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We Walk Alongside The World
Stock Code: 300415

YIZUMI GERMANY
Innovations Alongside The World

Industrial Additive Manufacturing

Nicolai Lammert

AM Workshop

Aachen, the 11.10.2019

Yizumi Germany GmbH

Agenda

- About Us
  - Location and Employees
  - Goals and Vision
  - Departments
- Yizumi Precision Machinery
  - Location and Employees
  - Goals and Vision
  - Product Portfolio

About Us

Location and Employees

YIZUMI GERMANY
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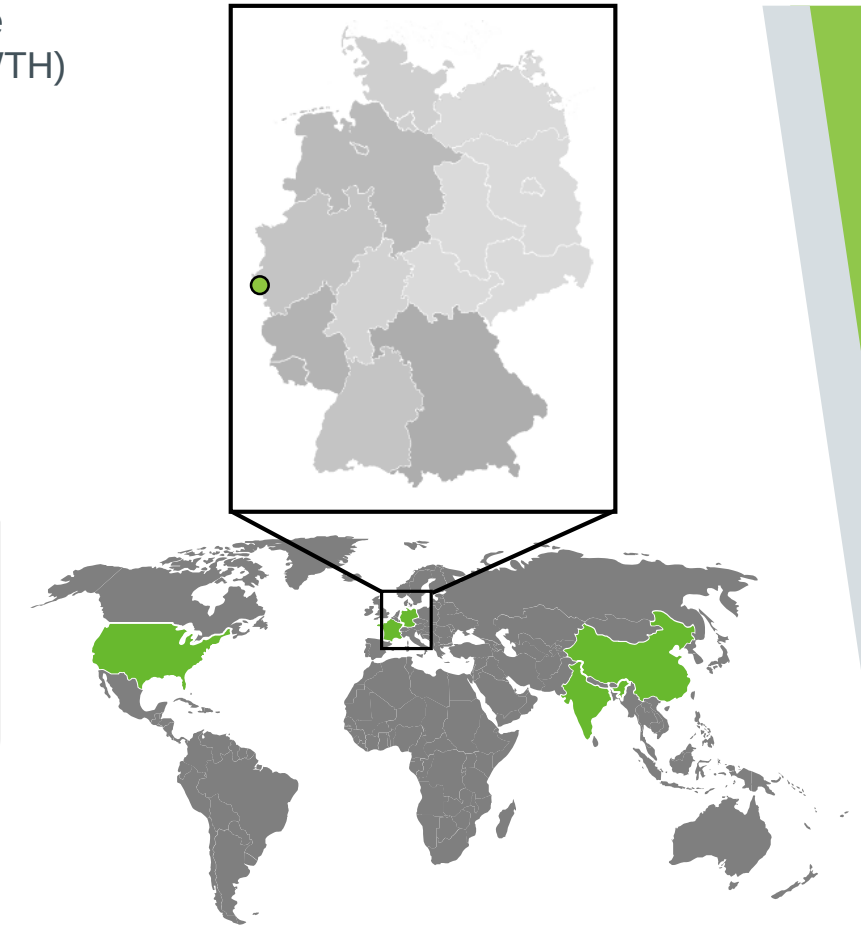
At the Production Cluster at the Campus Melaten of the Rheinisch-Westfälischen Technischen Hochschule (RWTH) in Aachen

RWTH Aachen University:

Students:	45,256 students
Chairs:	564
Employees:	8,500
Turnover:	998.5 Million Euro

AZL AACHEN EXCELLENCE IN LIGHTWEIGHT PRODUCTION BUSINESS PARTNER



Location

Campus Boulevard 30
52074 Aachen

Employees

Number: 20

5 Development Engineers
3 Sales Engineers

4 Technical Employees
2 Accounting Manager
6 Student Worker

About Us

Goals and Vision

YIZUMI GERMANY
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Goals

- European quality standards
- Development of innovative and smart production approaches
- Combining German Innovation Power with Chinese scale of economy production

Connecting two Worlds

Science – Economy
Germany - China

About Us

Departments

YIZUMI GERMANY
INNOVATIONS ALONGSIDE THE WORLD

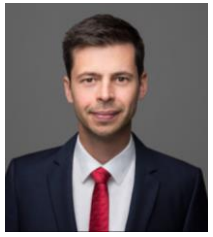
Departments

- Special Injection Moulding Technologies
- Thixomoulding & Multi-Material Design
- Additive Manufacturing
- Sales

Development

Benjamin Weßling

Special Injection Moulding Technologies
00 49 241 412 523 40



Philipp Ochotta

Thixomoulding & Multi Material Design
00 49 241 412 523 30

Nicolai Lammert

Additive Manufacturing
00 49 241 412 523 20

Sales

Ümüt Topbac

Sales Director North Europe
00 49 157 805146 44

Robert Weber

Sales Director South Europe
00 49 157 805146 45

Yizumi Precision Machinery

Company Structure

YIZUMI GERMANY
INNOVATIONS ALONGSIDE THE WORLD

Guongdong Yizumi Precision Machinery Co., Ltd.

Companies	Departments
Yizumi Germany GmbH	Injection Moulding
HPM	Rubber Injection Moulding
	Thixomoulding
	Die Casting
	Robotics & Automation
	Additive Manufacturing

6 Departments

2 Companies

Yizumi Precision Machinery

Location and Employees

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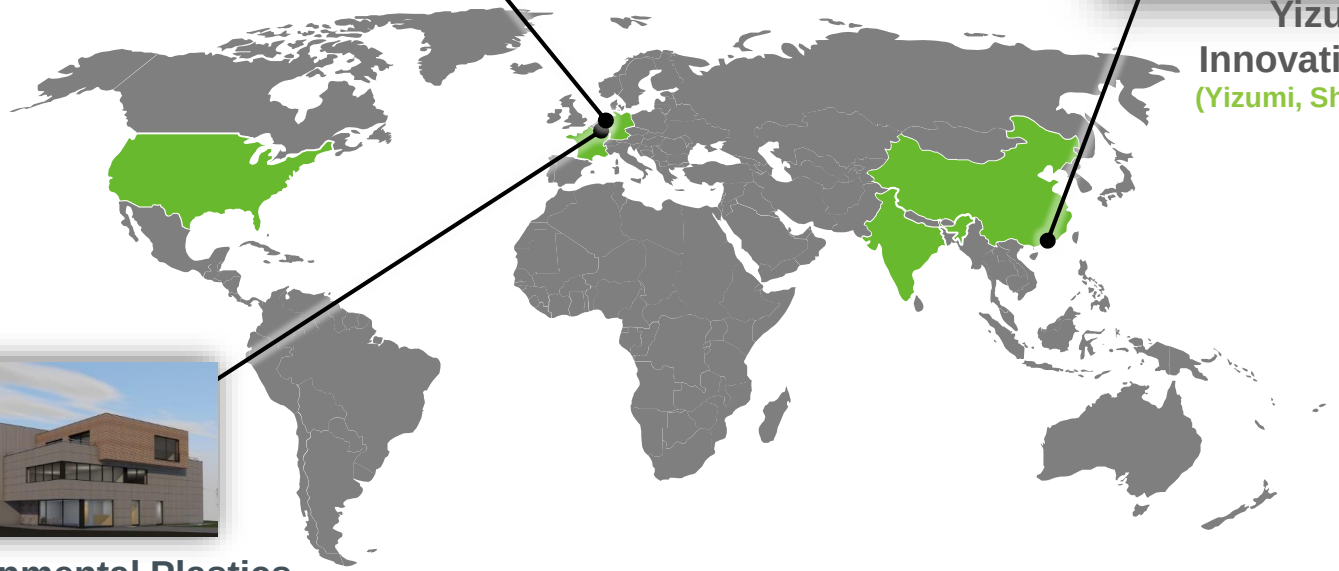
R & D Center
(Yizumi Germany GmbH, Aachen, Germany)

Yizumi Global Innovation Center
(Yizumi, Shunde, China)



Environmental Plastics Innovation Center
(Prince Weiss, Eupen, Belgium)

Plants:
- Gaoli, China
- Wusha, China
- Suzhou, China
- Shunde, China
- Wujiang, China
- Ahmedabad, India
- Ohio, USA

+2500
Employees

+130
Countries

provides

+9000
Machines per Year

Yizumi Precision Machinery

Goals and Vision

YIZUMI GERMANY
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Goals

We are dedicated in enabling Chinese equipment technology keeping pace with the world and providing global clients with better investment return and customer experience.

Mission

We are determined to become a world-class company in our field.

Vision

We wish to become a long-lasting enterprise with effective operations, efficient management and excellent culture, of which the employees are proud and to which social respect are showed.

Yizumi Precision Machinery

Location and Employees

YIZUMI GERMANY
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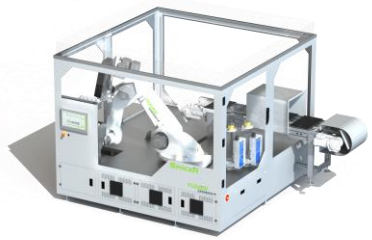
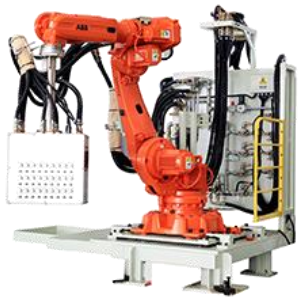


- Injection Moulding
- Rubber Injection Moulding
- Die Casting
- Thixomoulding
- Robotics & Automation
- Additive Manufacturing



+2500
Employees

+130
Countries

provides

+9000
Machines per Year

Yizumi Germany GmbH

Agenda

- Economic Use of AM
- SpaceA Technology Approach
- Best Practice Design

Additive Manufacturing for Economic Use

Current Cost Structure – Key Questions

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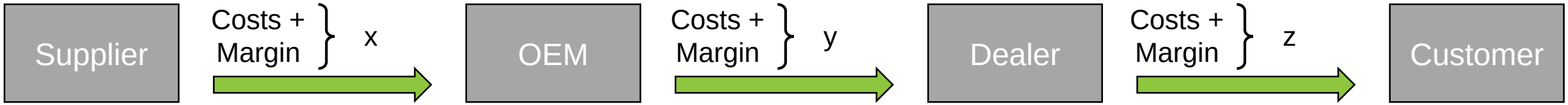
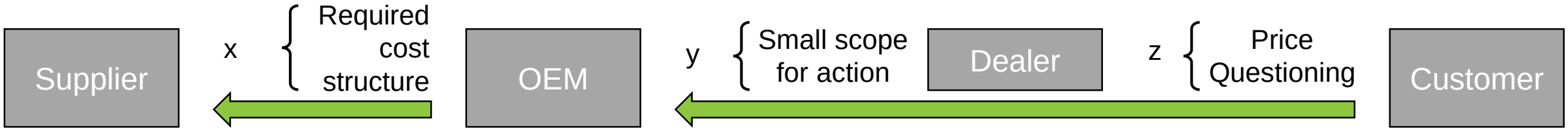
As an example: How automotive industry grows that much?



Where is the acceptance level?

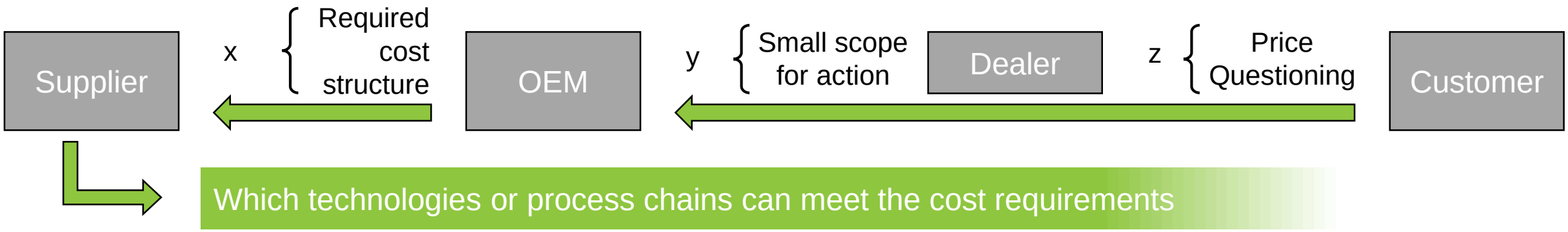
Which price is exaptable for the customer?



Which technologies or process chains can meet the cost requirements

Additive Manufacturing for economic Use

Current Cost Structure – Key Questions

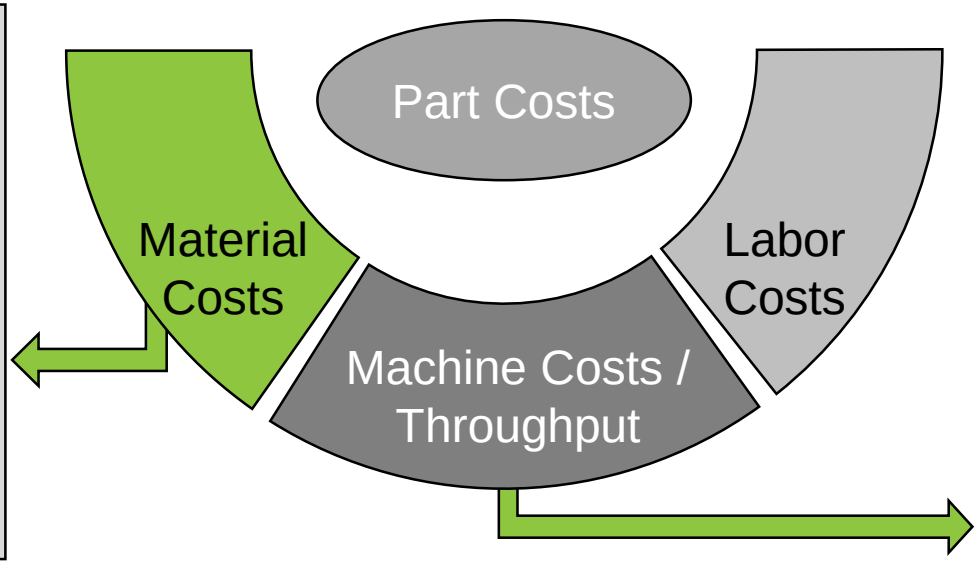


Which technologies or process chains can meet the cost requirements

Decreasing Material Costs

- Use different kind of raw material (mass production material)

Thermoplastic Granules



Increasing Throughput per machine cost ratio

- Increasing Throughput
- Decreasing Machine Costs

Technology Change

Righ use of current technologies

Specific Cost Analysis

Examplary Calculation – Thermoplastic Housing

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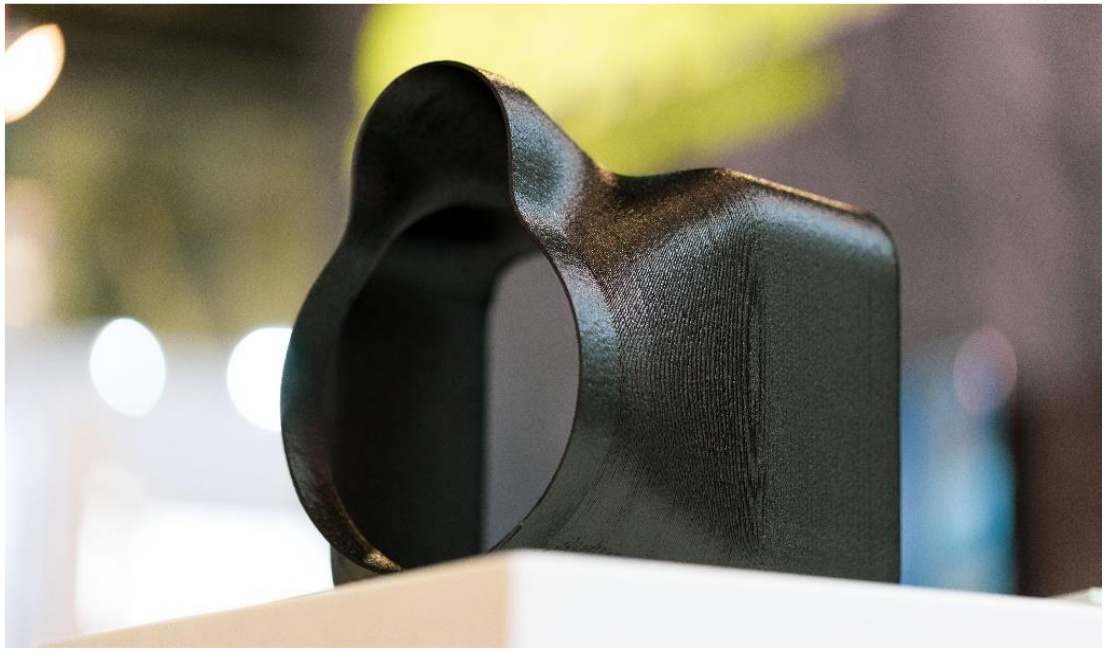
- Size: 190 mm x 150 mm x 200 mm
- Weight: 190 g
- Material: Carbon Fibre Filled Polyamide



- Throughput: 6 g/min
- Production Time: 31.66 minutes
- Auxiliary Time: 15 seconds
- Material Costs: 4.50 € / kg
  Granules PA 6 CF 30
- Wastage: 0 %

- Machine Costs: 72,000.00 €
- Machine Footprint: 1.2 m^2
- Production time: 5,000 h/a
- Amortisation period: 8 years

Possible Lot Size: 9.500 parts / year * machine

Calculated part costs: 2,58 € / part

Specific Cost Analysis

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Selective Laser Sintering:

PA 2200	569,82 € / part
PA 3200 GF	583,42 € / part
PA 6x	759,95 € / part
PA 12 flame-protected	1.056,96 € / part

MultijetFusion:

PA12	299,12 € / part

Possible Lot Size: 9.500 parts / year * machine

Calculated part costs: 2,58 € / part

Specific Cost Analysis

Examplary Calculation – Thermoplastic Housing

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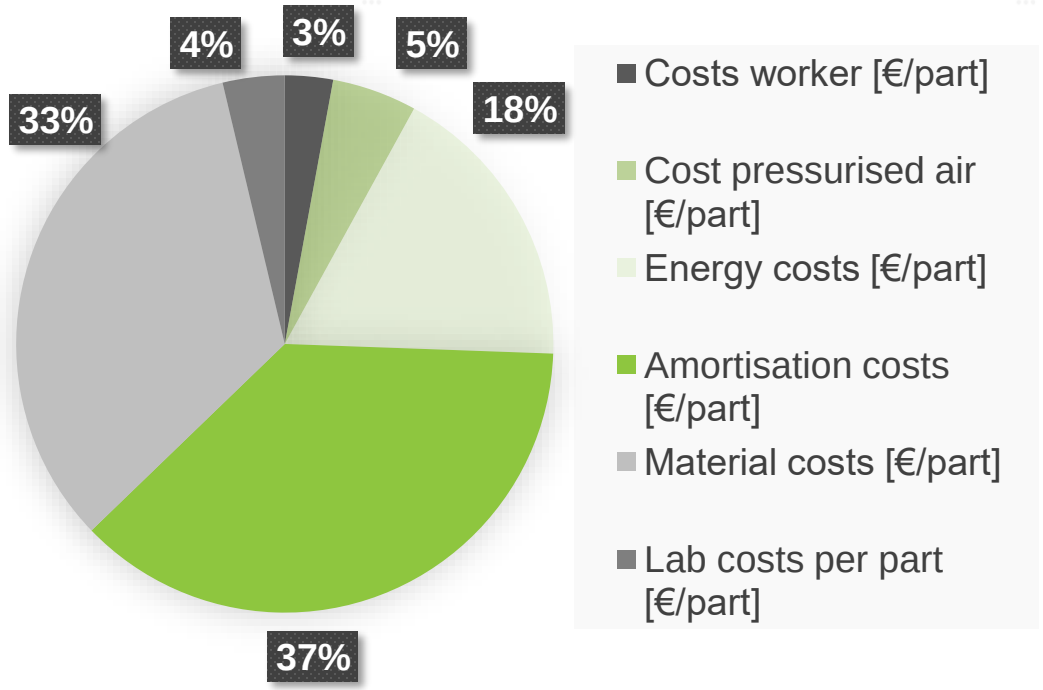

Possible Lot Size:	9,500 parts / year * machine
Calculated part costs:	2.58 € / part
Throughput:	6 g/min

Specific Cost Analysis

Examplary Calculation – Thermoplastic Housing

YIZUMI GERMANY
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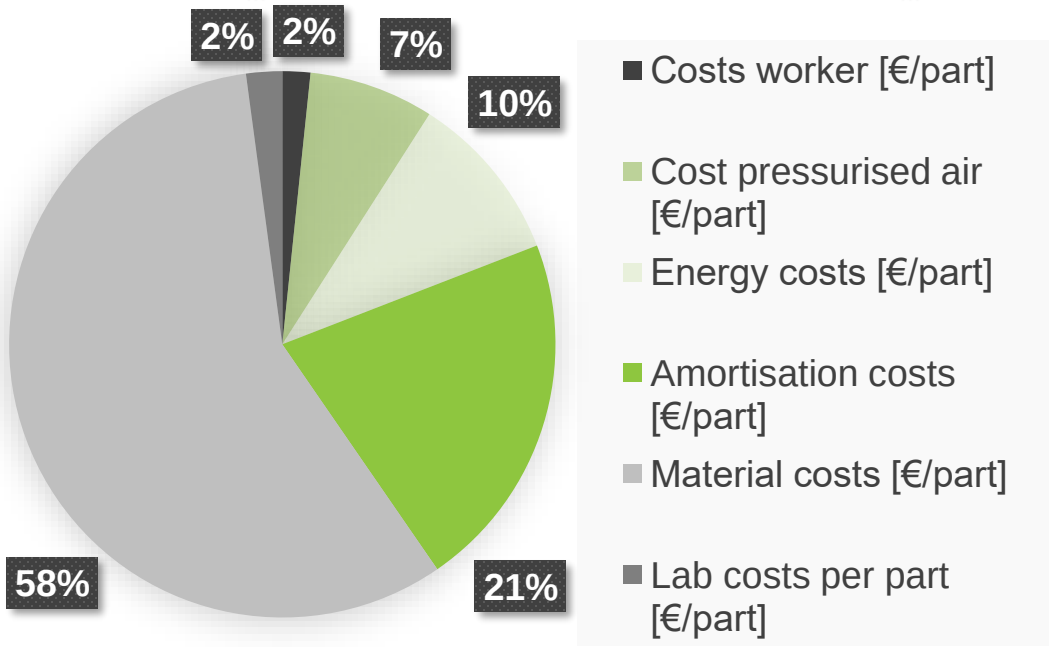
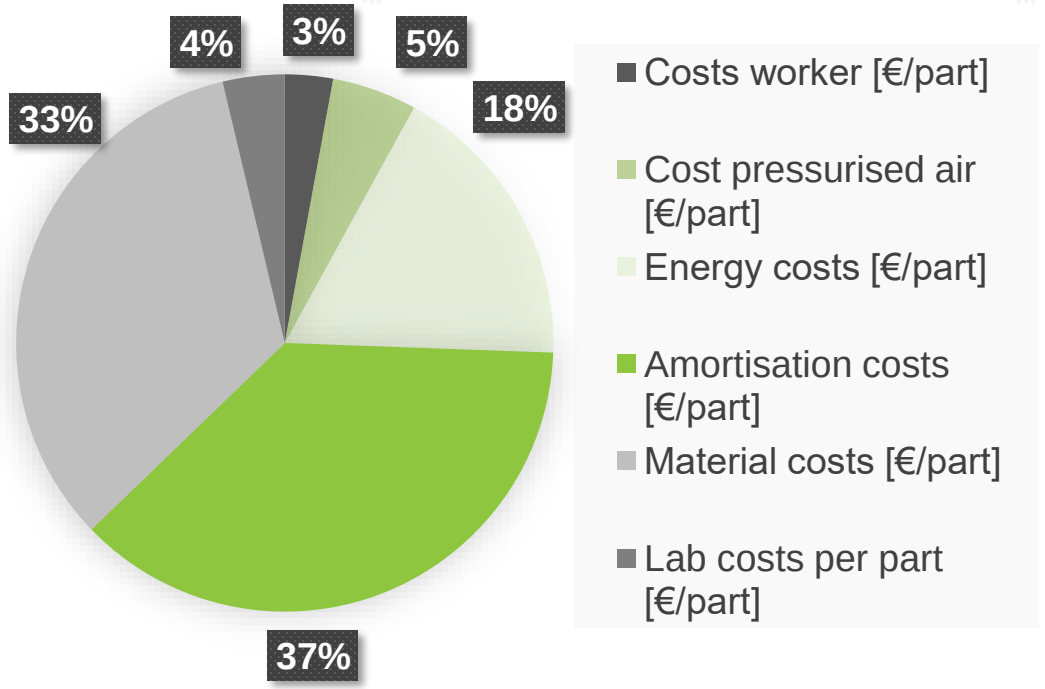


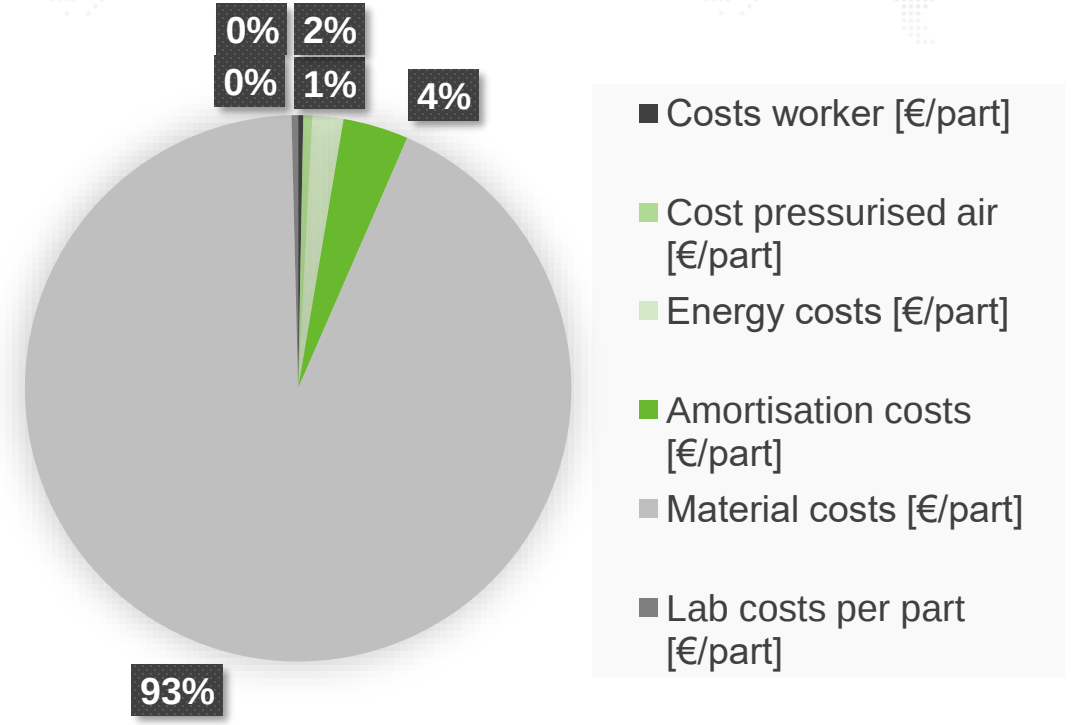


Possible Lot Size:	28,500 parts / year * machine
Calculated part costs:	1.50 € / part
Throughput:	18 g/min

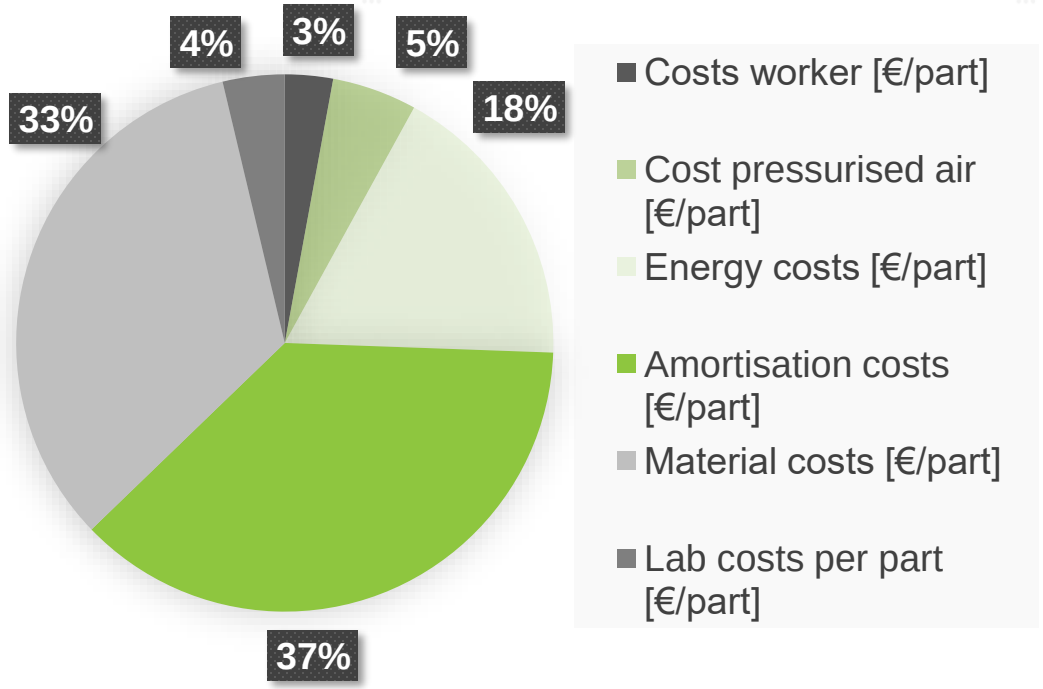
Possible Lot Size:	9,500 parts / year * machine
Calculated part costs:	2.58 € / part
Throughput:	6 g/min

Specific Cost Analysis

Examplary Calculation – Thermoplastic Housing



Possible Lot Size:	9,500 parts / year * machine
Calculated part costs:	24.52 € / part
Material Costs:	120 €/kg



Possible Lot Size:	9,500 parts / year * machine
Calculated part costs:	2.58 € / part
Material Costs:	4.50 g/min

Economic Analysis

Conclusion - Most Important Cost Parameters

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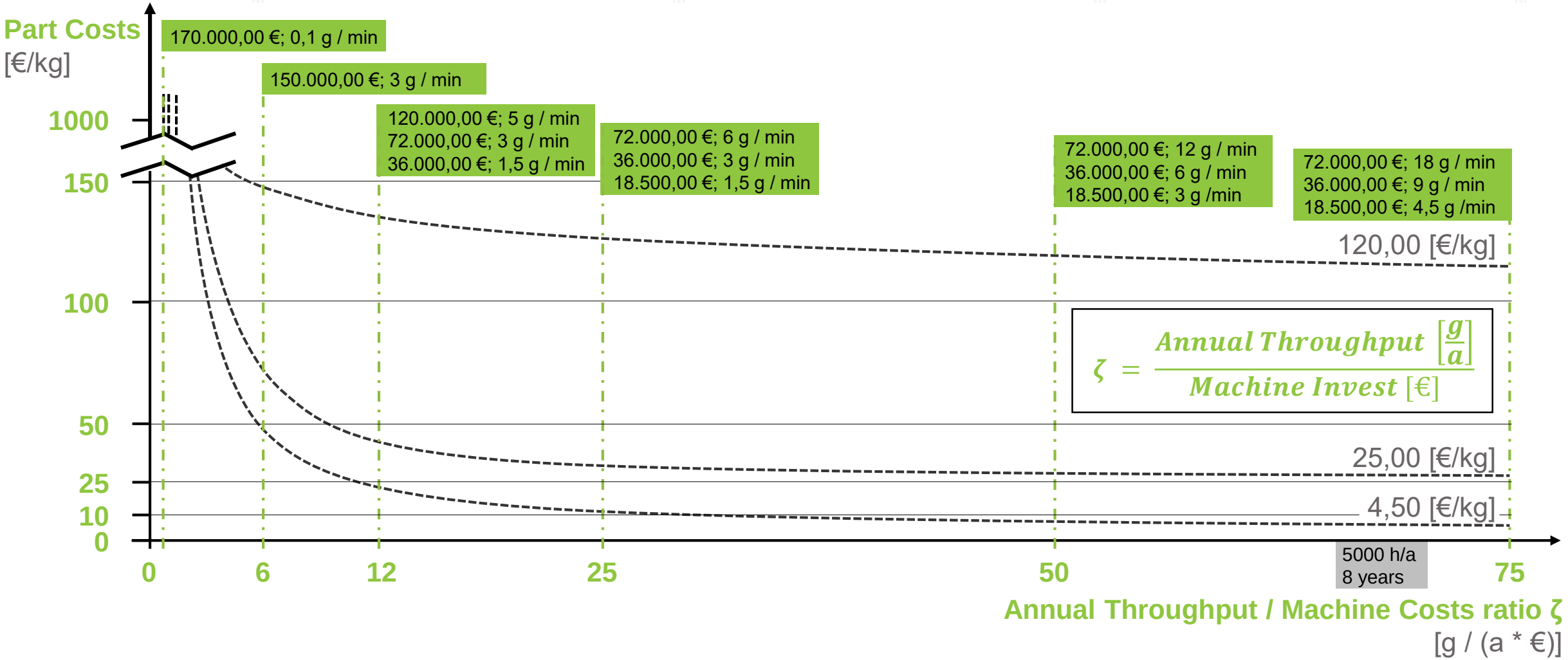

Economic Analysis

Conclusion - Most Important Cost Parameters

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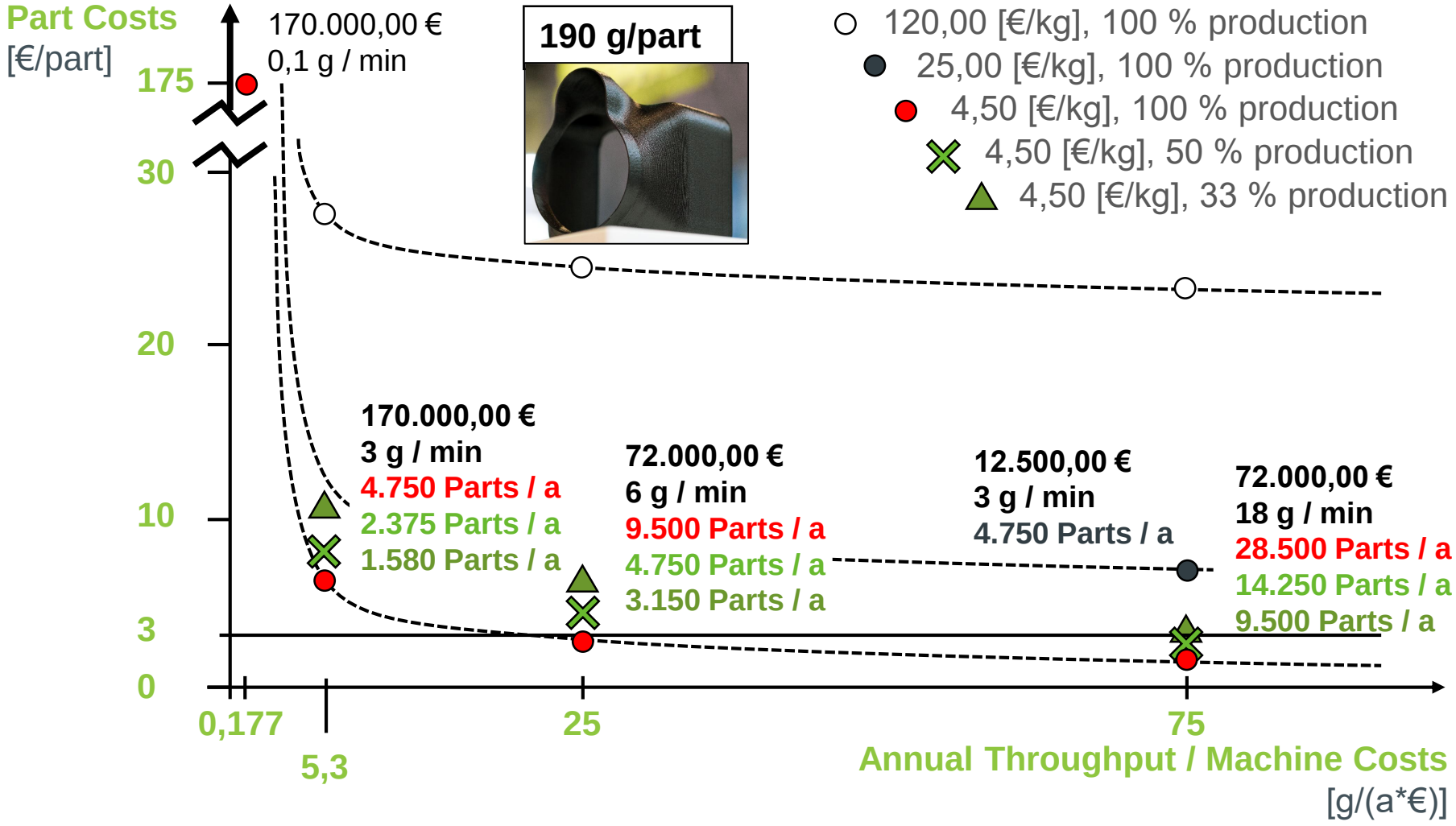
Main Effects:

- *Material Costs*
- *Machine Costs*
- *Part Design*

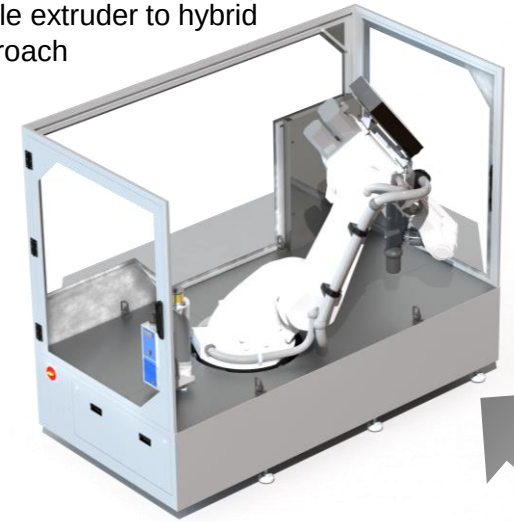


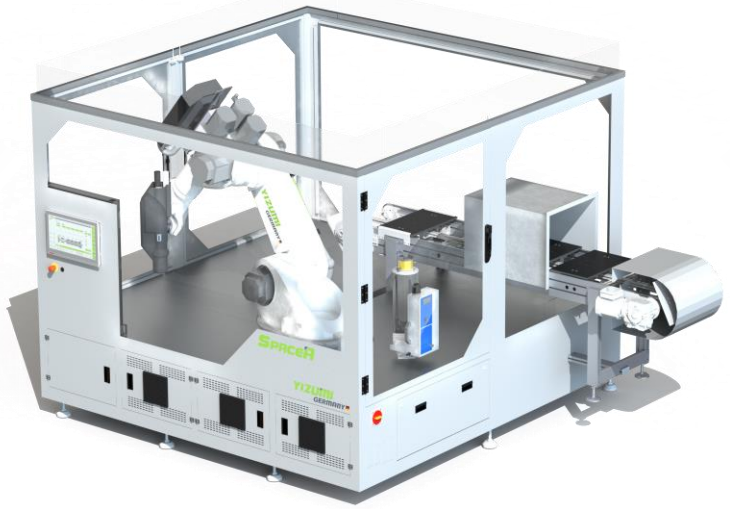
Hybrid Manufacturing Cell

Flexible and Modular Platform Strategy

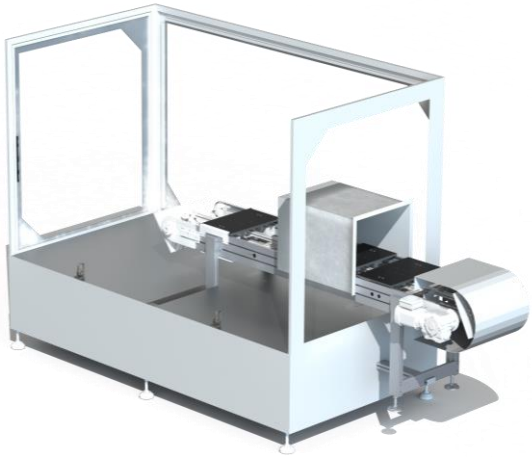
YIZUMI GERMANY
INNOVATIONS ALONGSIDE THE WORLD

Different possible option from single extruder to hybrid approach





Modular system with different possible platforms

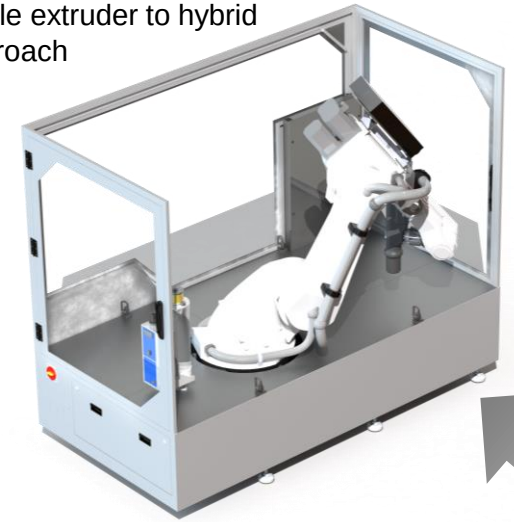


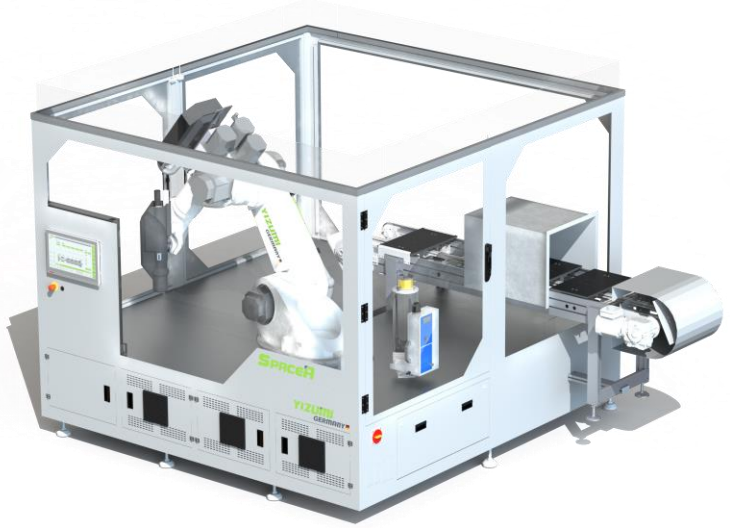
Hybrid Manufacturing Cell

Flexible and Modular Platform Strategy

YIZUMI GERMANY
INNOVATIONS ALONGSIDE THE WORLD

Different possible option from single extruder to hybrid approach





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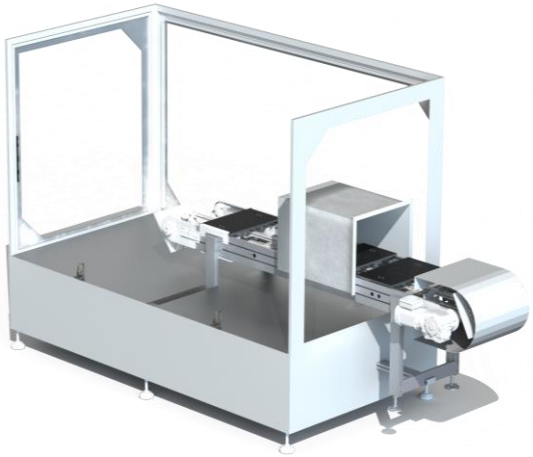

Hybrid Manufacturing Cell

Formnext 2018 - Impressions

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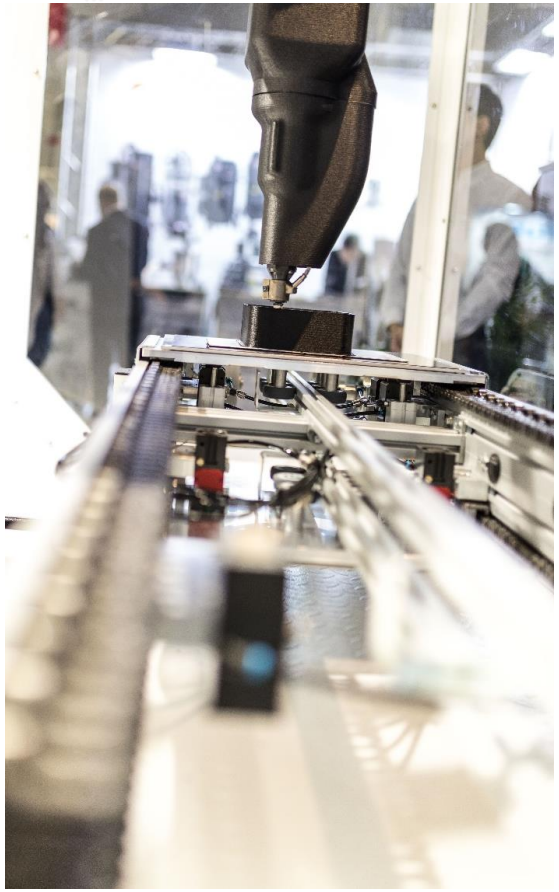

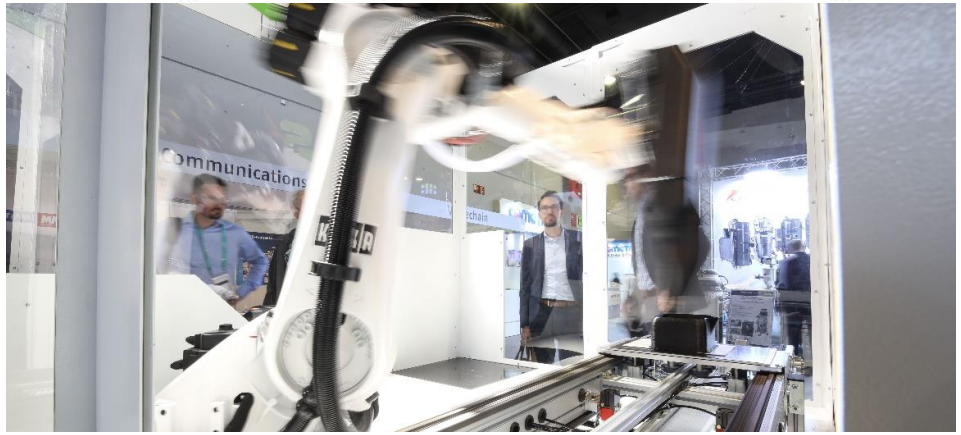

Hybrid Manufacturing Cell

Formnext 2019 - Impressions

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Hybrid Manufacturing Cell

Stackable Solution for Additive Mass Production

YIZUMI GERMANY
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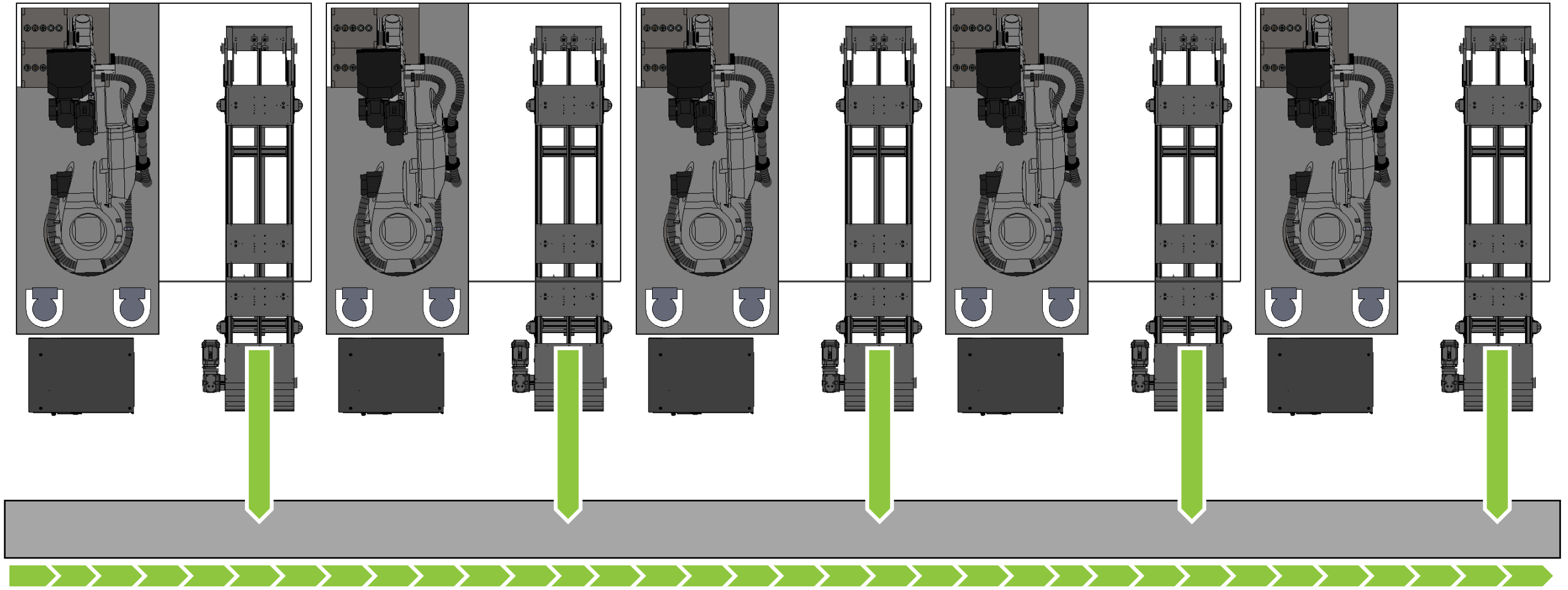
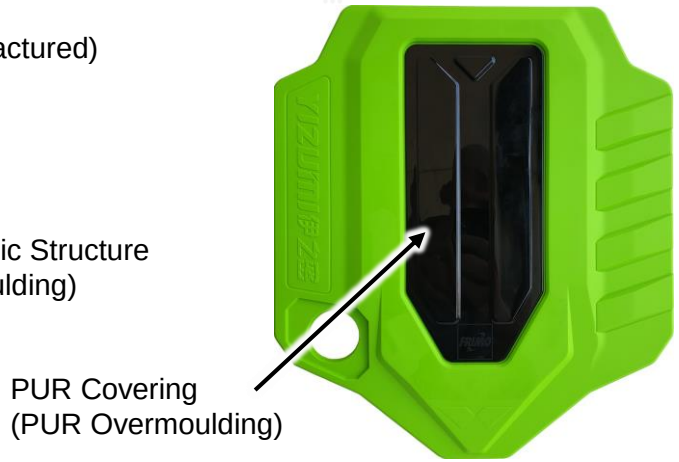
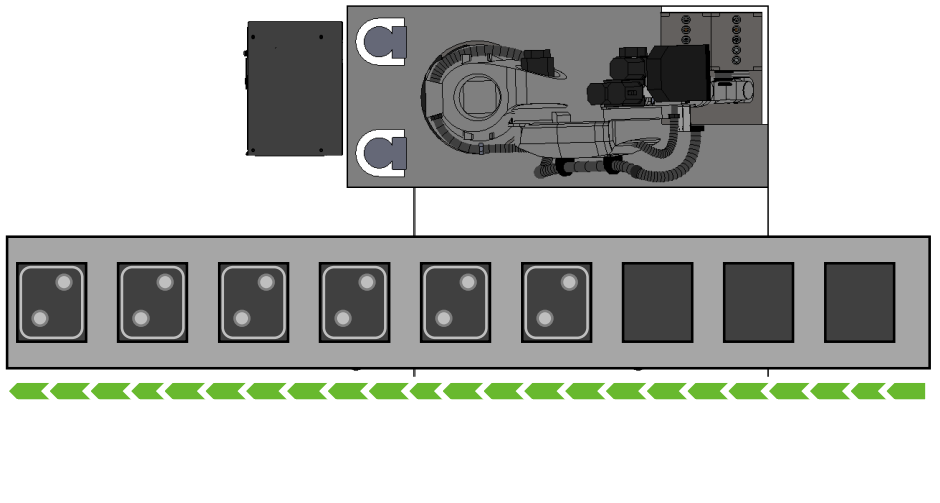


Hybrid Manufacturing Cell

Stackable Solution for Additive Mass Production

YIZUMI GERMANY
INNOVATIONS ALONGSIDE THE WORLD





Game Changing Technology

Magnitude Shift in Additive Manufacturing

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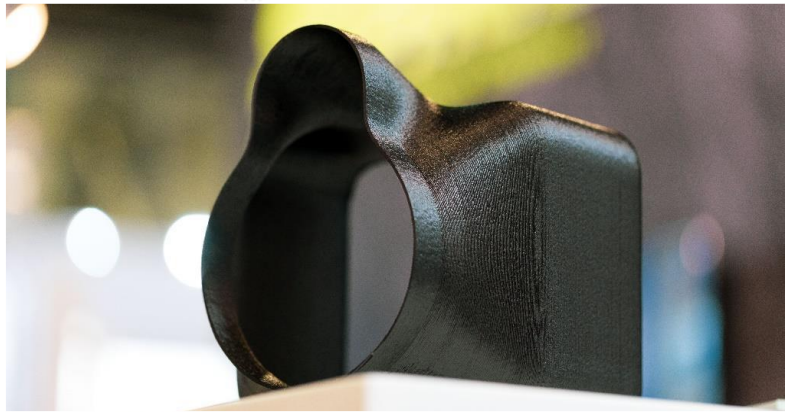
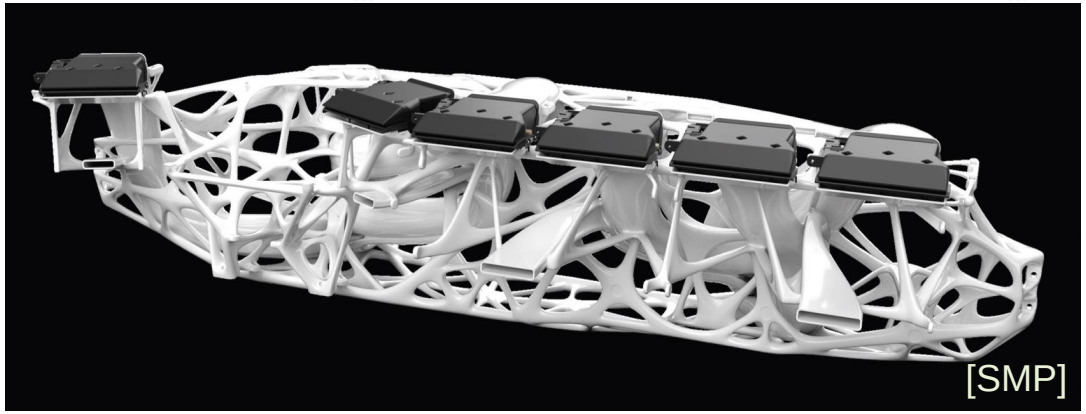
INNOVATIONS ALONGSIDE THE WORLD



Weight:	Approx. 190,00 g
Dimension:	190 mm x 150 mm x 200 mm
Part Costs SpaceA:	Approx. 3,00 €
Part Costs SLS:	Approx. 570,00 – 1.000,00 €
Part Costs MJF:	Approx. 300,00 €



Weight:	Approx. 5.000,00 g
Dimension:	1400 mm x 400 mm x 400 mm
Required Part Costs:	Approx. 80,00 €

Game Changing Technology

Best Practice Design

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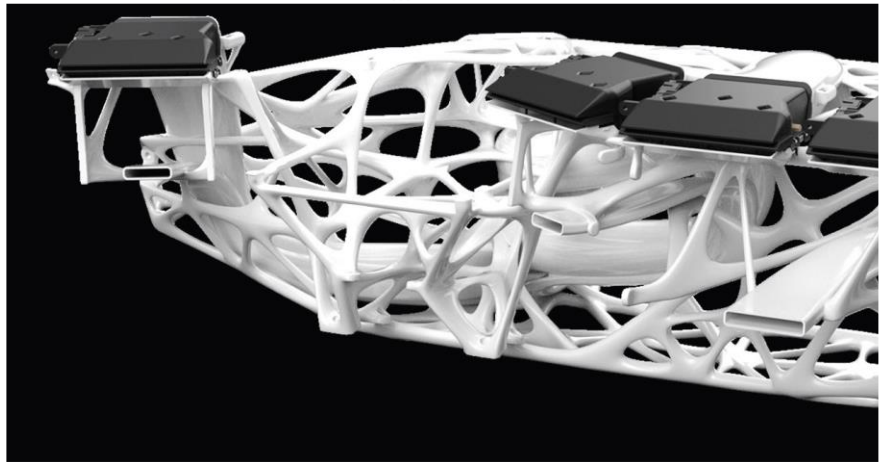

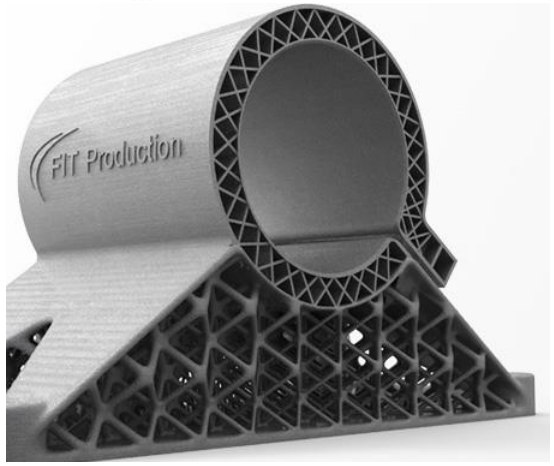

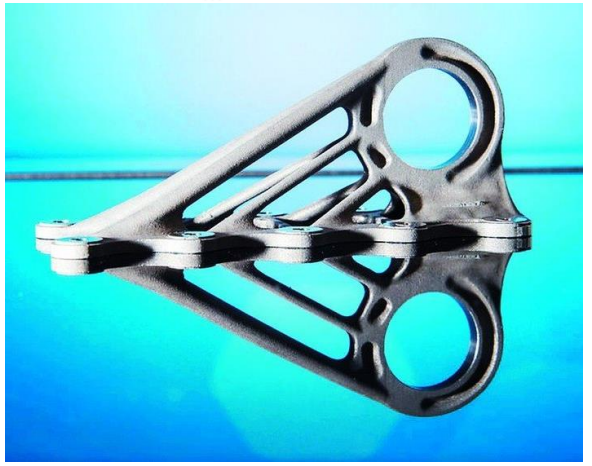

[FIT, SMP, VDMA]

Classic topology optimised designs will never be produced economic

1. **Avoid non-productive time → every movement should be a print movement**
2. **Use manufacturing advantages → high dimensional stiffness possible / e.g. use of beads**

Best Practice Design

Topology Optimisation

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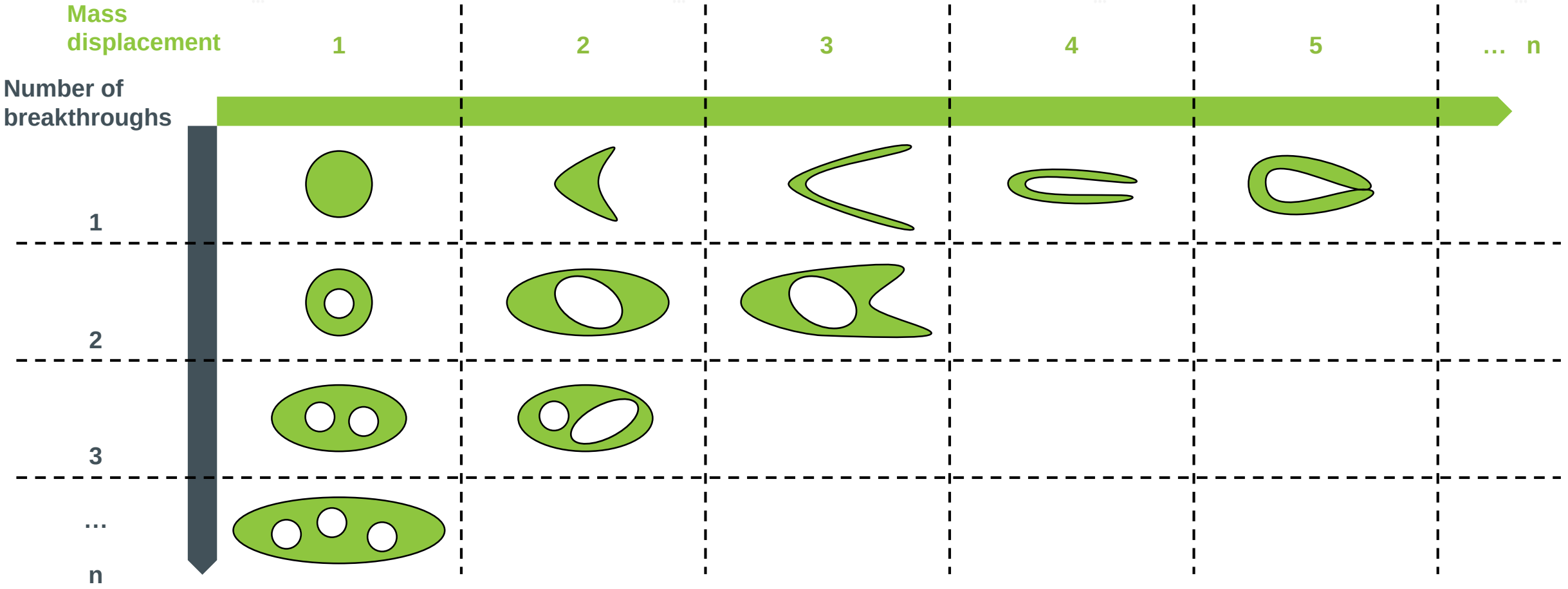

Best Practice Design

Topology Optimisation

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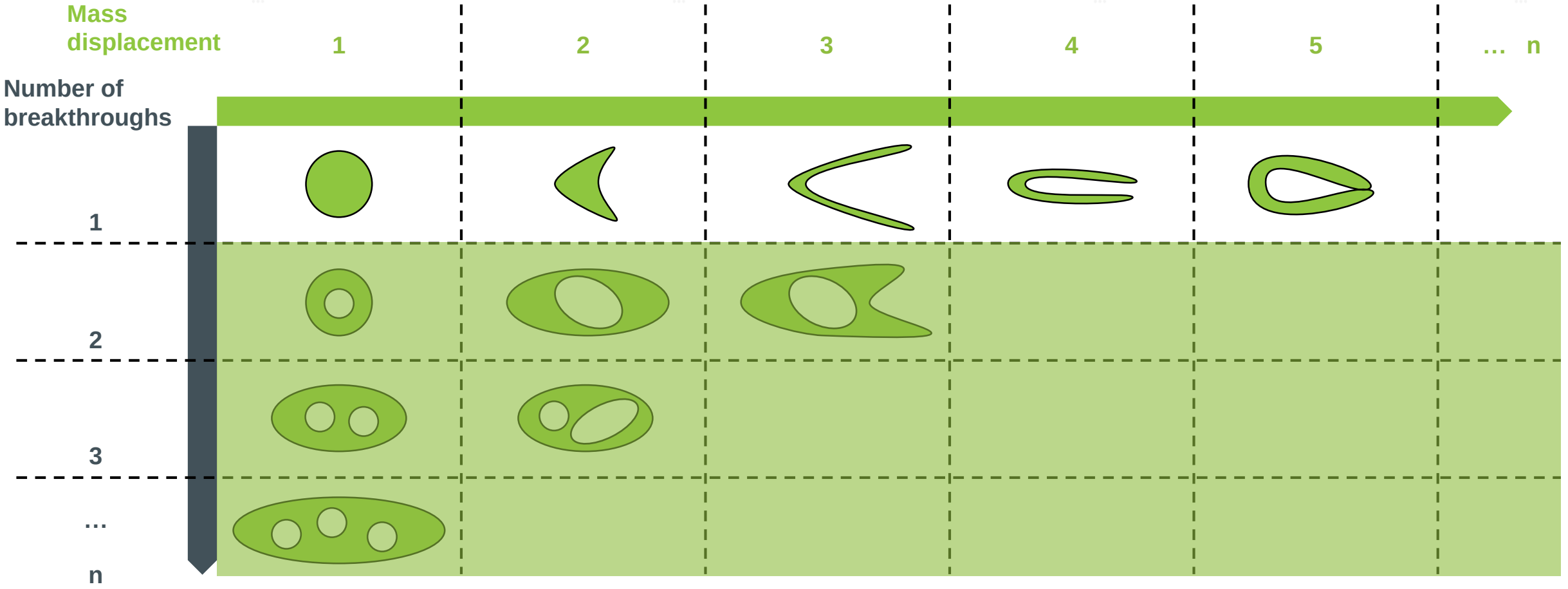

Industrial Additive Manufacturing

Conclusion

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- Additive Manufacturing is not 3D Printing.
- We have to use additive manufacturing as a manufacturing technology to use economic potential.

- Additive Manufacturing Technologies have the potential to substitute injection moulding machines and moulds.
- There will be market restructuring due to substituted mould makers and injection mould machine makers.

- Basis of an economic use of Additive Manufacturing Technologies is a competent and holistic support in the fields of part design, manufacturing cell design and material use.

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THANK YOU

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