

AM 2025 – Wohin geht die Reise in der Additiven Fertigung mit den neuen Verfahren „SAT-3D“ und „SLEDM“

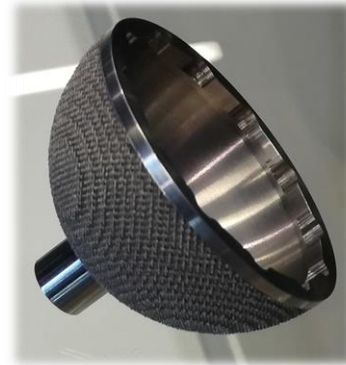
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Dipl.-Ing. **Patrick Aschauer**

Institute of Production Engineering (IFT), Graz University of Technology

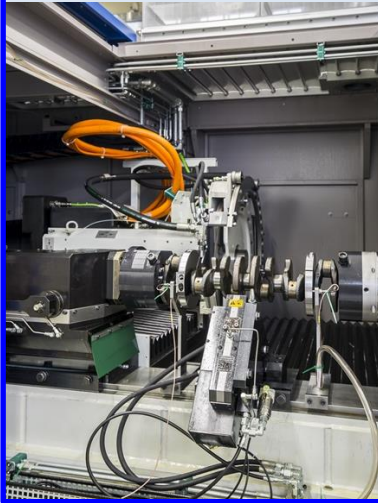
Agenda

- **Initial Situation**
- Invention → Prototyping “SAT-3D”
- Invention → Production “SLEDM”
- LED vs. Laser/Electron Beam
- Design Process
- Summary and Outlook



IFT - Competence Portfolio

Precision Machining



Fluid Technology



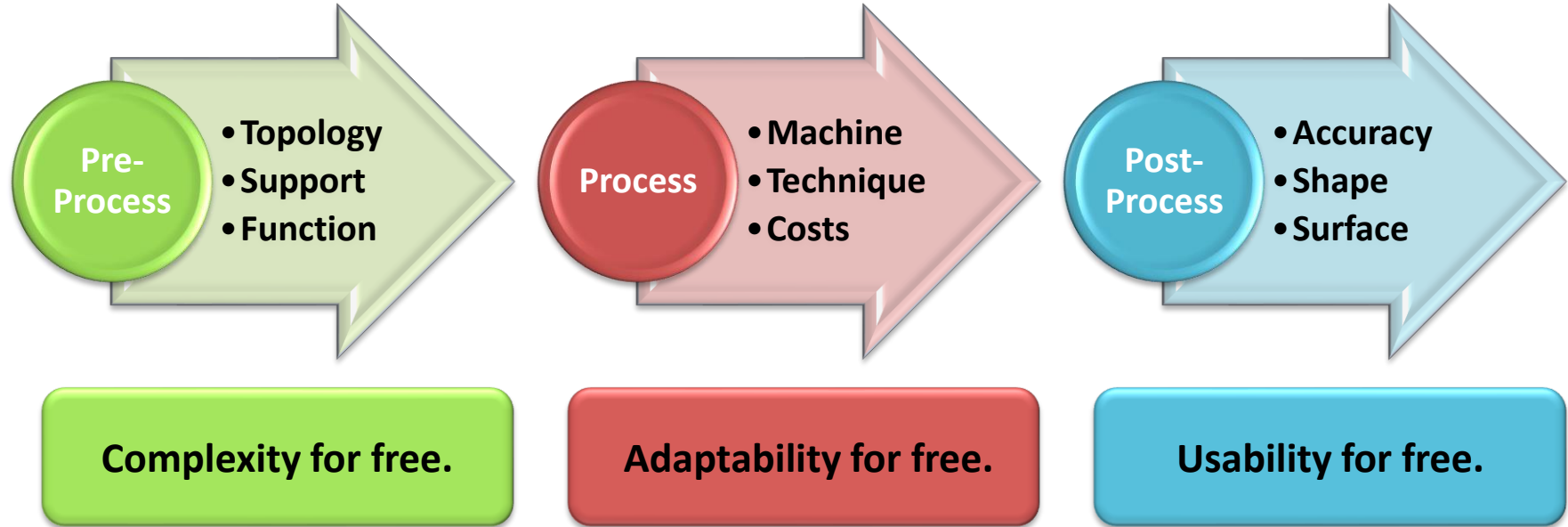
Additive Manufacturing



Smart Factory



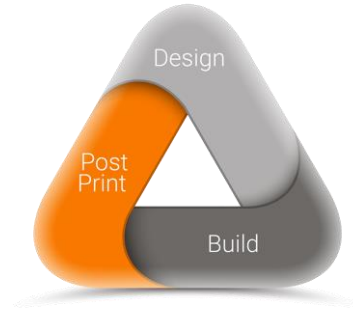
Process Chain and our Mission



Limitations until now



Production Time



Post Processing



Machine Costs



AM is still not established in mass production.

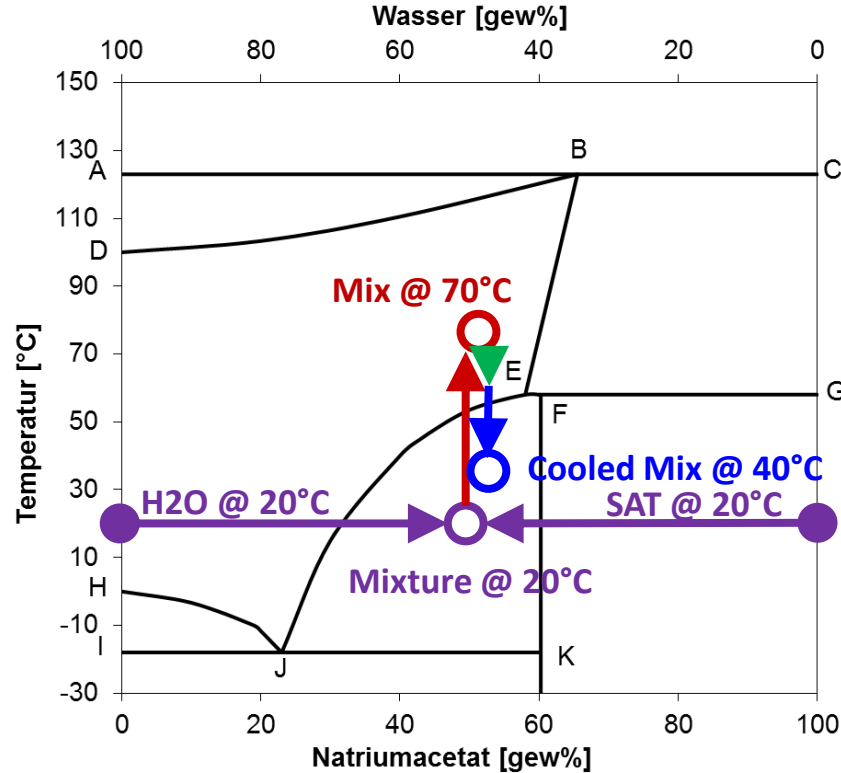
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Source: <https://cypherbits.net>

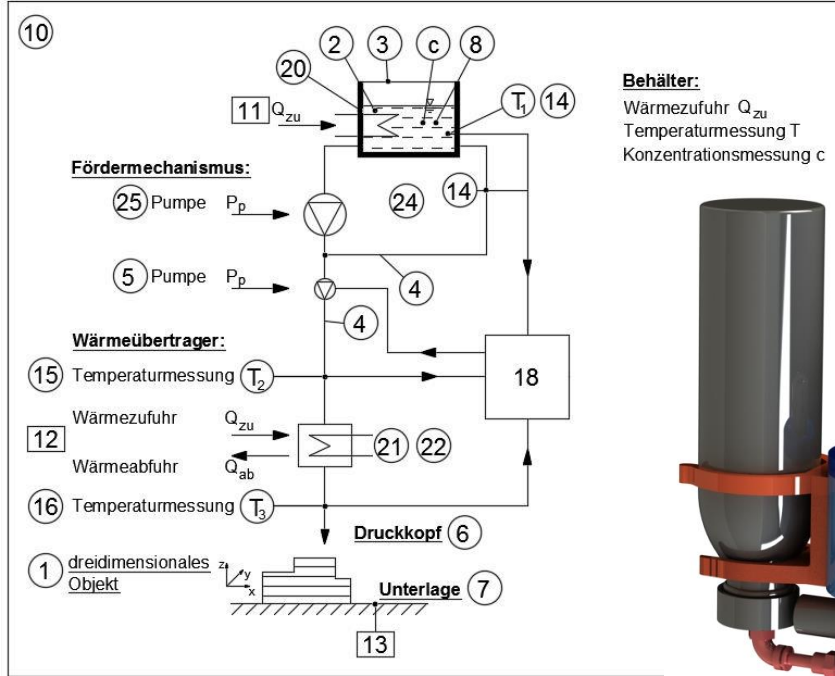
SAT-3D (Natriumacetat Trihydrat)



Process Steps:

- Mixture
- Heating
- Transportation
- Cooling
- Printing

Patent and Results



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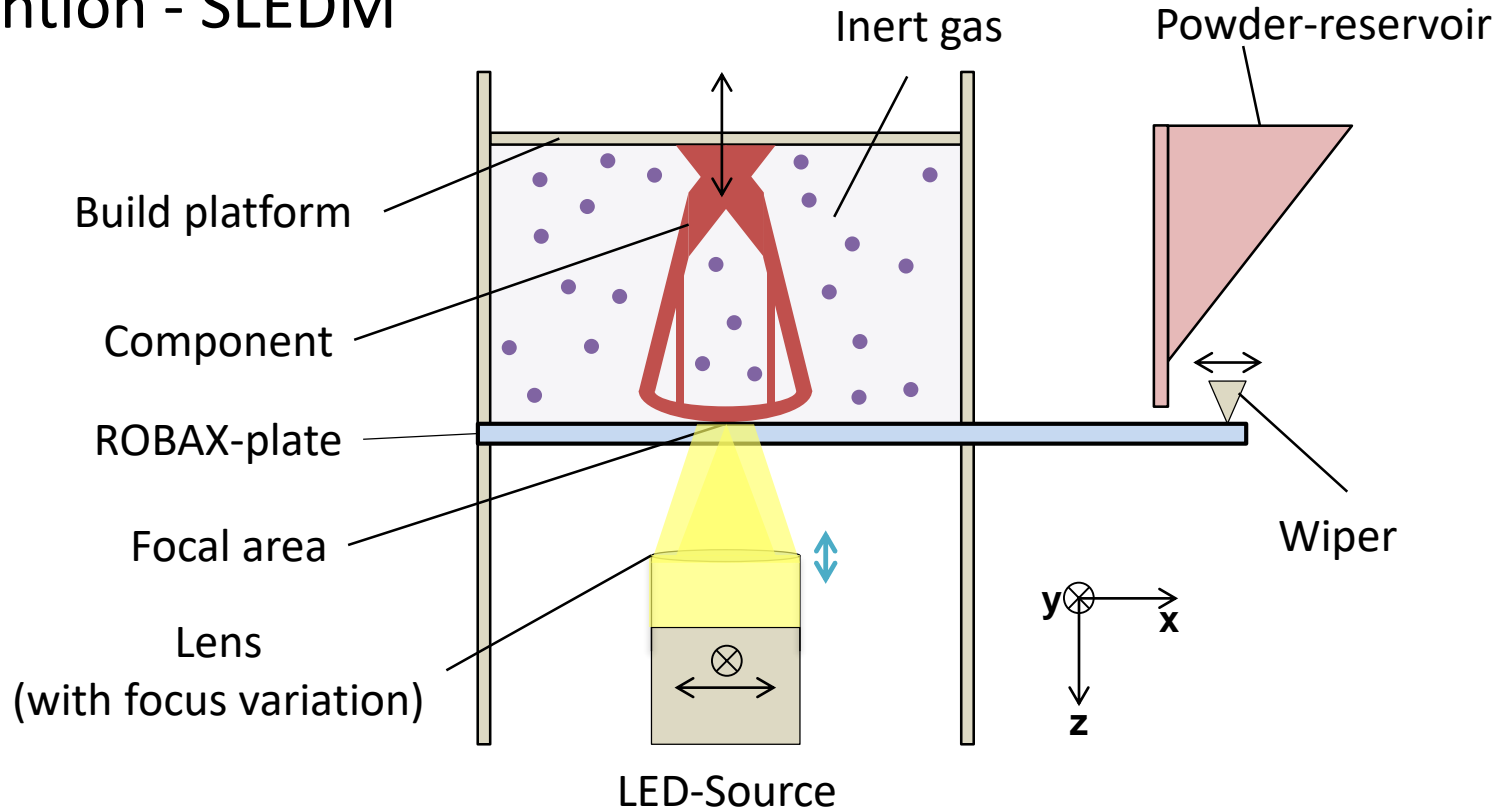
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Change in Metal Additive Manufacturing

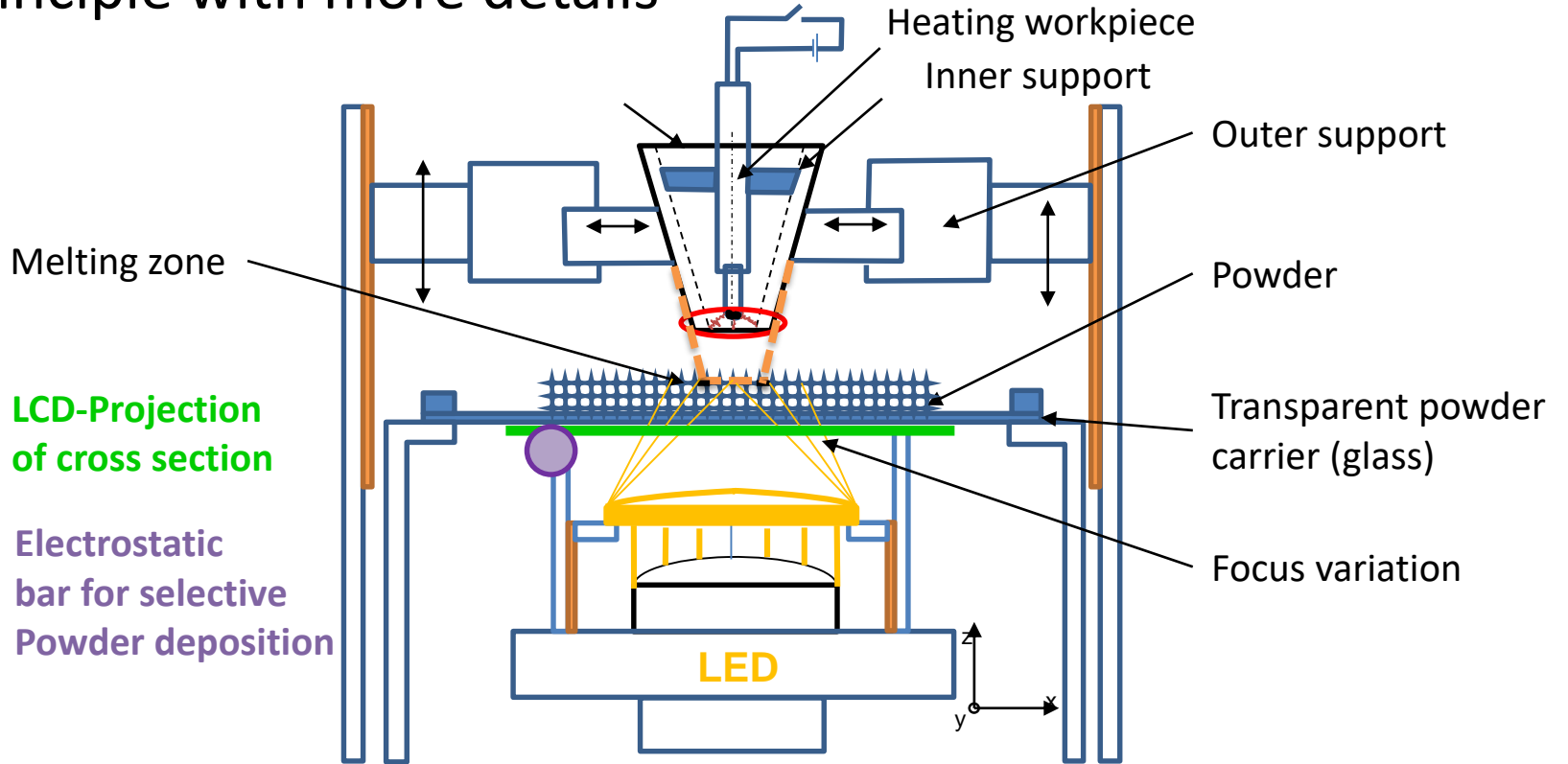
From Laser (SLM)

to LED (SLED^M)

Invention - SLEDM

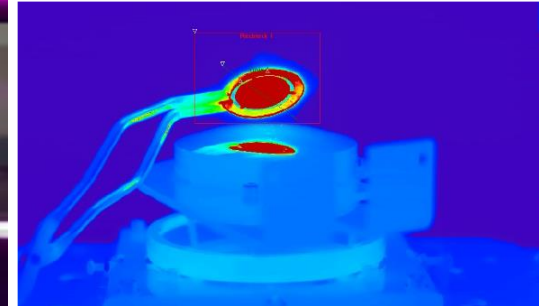
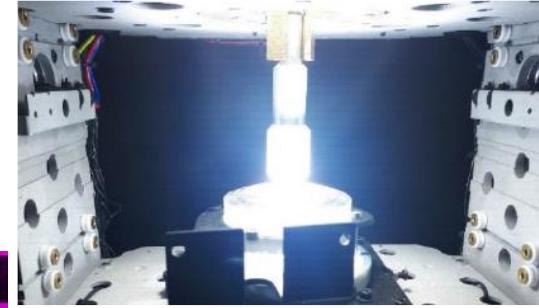
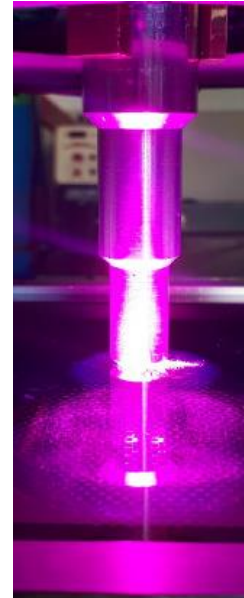


Principle with more details



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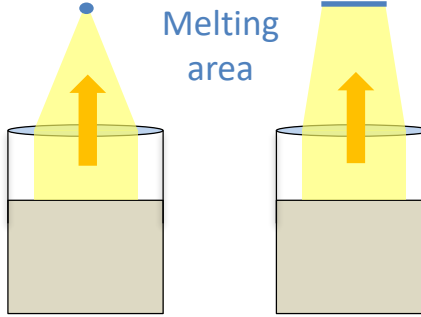
LED vs. Laser/Electron Beam

SLEDM	Characteristic	Laser/Electron Beam
LED	Energy Source	Laser, Electron
Variable (200 μm up to 20 mm)	Melting Spot	Constant (e.g. 90 μm)
Top-Down	Building Direction	Down-Top
Linear Direction LED	Scanning Device	Mirror/Deflection System

SLEDM – Technical Advantage



Safety



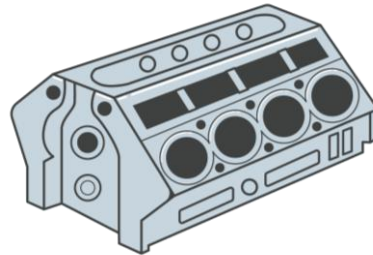
Variable melting area



Time & costs



Low active powder volume



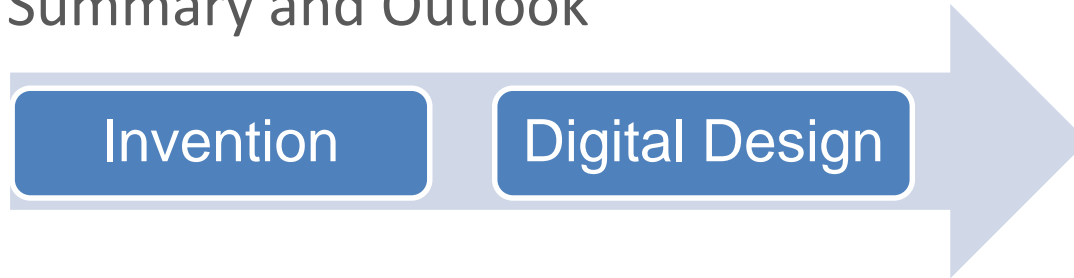
Powder handling



Ready for mass production

Agenda

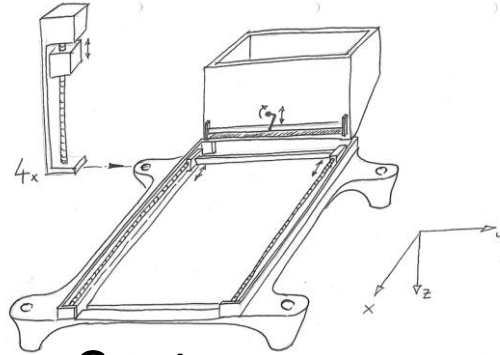
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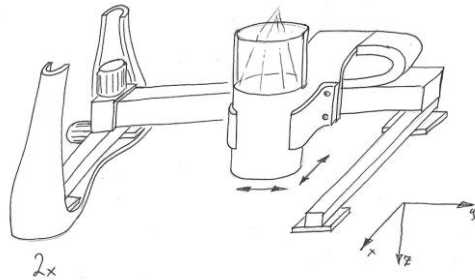
Design Process



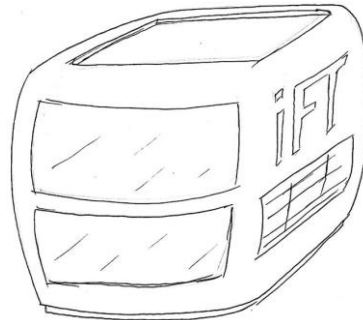
Top



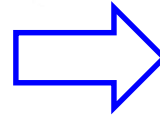
Centre



Bottom



Housing

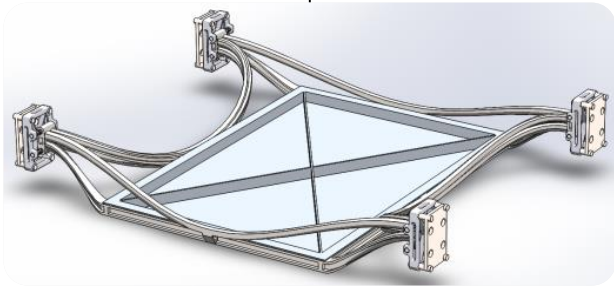


Final product

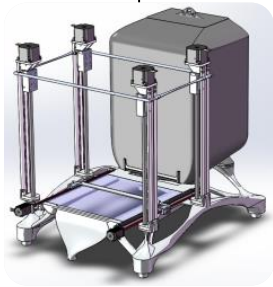


SLEDM – Assemblies

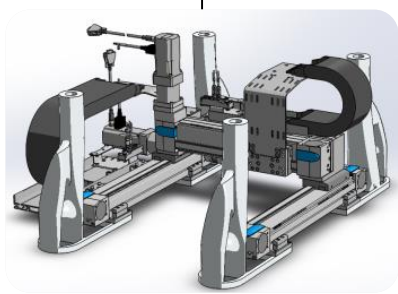
Assemblies



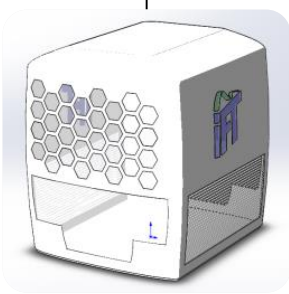
Top



Centre



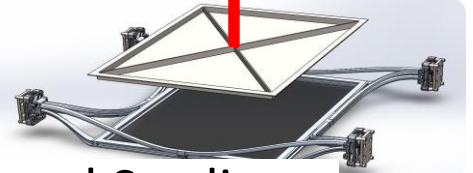
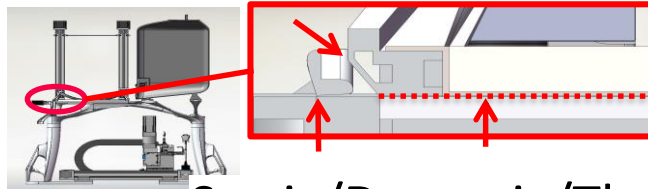
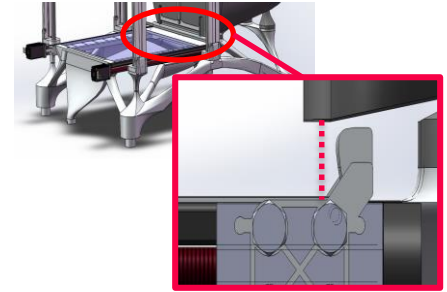
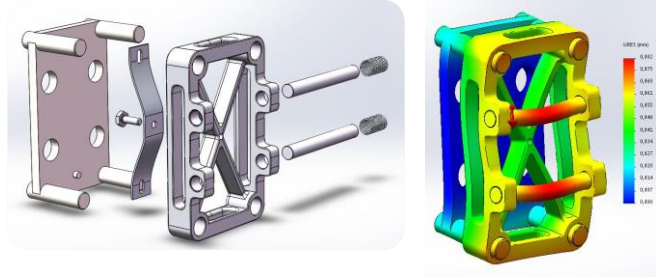
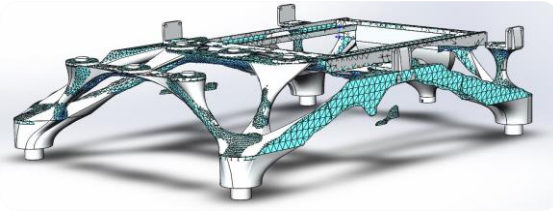
Bottom



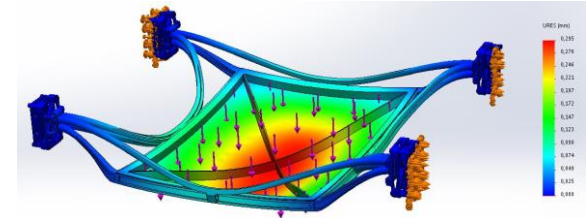
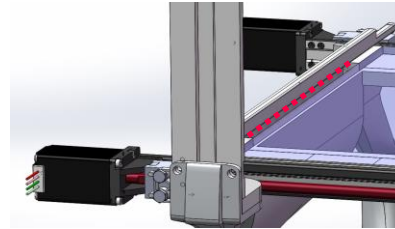
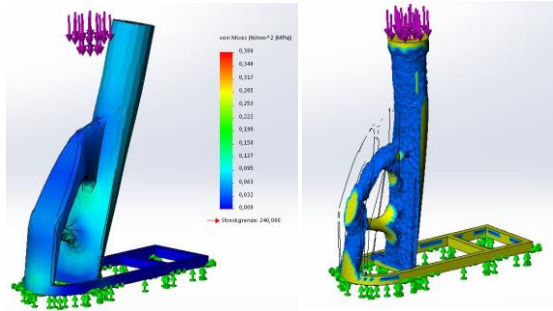
Housing

FEM-Analyses

Topology Optimization

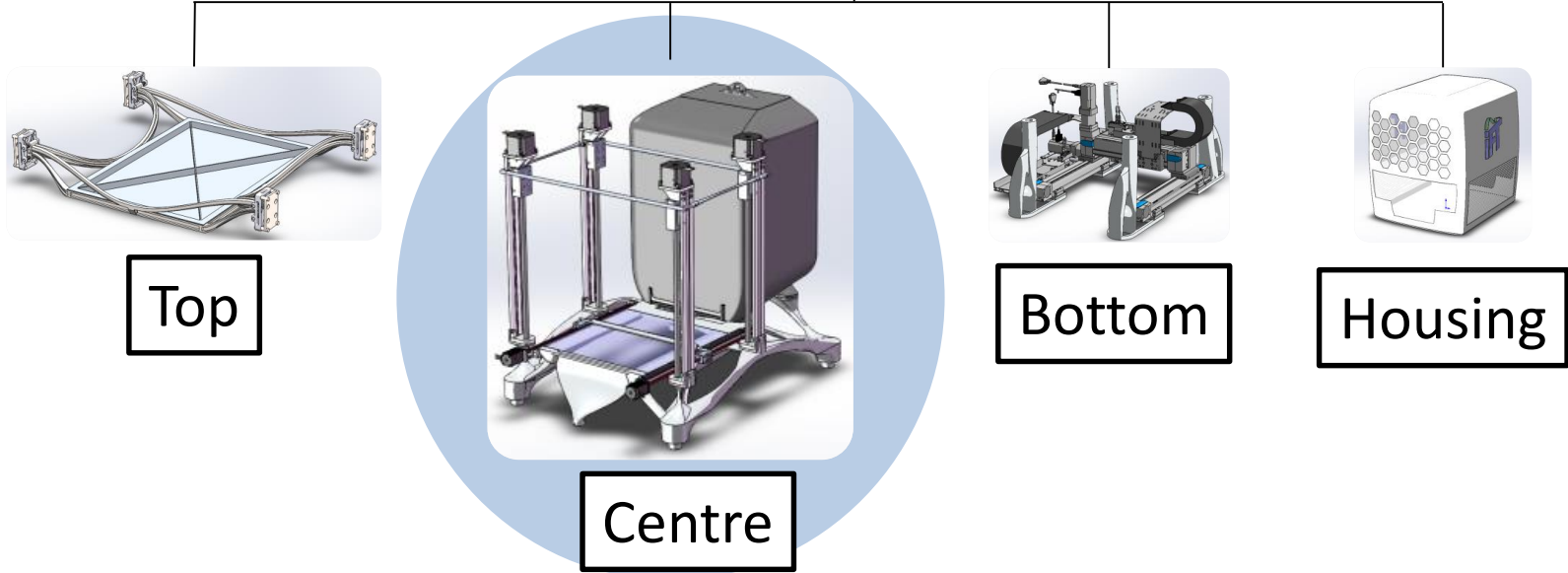


Static/Dynamic/Thermal Studies

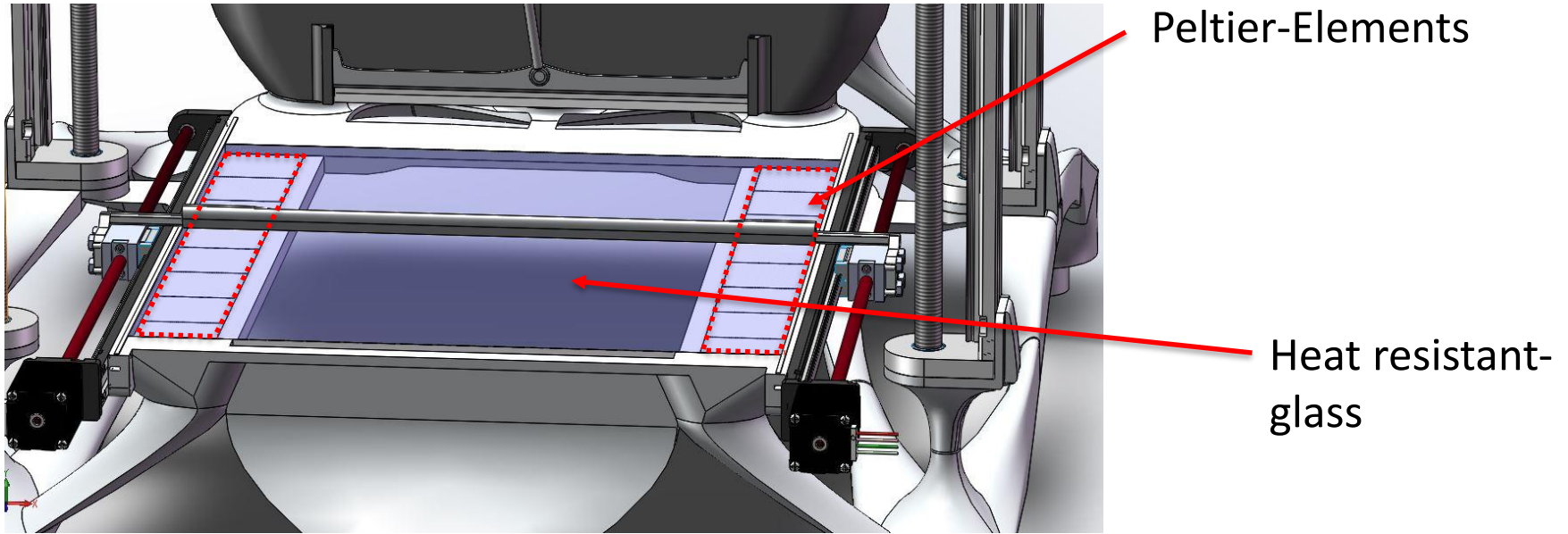


SLEDM – Construction

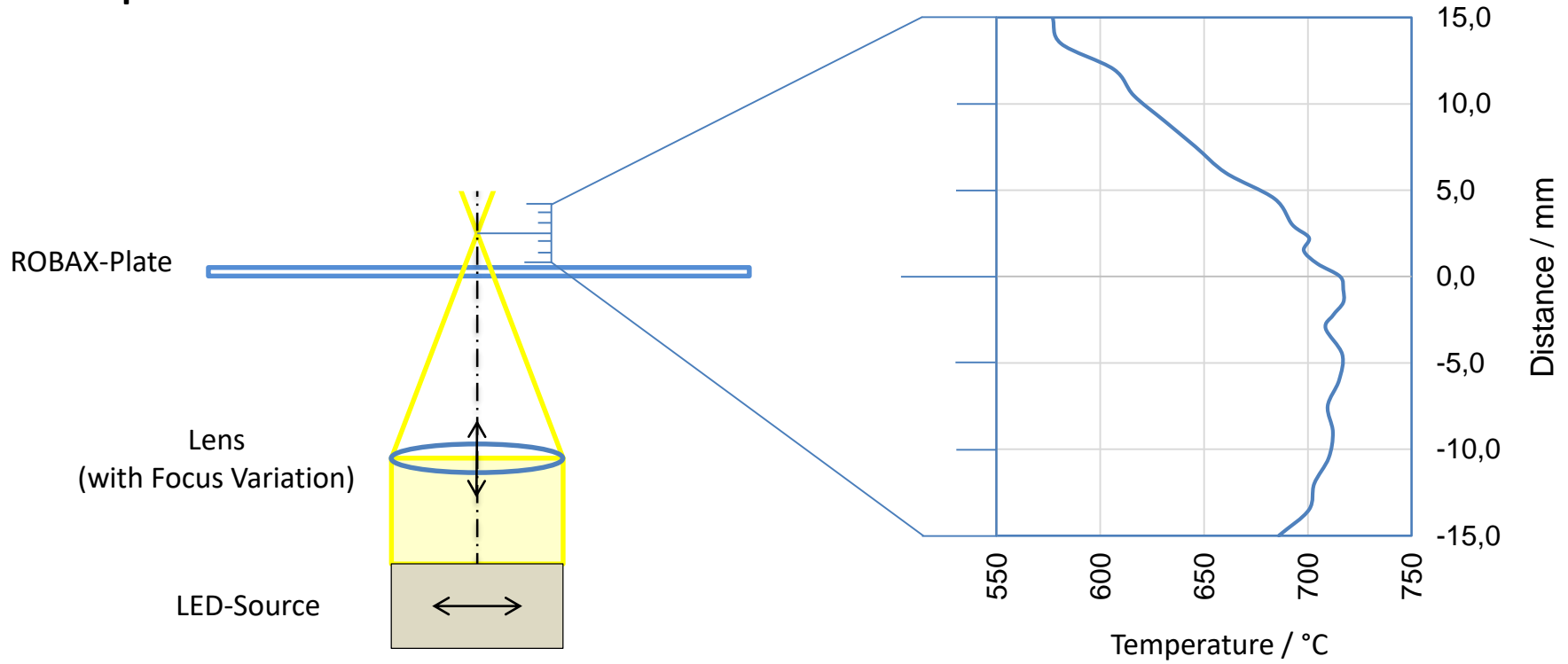
Assemblies



Thermal Management - Centre



Temperature Measurements



SLEDM-Prototype

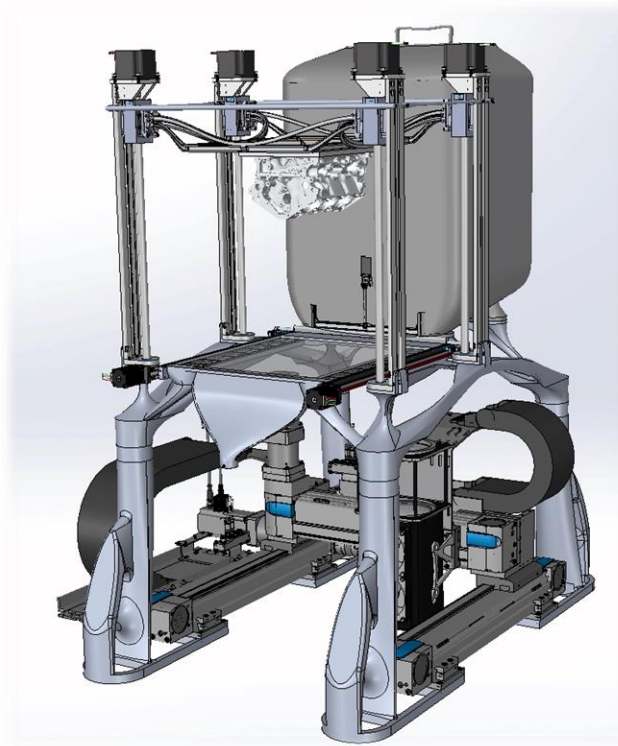


Summery and Outlook

Patent application
done

Scientific work

Publications



Tests with different
powders

Collaboration with
industry

Standardization