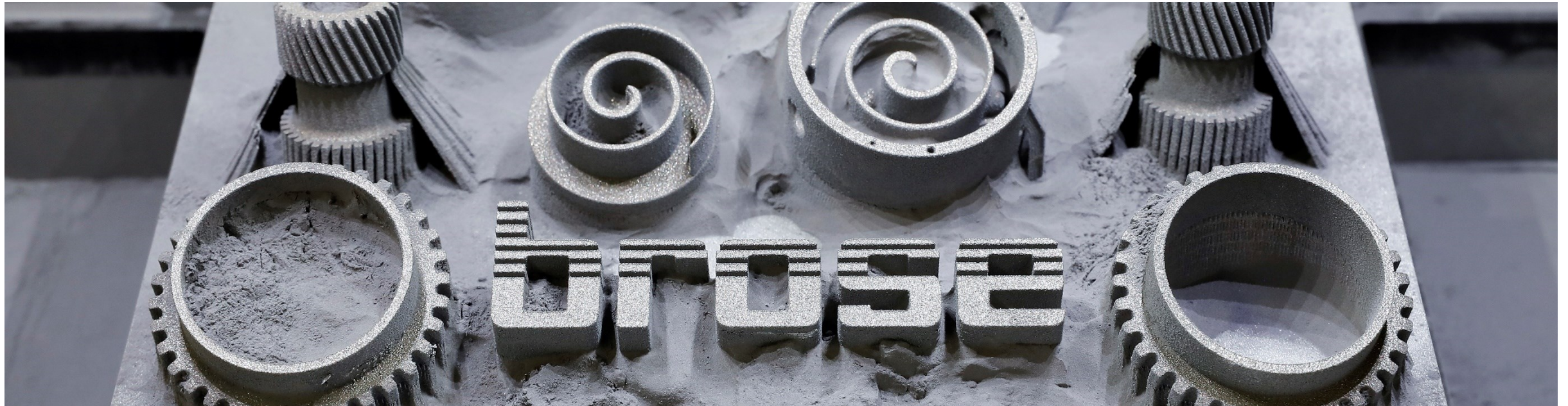


Brose Goes Additive

The way to additive series production in the automotive industry



Mechatronic Systems and Drives for Automobiles



Seat systems and components



Sensors for interior and exterior



Systems and components for vehicle doors and closure systems



Electric motors for steering, braking systems and drive train



Systems and components for thermal management



Liftgate and side door drives



Systems and components for micromobility

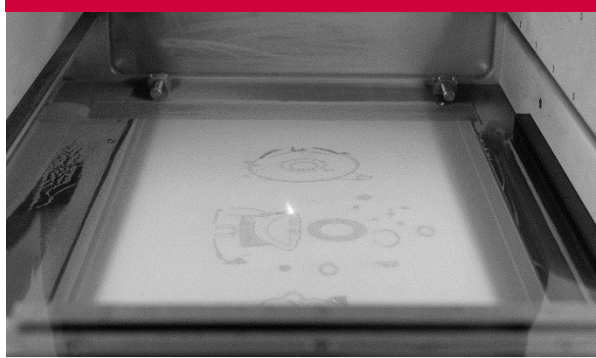
Market leader through specialization
Turnover: 7.4 billion €, employees: 30.600

Brose Goes Additive

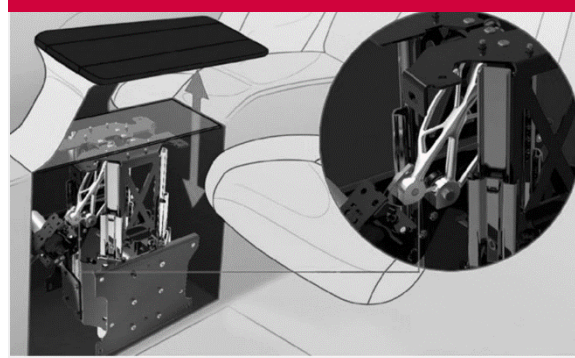
Range of Services



**Consulting and
Training**



**Material and Process
Development**



**Product
Development**



Manufacturing Service

Development focus is on automotive requirements.

Brose Additive Technology

The way to additive series production in the automotive industry

- Light weight parts
- Improved efficiency
- Shorter production cycles
- New functionalities



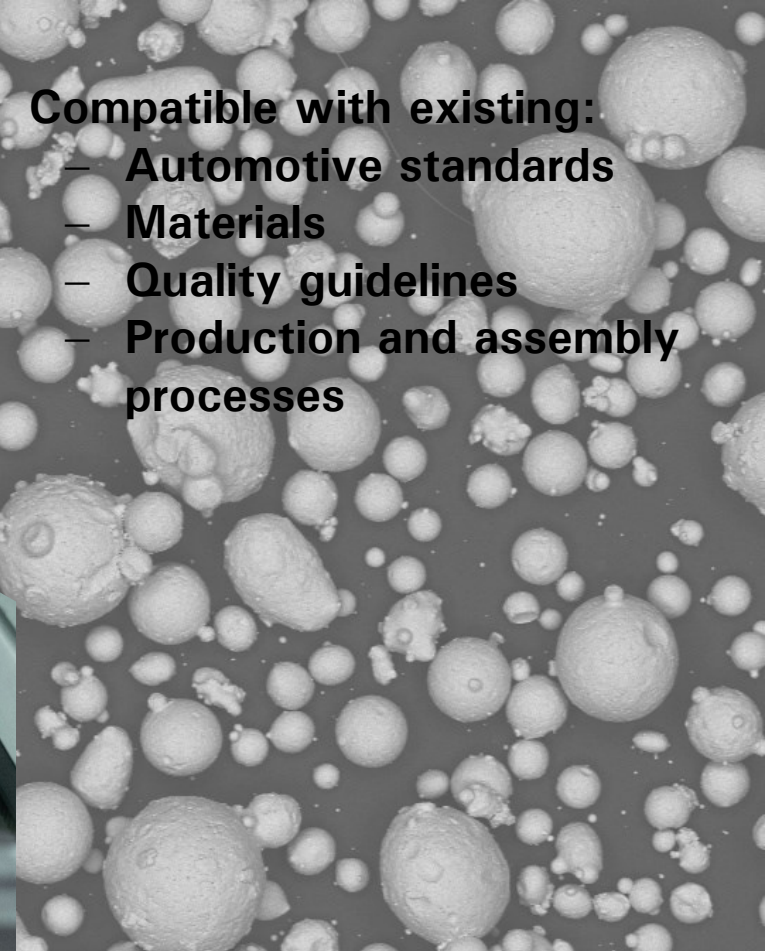
3.
Application
benefit

1.
System
Compatibility

2.
Cost effective
Production

- Compatible with existing:
 - Automotive standards
 - Materials
 - Quality guidelines
 - Production and assembly processes

- Low material costs
- High speed printing process
- Minimal post-process



Brose Additive Technology

The way to additive series production in the automotive industry

- Light weight parts
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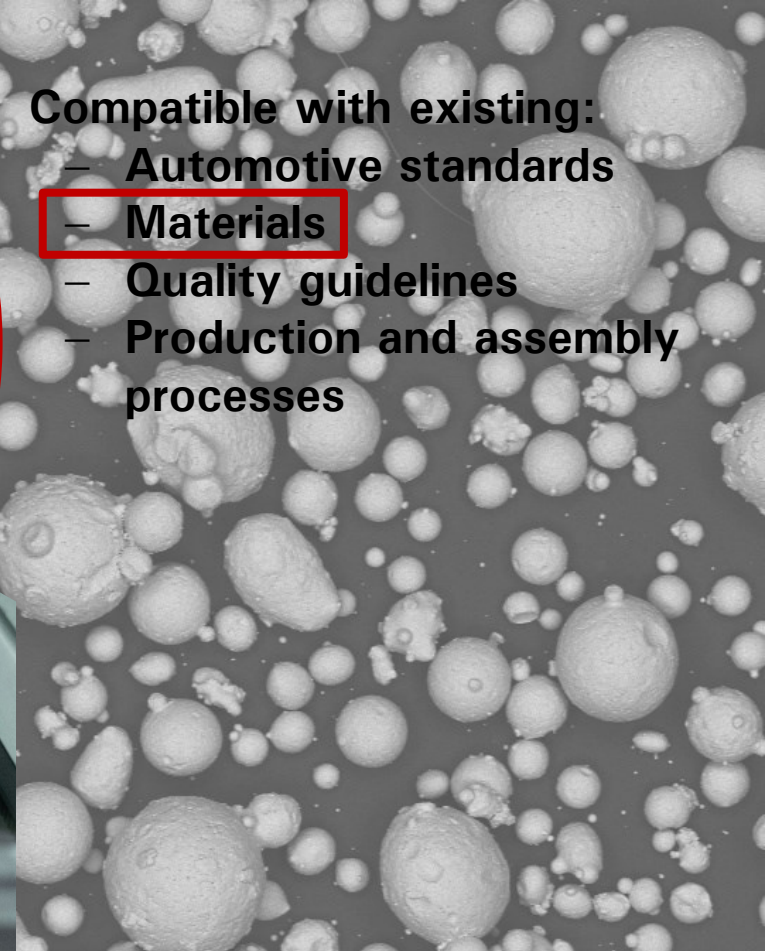
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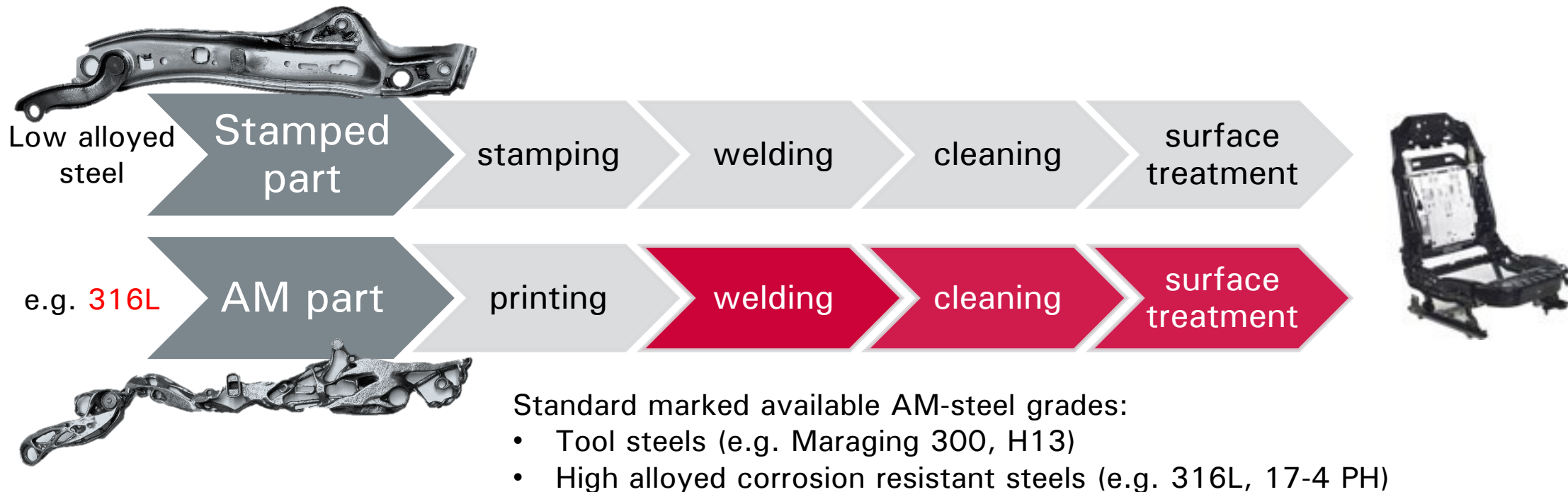
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Brose Polymer material development

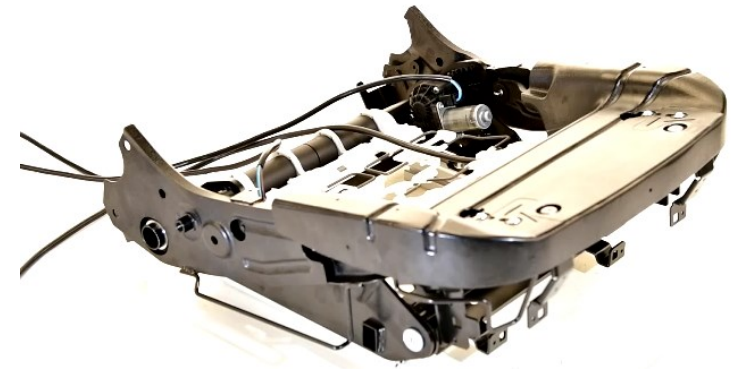
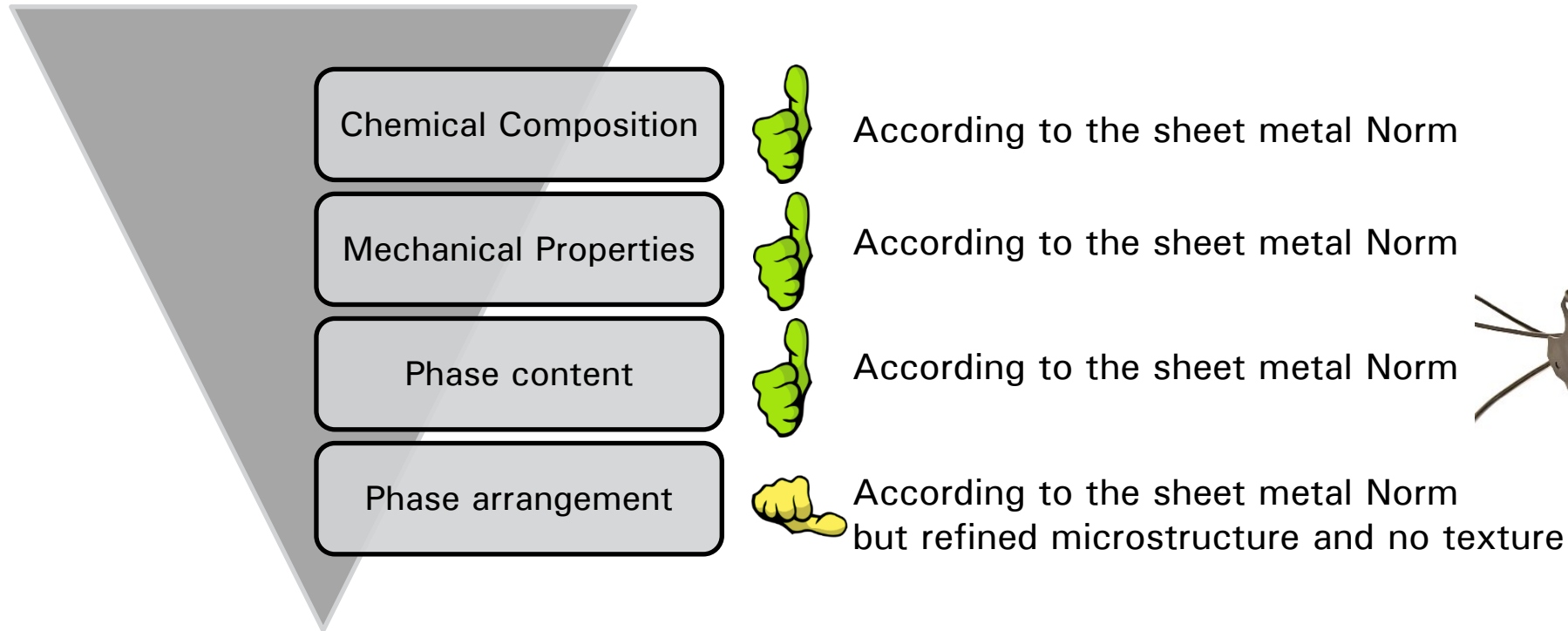
Initial situation



The available AM-steel grades are not compatible with the modular Brose production system

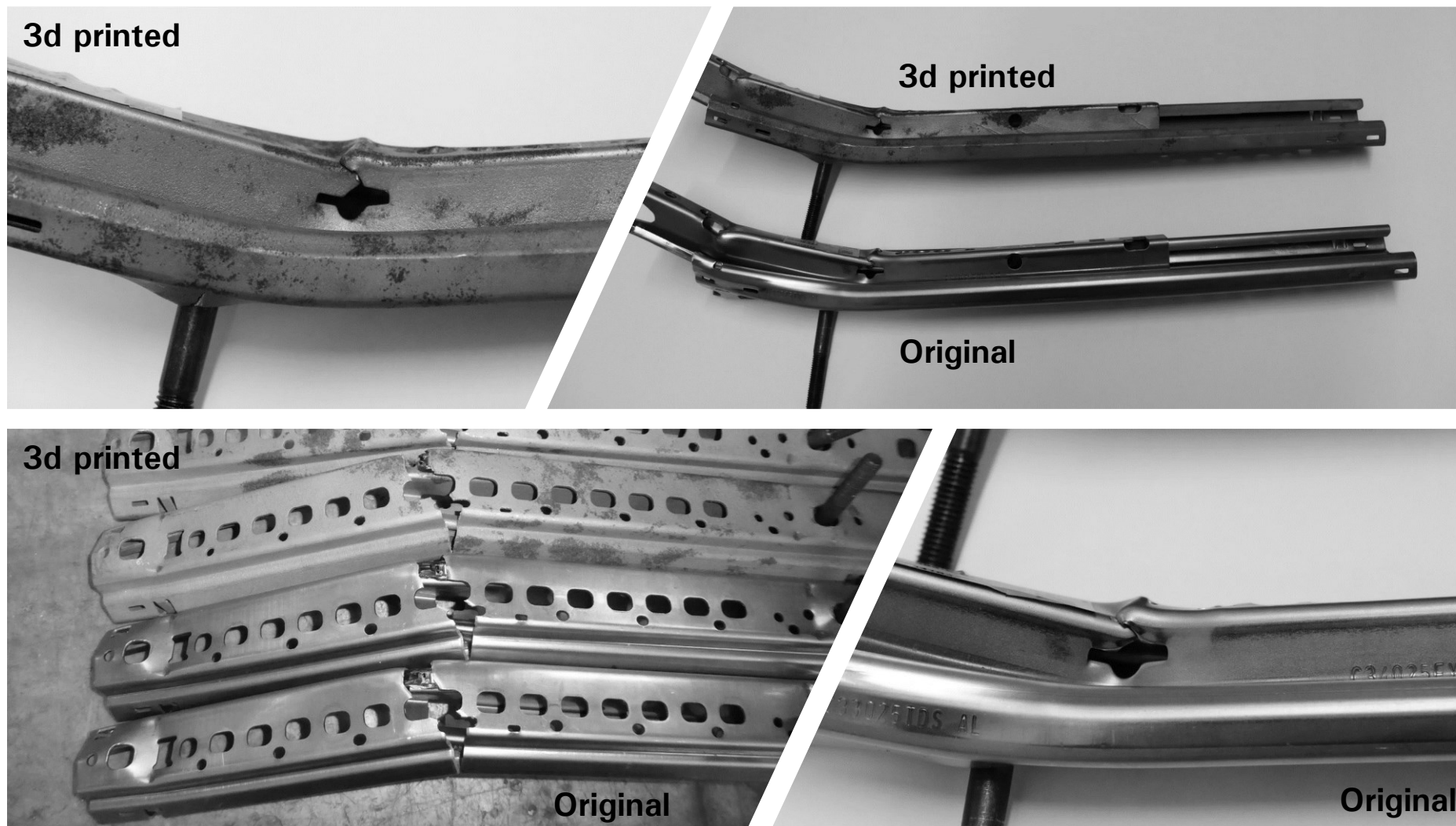
Brose SLM material development

Automotive compatible steel



*According to: DIN EN 10149

USP: Brose is able to manufacture AM-parts with an automotive industry compatible steel grade



Brose Goes Additive

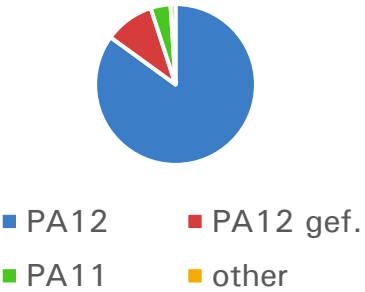
Production Services - Polymer



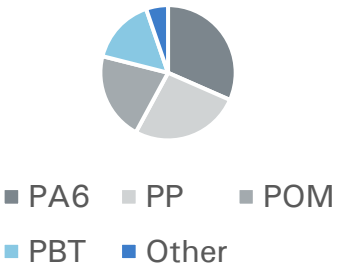
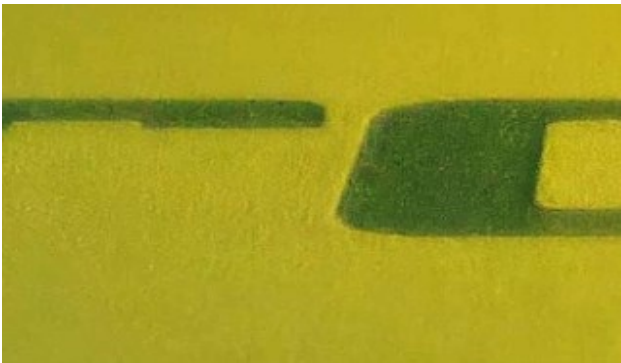
Brose Polymer Applications



AM – Standard Polymers



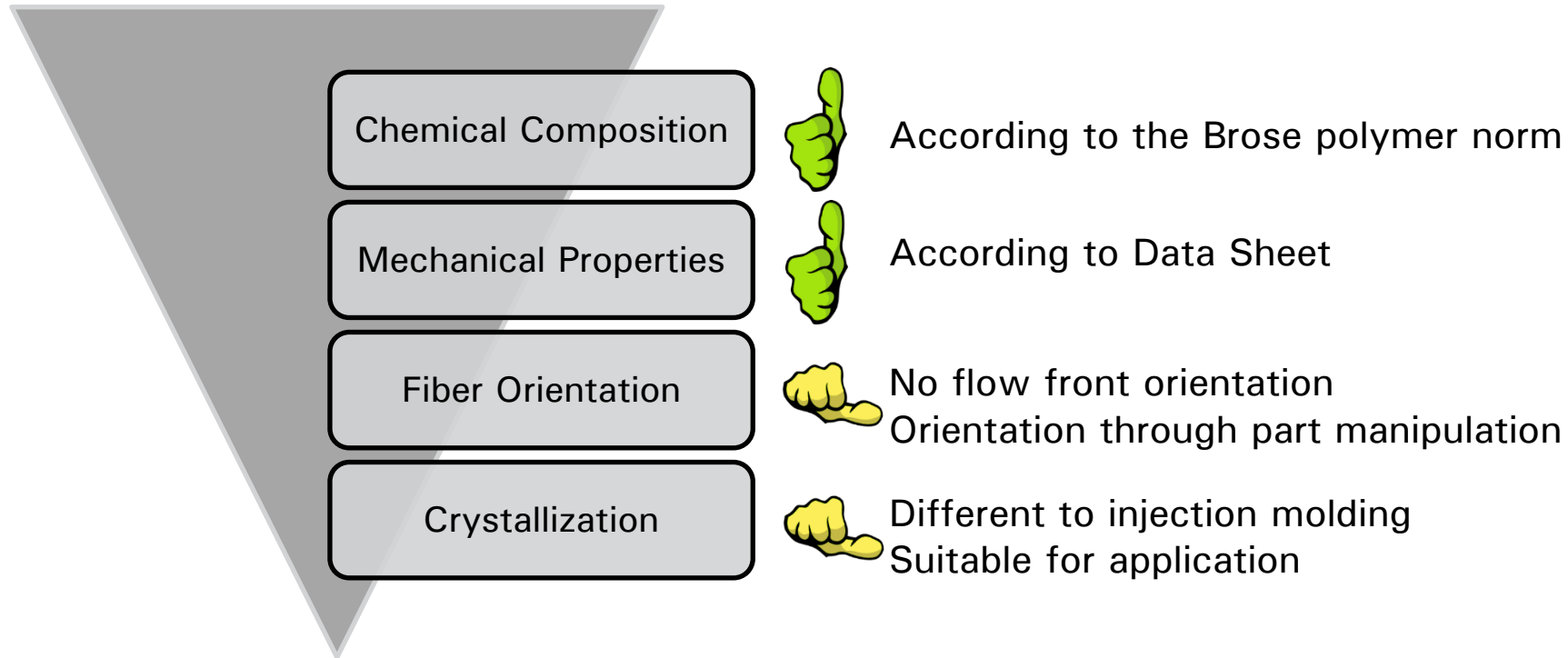
AM – Brose Polymers



Focus on polymers for the mobility applications

Brose SLM material development

Automotive compatible polymers



USP: Brose is able to manufacture AM-parts with an automotive industry compatible polymers

Brose Goes Additive

Production Services - Polymer



Prodways ProMakerP1000X
(**CO₂ Laser** - **Thermographiekamera**)
300 x 300 x 360 mm³
Igus, POM



Farsoon HT403P
(**CO₂ Laser** + **Fibre Laser**)
400 x 400 x 540 mm³
PA6 GF, PBT GF, PP,



3D-Systems sPro230
(**CO₂ Laser**)
550 x 550 x 750 mm³
PA12

Brose Goes Additive

Production Services - Polymer



Overview Polymer Materials and Properties

	PA12 LV 9270 BK	PA6 GF FS6140GF	PP Luvosint
Tensile strength [MPa]	46	73-88	28
Tensile Modulus [MPa]	1740	6500	1400
Elongation at Break Ef [%]	20	min 7	30

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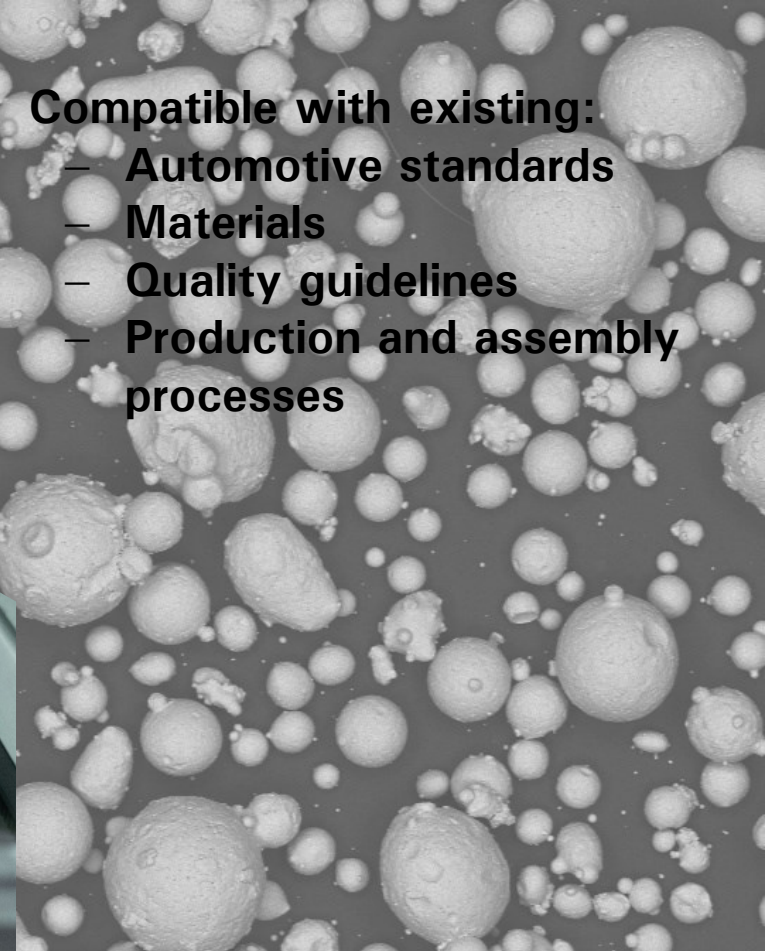
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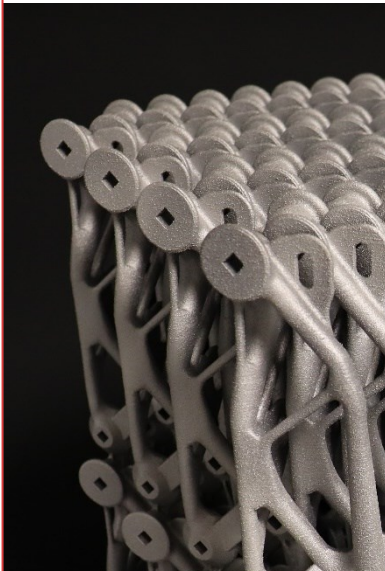


Brose Goes Additive

Cost effective Production

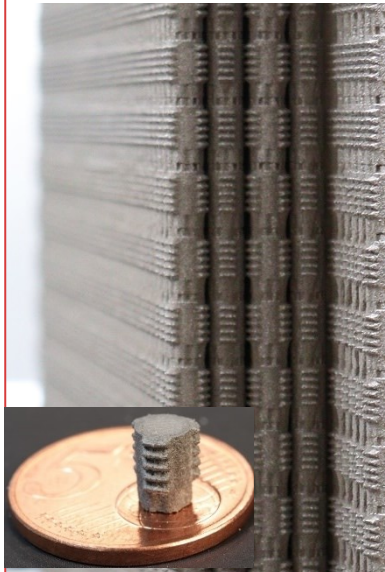
Design for AM

- Volume ↓
- Support ↓
- Packing density ↑



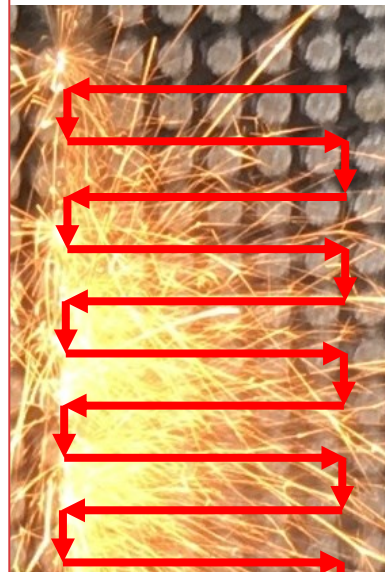
Printing process

- Optimized parameters
- 205000 parts/job



EDM

- Automatic layerwise cutting



Sandblasting

- Automatic drum



Quality control

- Part based

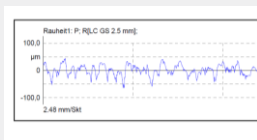


Optimization of the complete process chain

Strahlen

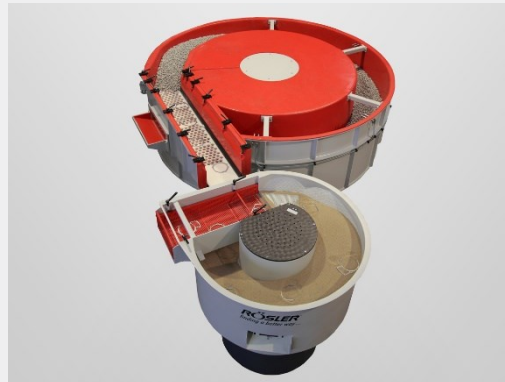


MINI

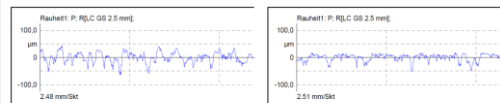


- 20 Min. Strahlen
- Strahlgut entpulvert und verdichtet

Gleitschliff



Oberfläche: Gleitschleifen vorher / nachher



- 5h Gleitschleifen: Ra – 2,8 µm
- Reduktion der Rauheitsparameter um ca. 80% zum

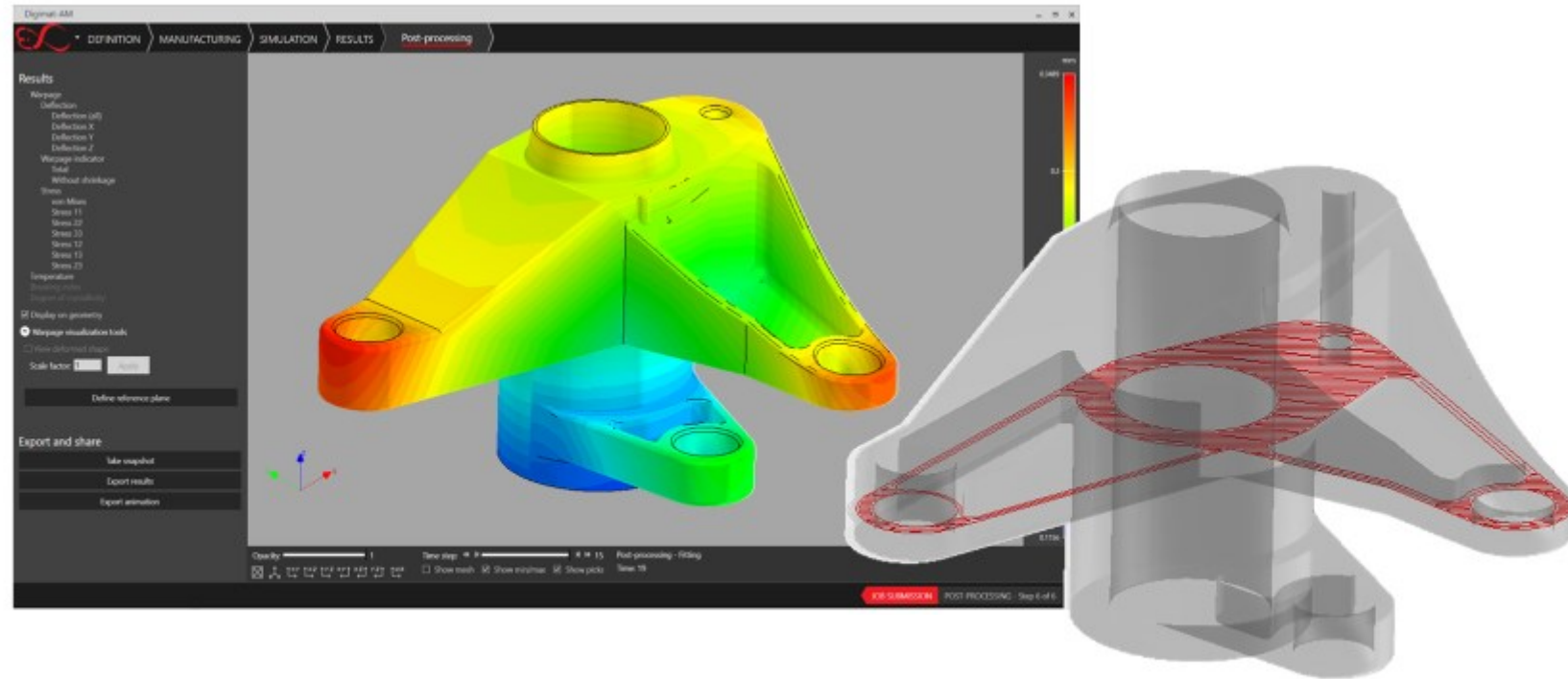
Vapor Smoothing



- Spritzgussoberflächen
- Verbesserung der mechanischen Eigenschaften

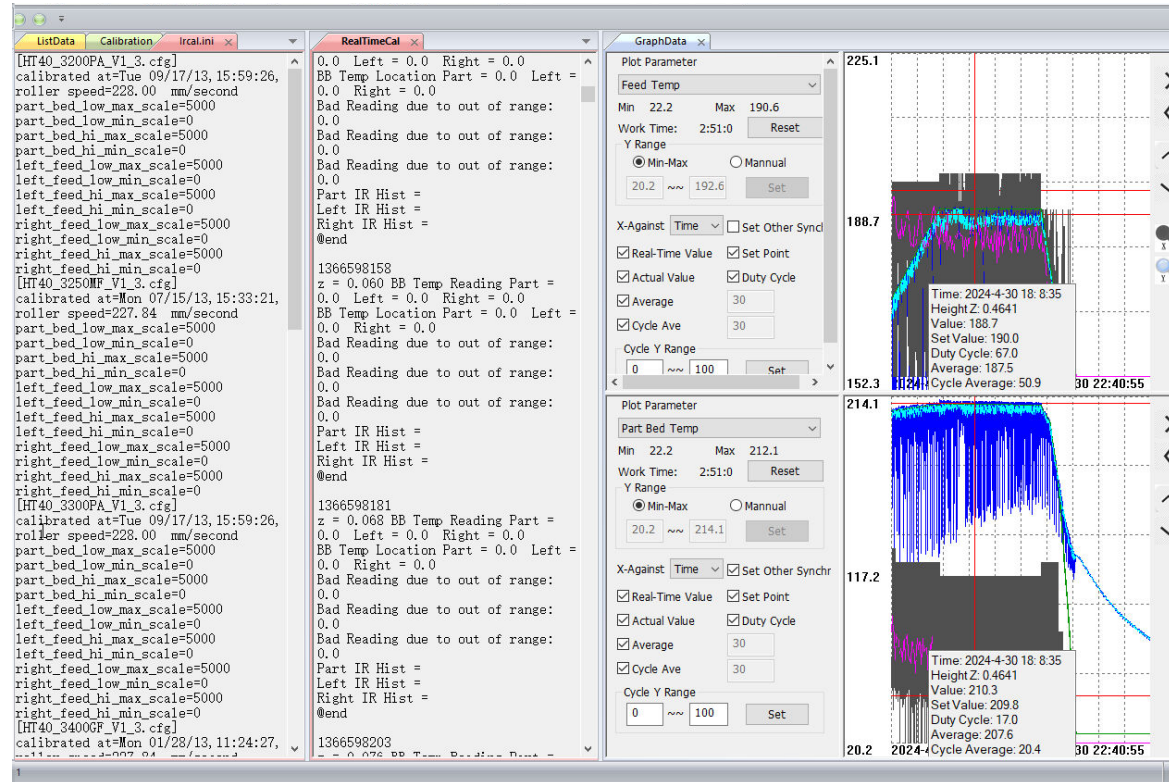
Optimization of the complete process chain

Brose Goes Additive Challenges



Challenge: Prozesssimulation – Thermomechanisch & Verzugsverhersagen

Brose Goes Additive Prozessüberwachung



Challenge: Prozess Monitoring & Aktive Prozesssteuerung

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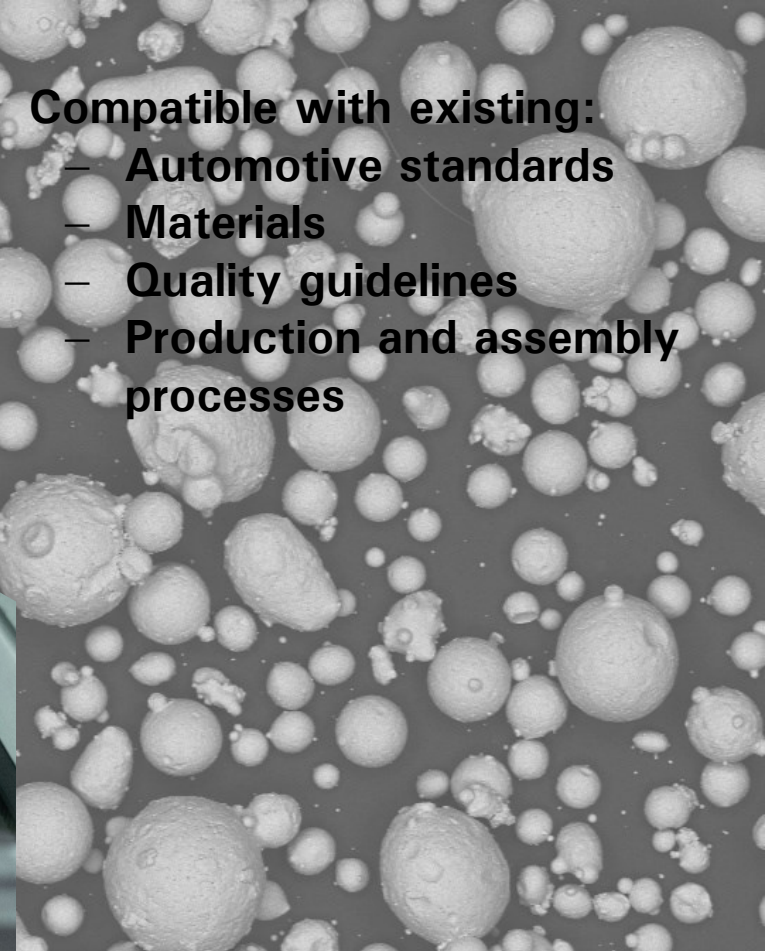
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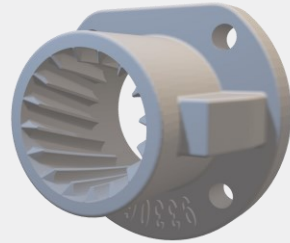
Brose Goes Additive Erfolge



Prototyp

Motorhalter GM-Sitz PA6GF-Aquise

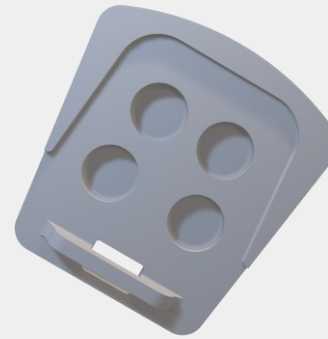
Einsparung: 40%



Betriebsmittel

Entspindlungsvorrichtung (Verschleißteil)

Einsparung: 85%



Ersatzteilmontage

Dämpfer BMW Fensterheber

Extern: kein
Qualifizierter Lieferant



Serienanlauf

Abdeckung Memobloch ID-Buzz
30.000 Teile

Extern: kein
Qualifizierter Lieferant

Overview 3d-printing parts in Brose products (prototype and serial)



Key Statements

- 3d-printing material for every Brose product
- Original material properties compared to conventional parts
- Usage of standard welding and coating process is possible
- Fully movable and functional prototypes
- No serial tools for low volume necessary
- Economical benefit in 3D-printing compared to conventional options

Summary

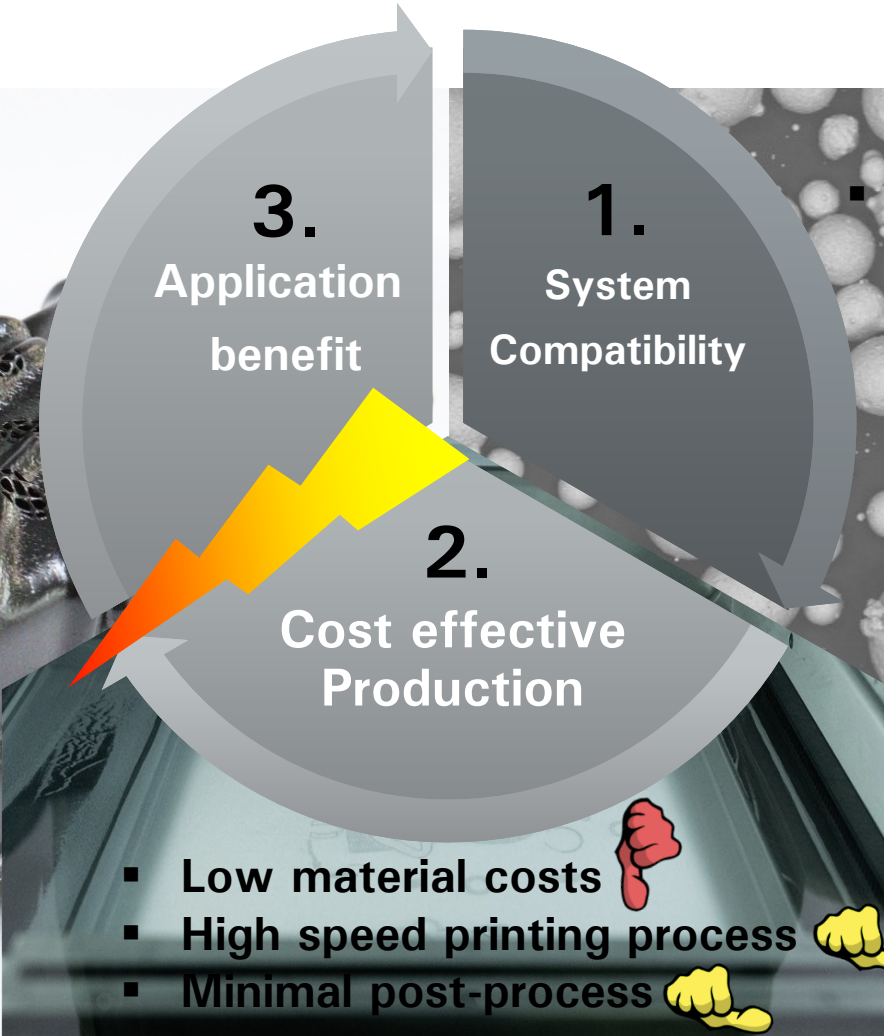
- **Type:** Prototypes, production equipment, spare parts, serial products
- **Printed parts:** > 200.000

Brose Additive Technology

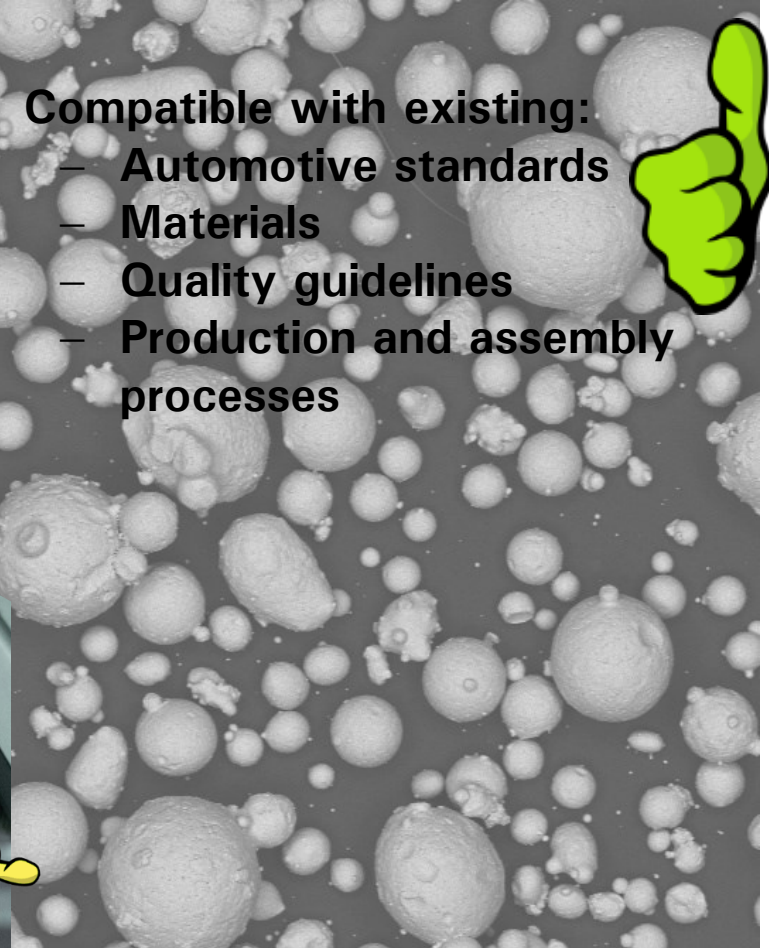
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Brose Goes Additive

Impressionen Konzept eBike formnext



Besucht unseren Stand 2-317

I AM ready.

