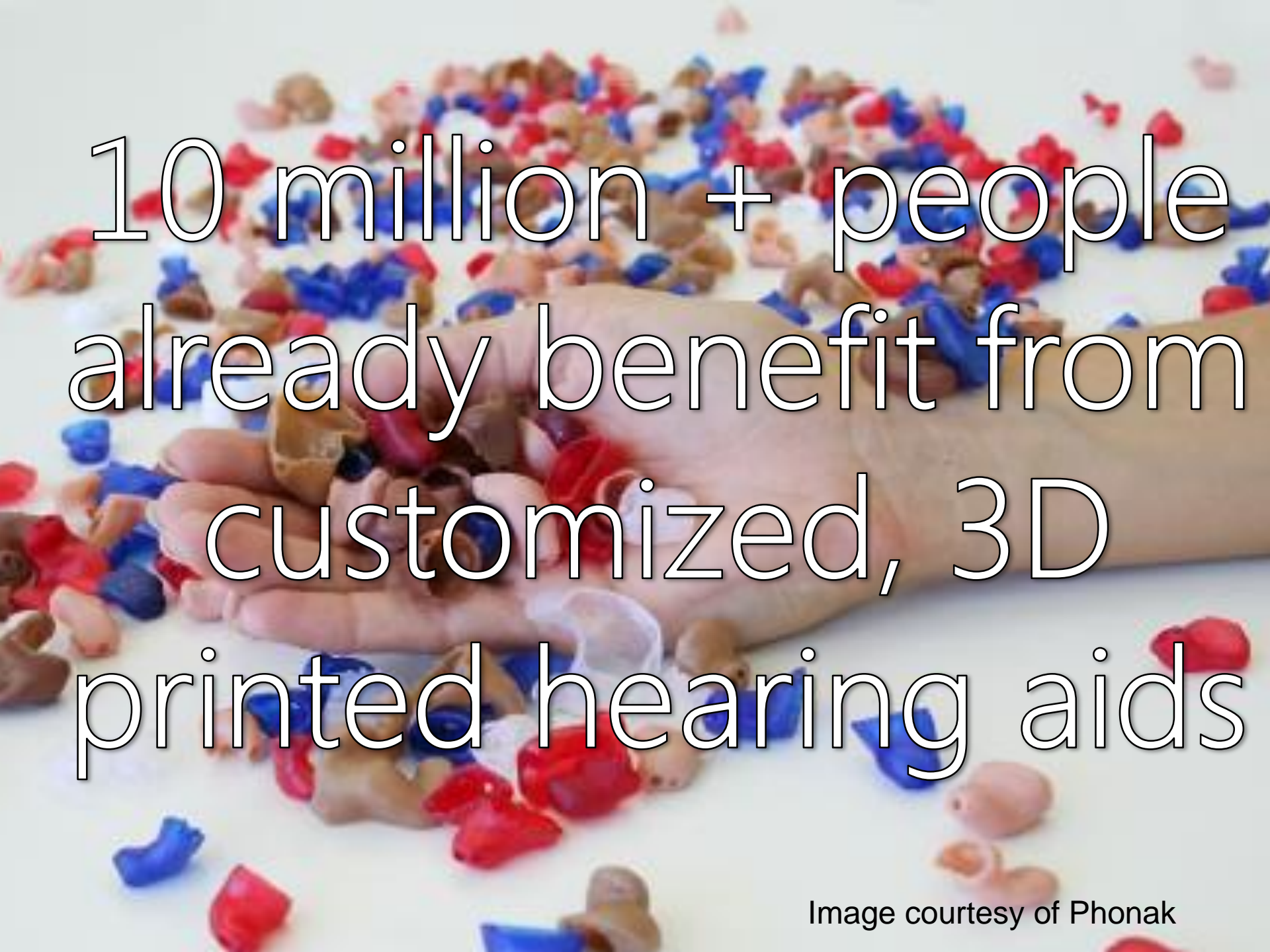


HOW CAN THIS CREATE NEW BUSINESS?

CASE STUDY 1: MASS CUSTOMISATION

Hearing Aids



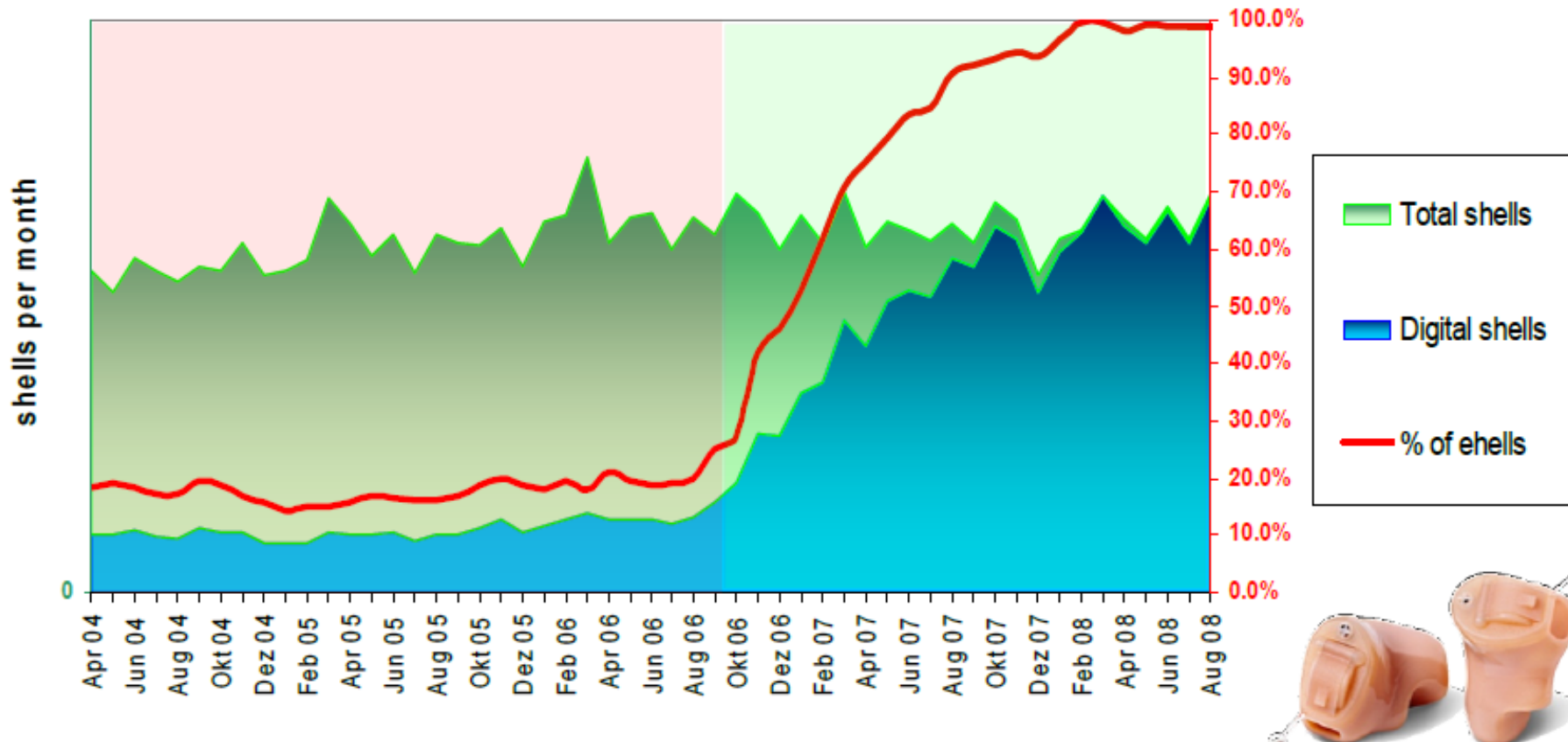
A close-up photograph of a person's hand holding a large quantity of small, colorful, 3D printed hearing aid shells. The shells are in various colors, including red, blue, and brown, and are scattered around the hand. The background is a plain, light-colored surface.

10 million + people
already benefit from
customized, 3D
printed hearing aids

Image courtesy of Phonak

Hearing Aids

- Digital manufacturing of shells to nearly 100% in 2 years

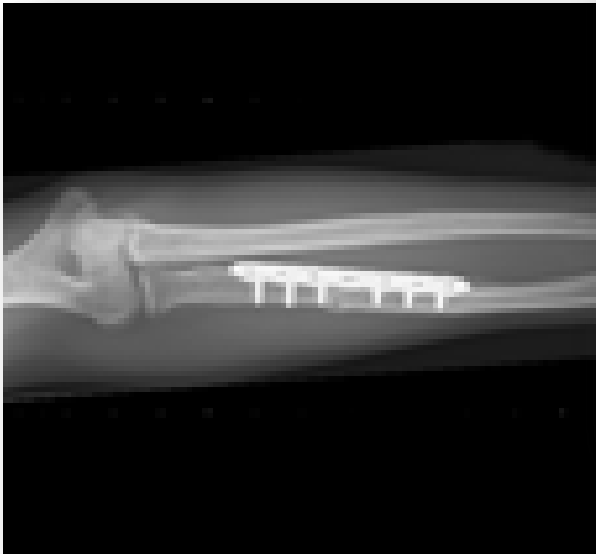


Sup



F. Stockmans, MD, KULeuven – Campus Kortrijk, Belgium
T. Husby, MD, Ulleval Universtitetssykehus, Oslo, Norway

Surgical Tools



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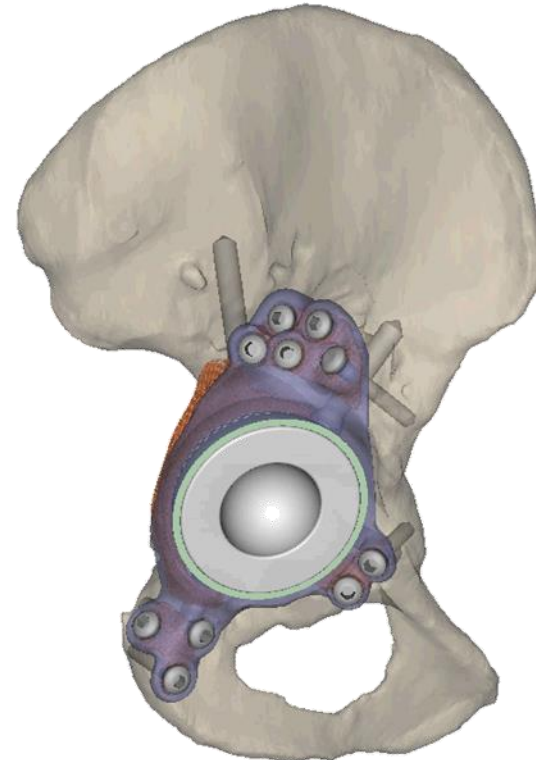
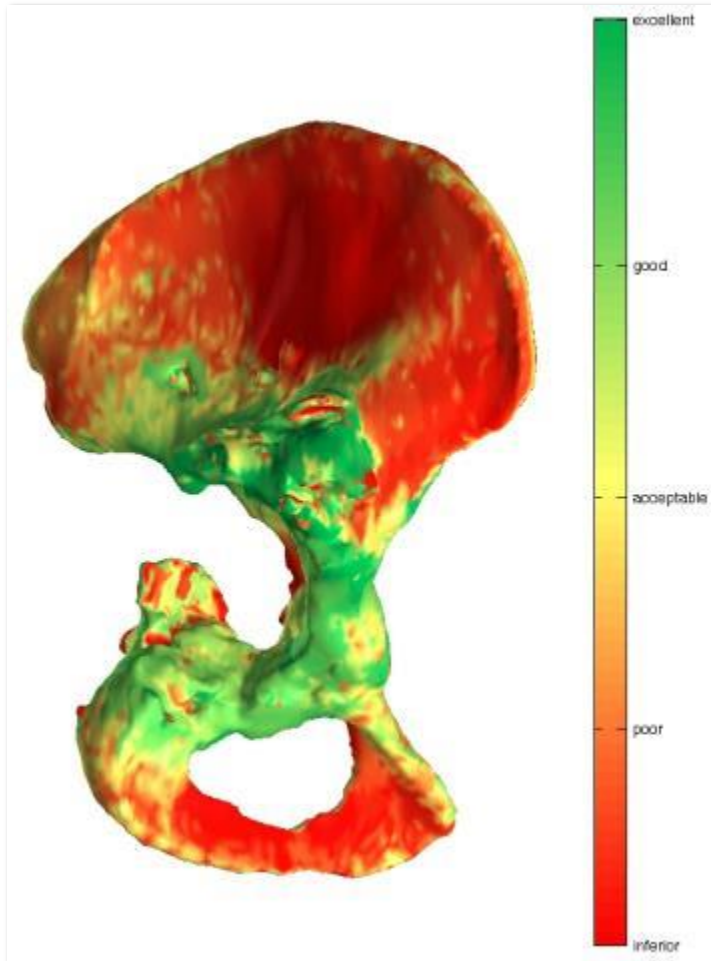
CASE STUDY 2: INCREASE THE ADDED VALUE

The Kaiba case



Image courtesy of Prof. G. Green, S. Hollister
University of Michigan, USA

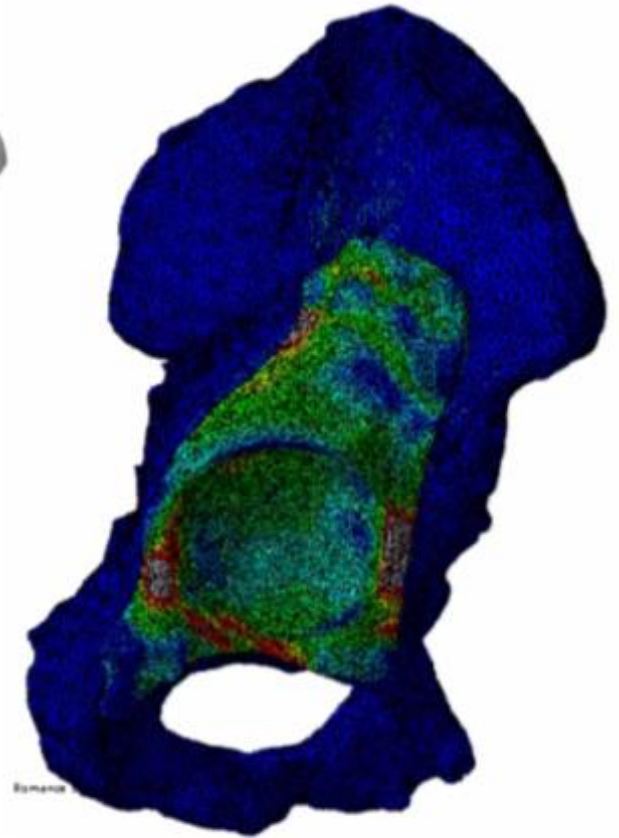
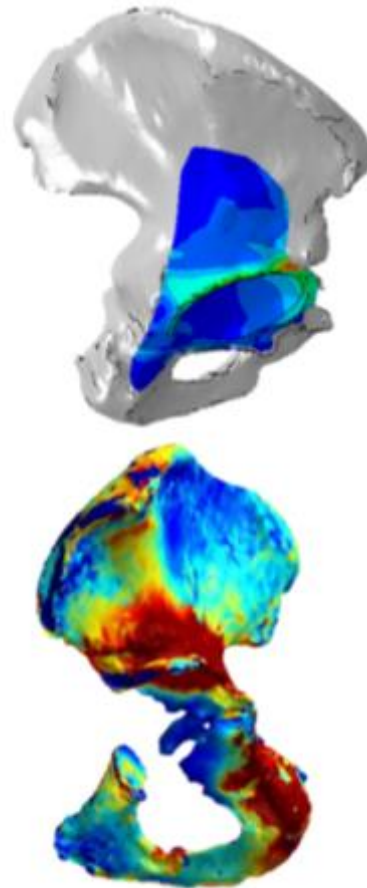
Implants by Mobelife



Implants by Mobelife



Courtesy by W. Bartels, K.U.Leuven



Implants by Mobelife



Fashion



CASER STUDY 3: INVOLVE THE COMPUTER

The Mathematics of Life



Designed by
WertelOberfell - Platform



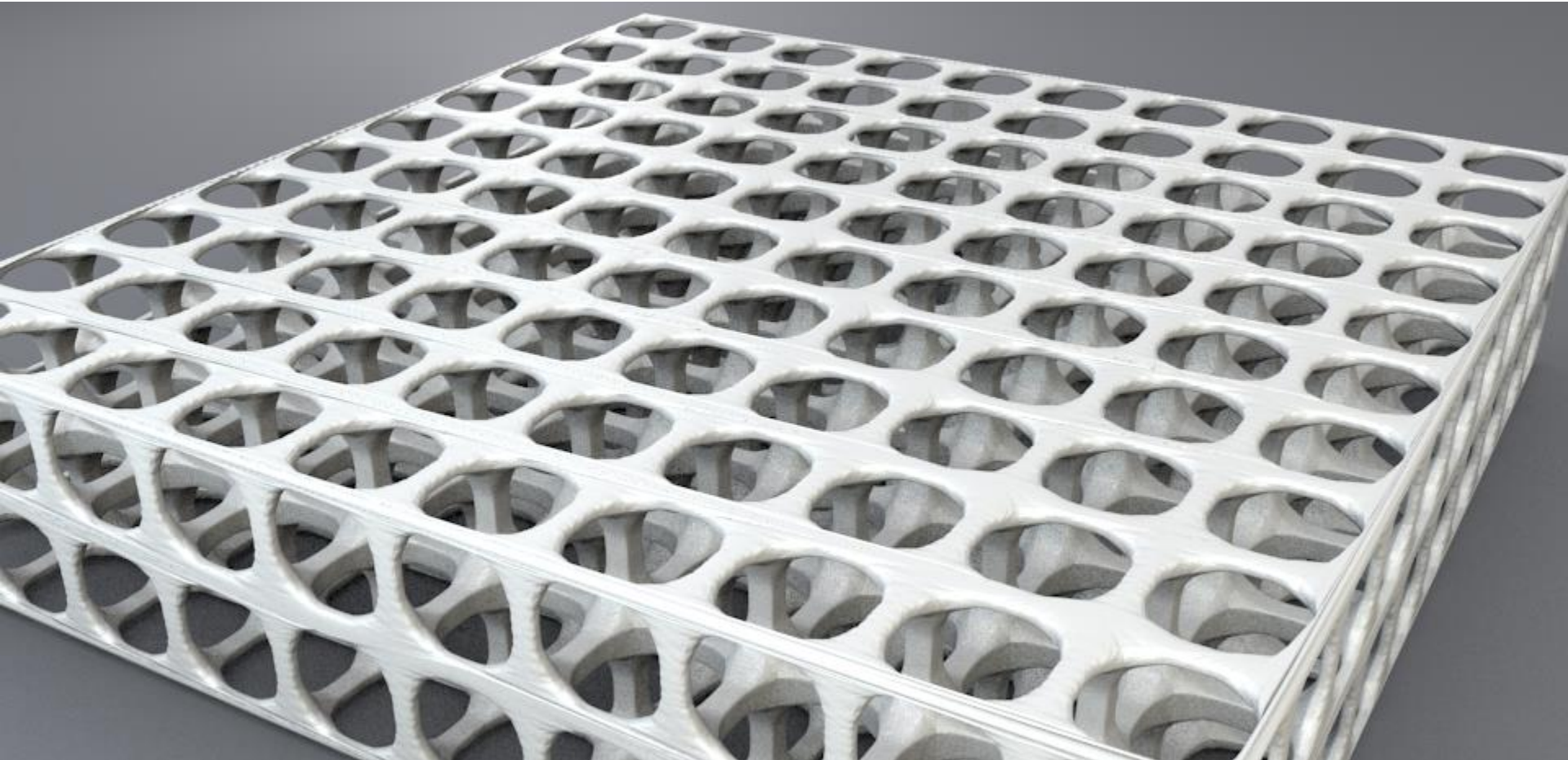
Fractal.MGX

Designed by
WertelOberfell - Platform

© Susan Smart

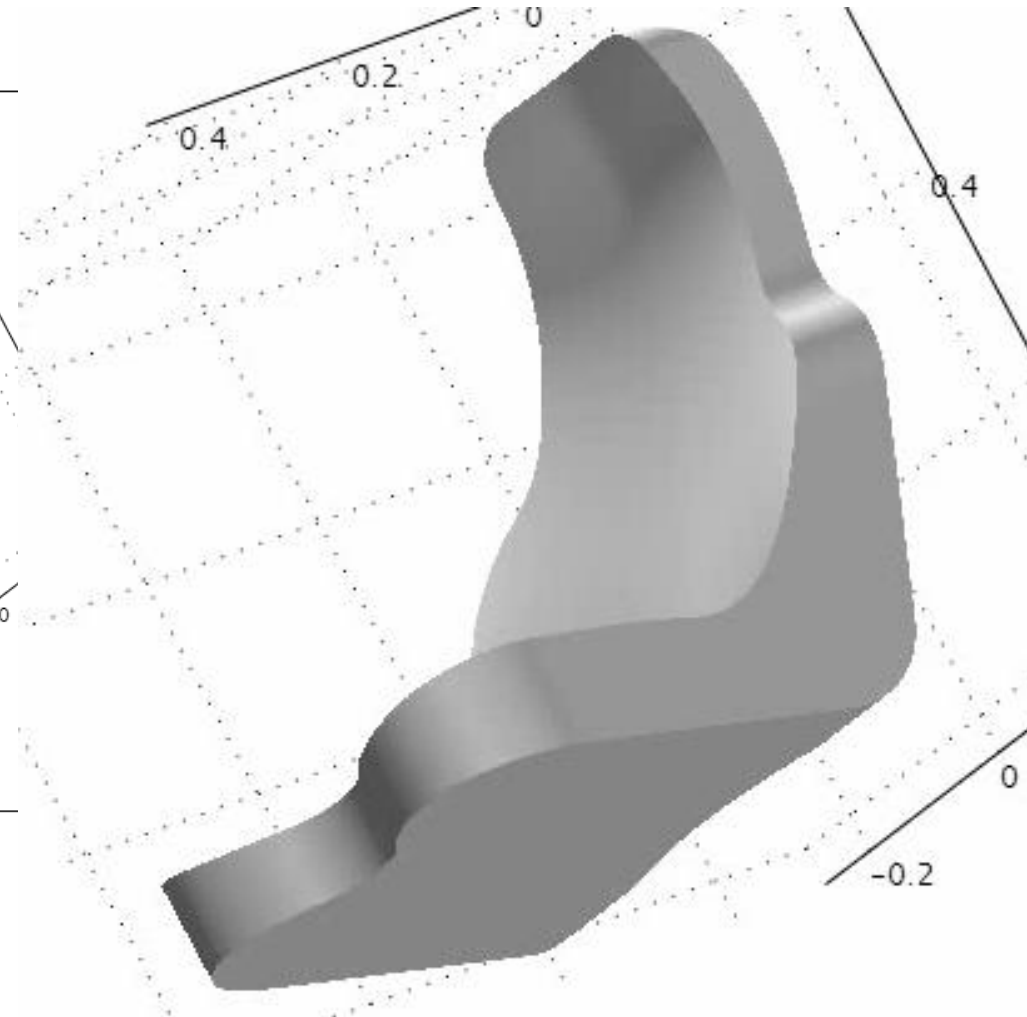
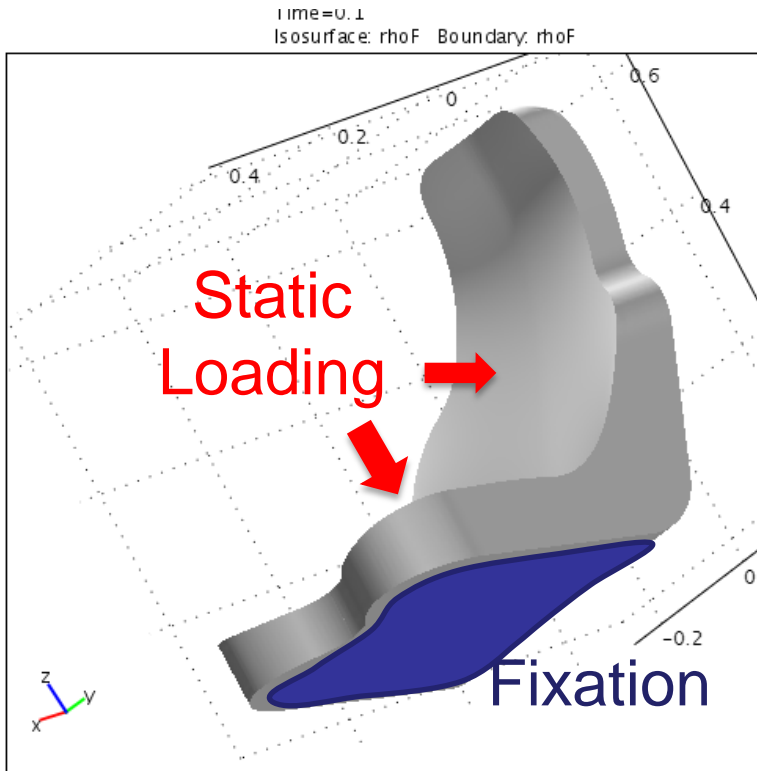
The Mathematics of Life

As in nature, **lightweight** forms can be designed and realized



Topology Optimisation

Design domain



Topology Optimisation



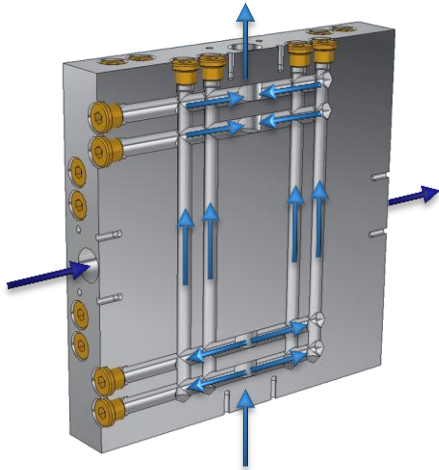
Topology Optimisation





Courtesy Gilles Retsin

Generation of Lightweight



Classical design

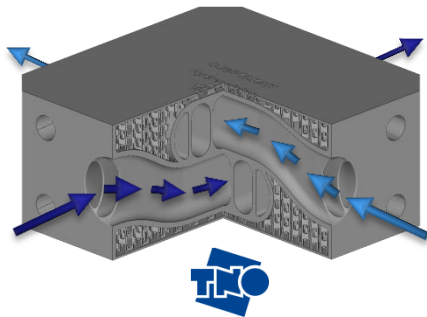
Volume: 2900 cm³
Weight: 19.2 kg
Pressure loss : 4.0% at 200 bar
(8.1 bar)



Volume: 12 x smaller
Weight: 28 x lighter
Pressure loss: 7 x smaller
Burst pressure: 1.7 x higher than test pressure of 600 bar

Optimized design:

Volume : 244 cm³
Weight: 0.7 kg
Pressure loss: 0.6% at 200 bar (1.2 bar)
Burst pressure: 1044 bar

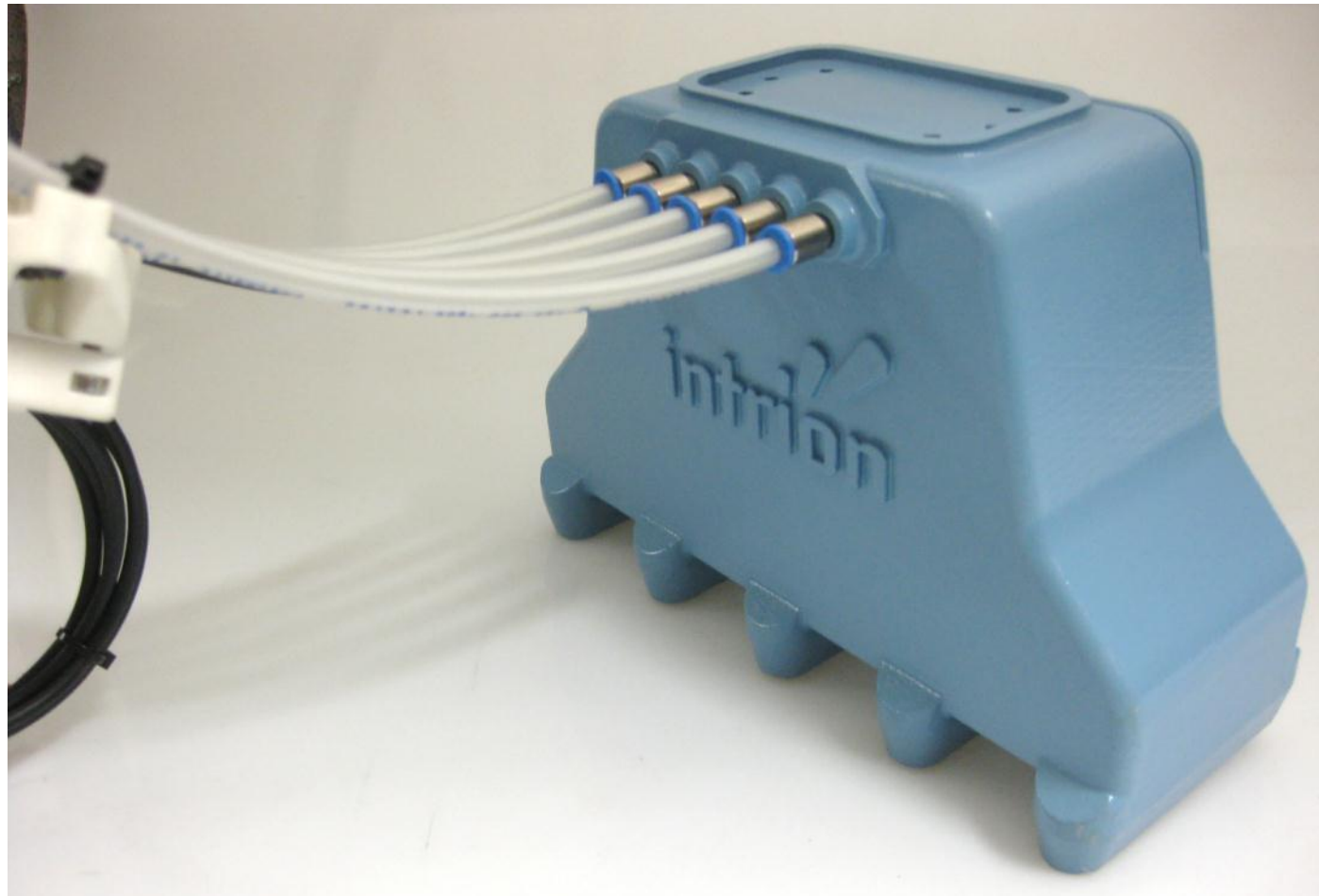


Fraunhofer
IFAM



Function Integration

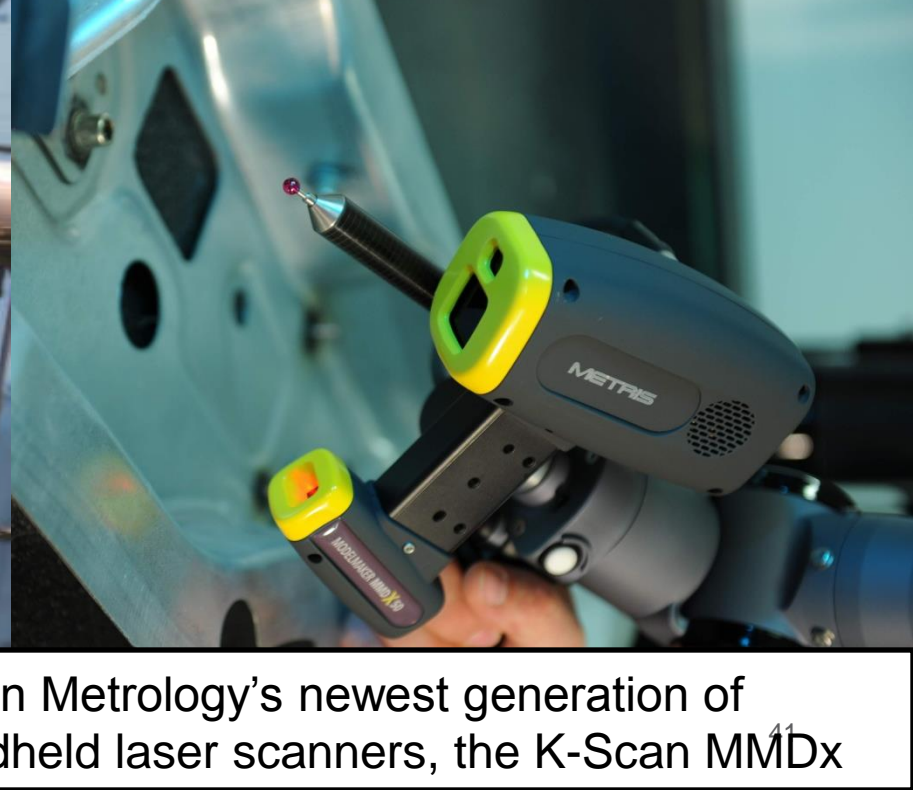
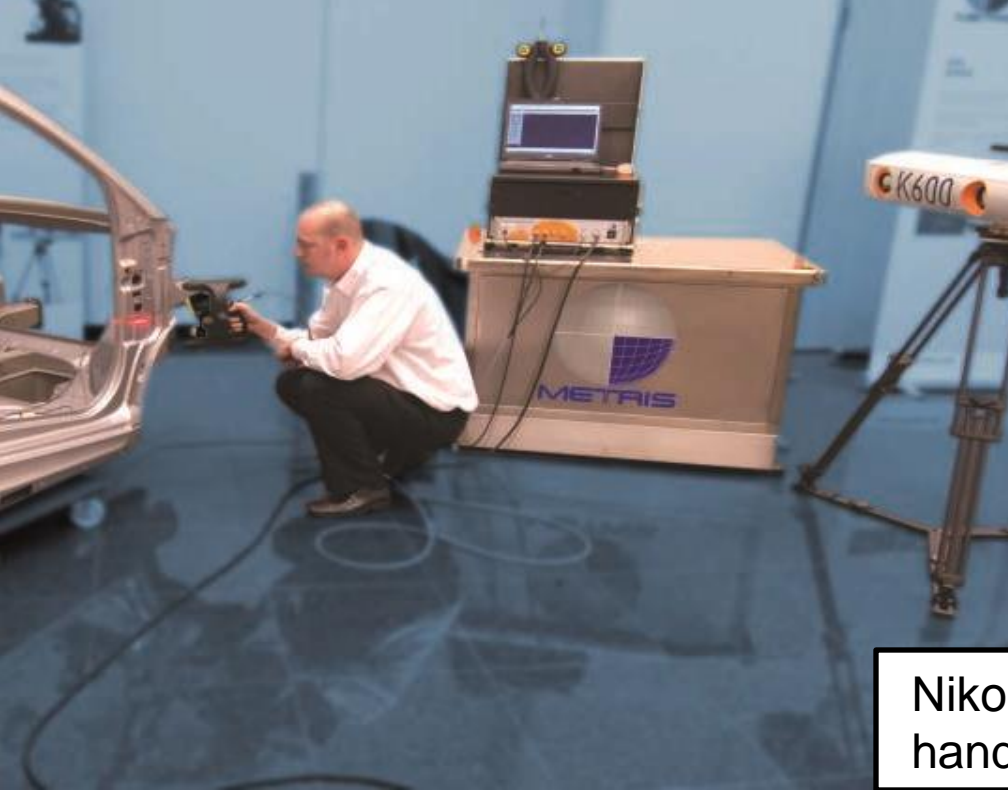
High speed robot application – Industrial automation



Function Integration

Dust extraction in pipe sanding – Industrial automation





Nikon Metrology's newest generation of handheld laser scanners, the K-Scan MMDx

Conclusions

- 3D Printing offers new possibilities to produce parts
- More importantly: it offers a new eco-system that creates new opportunities for new business models
- This is industrial revolution
- And this creates business and jobs (though high skill)



**THANK YOU
QUESTIONS?**