Herzlich willkommen

Bitte haben Sie noch etwas Geduld.
Das Webinar beginnt in Kürze!

Virtuelle Innovationstage Medizintechnik

10.11. bis 13.11.2020

KEYNOTE: 3D-Druck mit LED-Strahlen – Neue Technologie revolutioniert 3D-Metalldruck

Referent Prof. Franz Haas

11. November 2020, 09.35 Uhr bis 10.00 Uhr

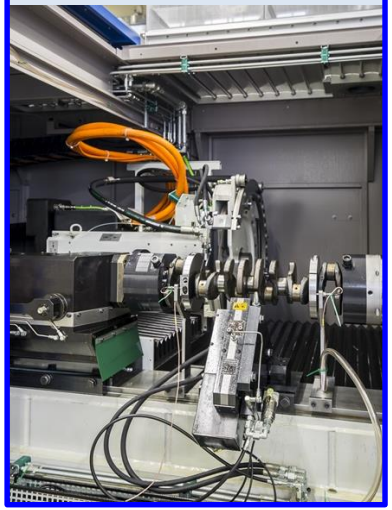
medizin & technik
Virtuelles Fachforum
Innovationstage
Medizintechnik

konradin Industrie

Bei Problemen mit dem PC-Ton bitte per Telefon einwählen: +49 721 9881 4171 | Audio-Zugangscode: 986-307-647 | Webinar-ID: 968-594-459

Institute of Production Engineering (IFT) - Portfolio

Precision Machining



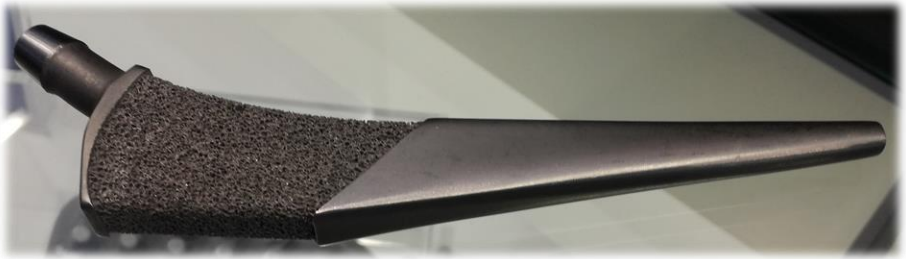
Fluid Technology

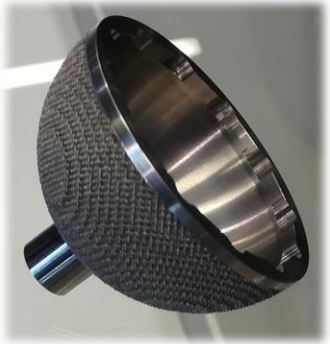
Additive Manufacturing

Smart Factory

Agenda

- **Initial Situation**
- Invention → Product “SLEDM”, Principle “PLF”
- LED vs. Laser/Electron Beam
- Design Process
- Summary and Outlook

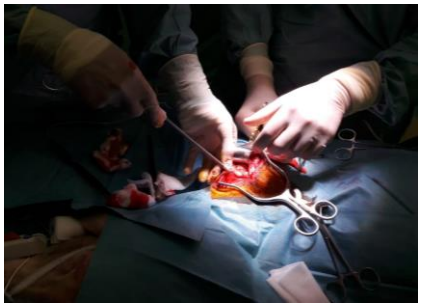




3D-Printing for Medical Applications

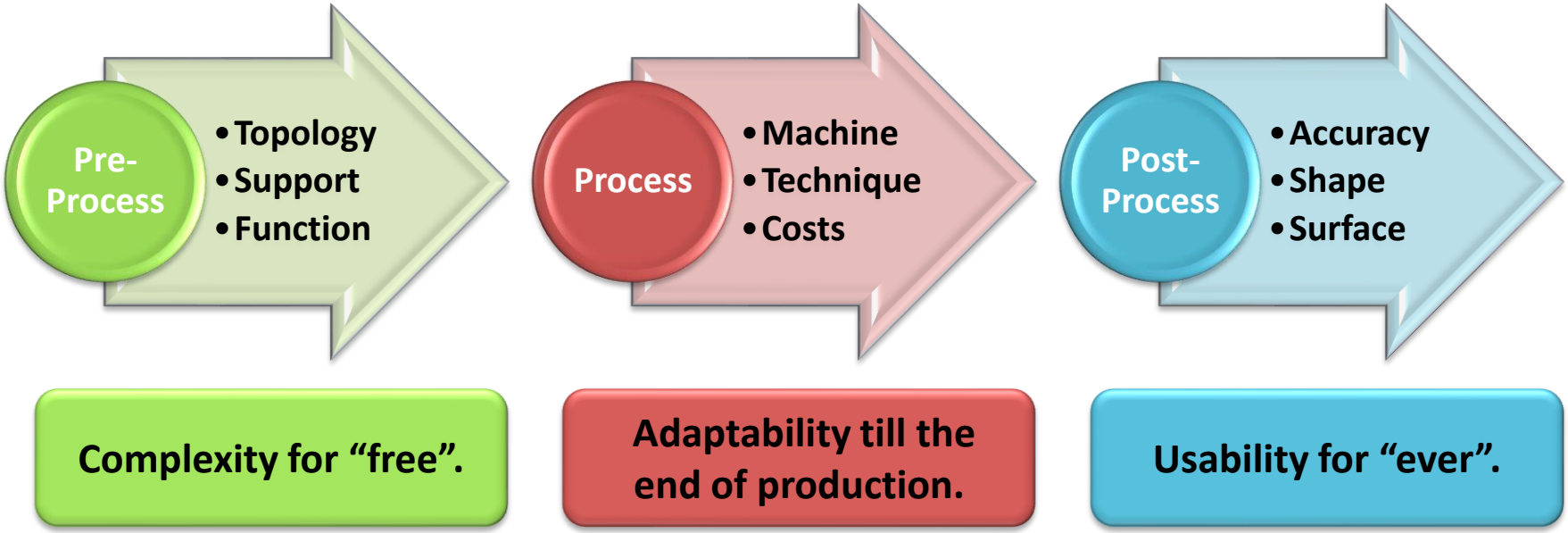
Source: Schäfer U., Weinberg A., Meduni Graz, 2019

Source: Haas F., IFT, TU Graz, 2018



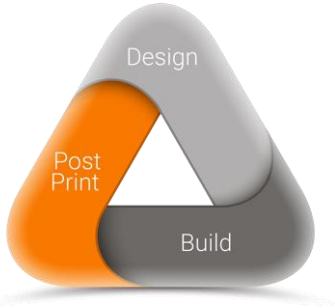
CAMed Medical University of Graz
Clinical additive manufacturing for medical applications

Process Chain and our Mission for Medical Applications



Limitations until now

Production Time



Post Processing

Machine Costs

AM is still not established in mass production.

Agenda

- Initial Situation
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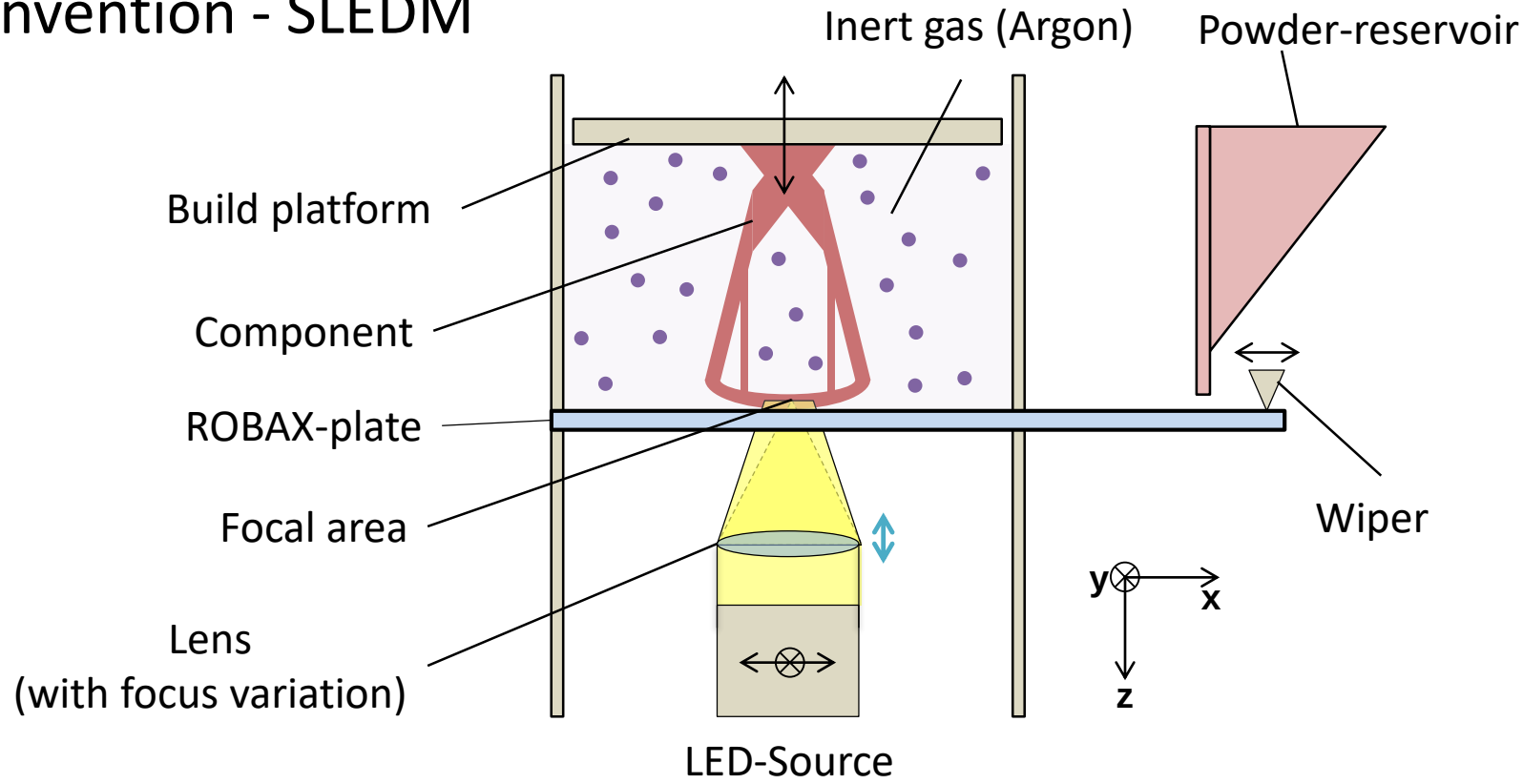
Source: https://cypherbits.net

Change in Metal Additive Manufacturing

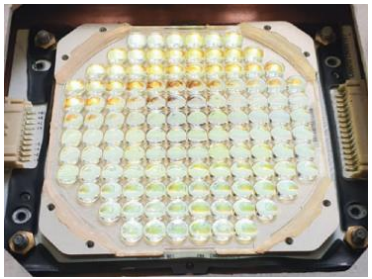
From Laser (SLM)

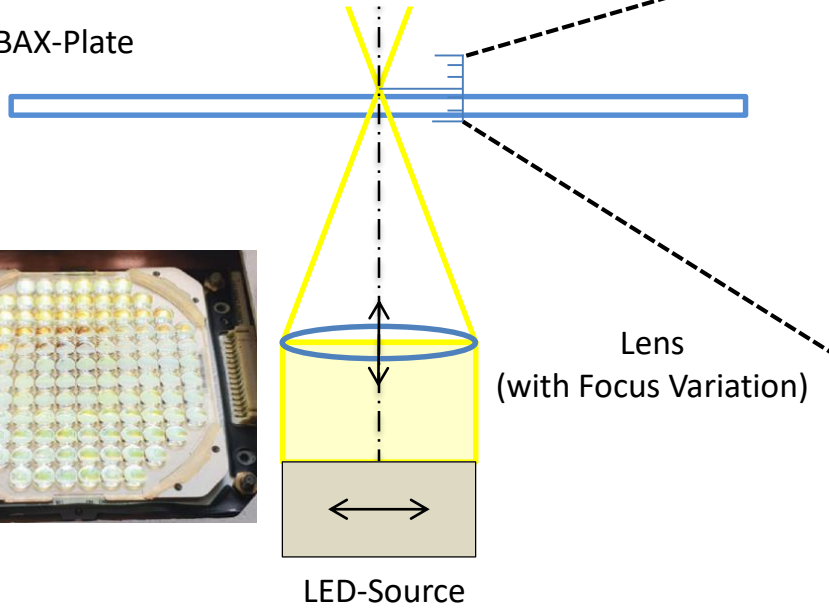
to LED (SLEDM)

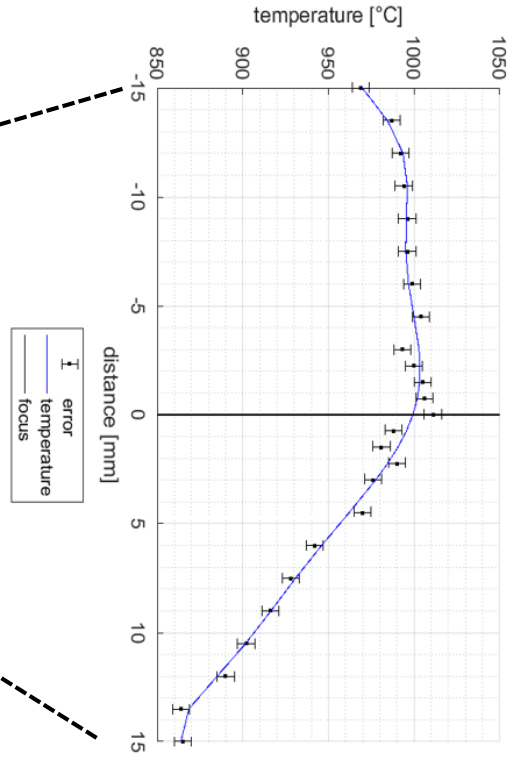
Invention - SLEDM



Temperature Measurements

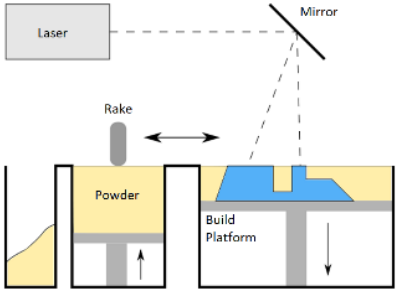






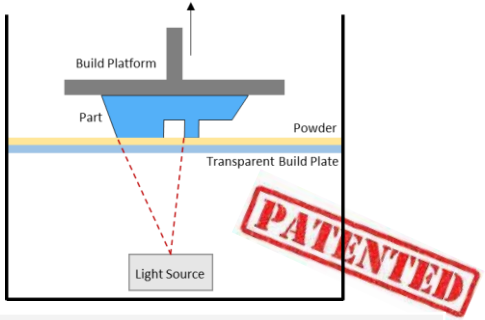
Powder Bed Fusion (PBF) vs. Powder Layer Fusion (PLF)

Powder Bed Fusion (PBF)



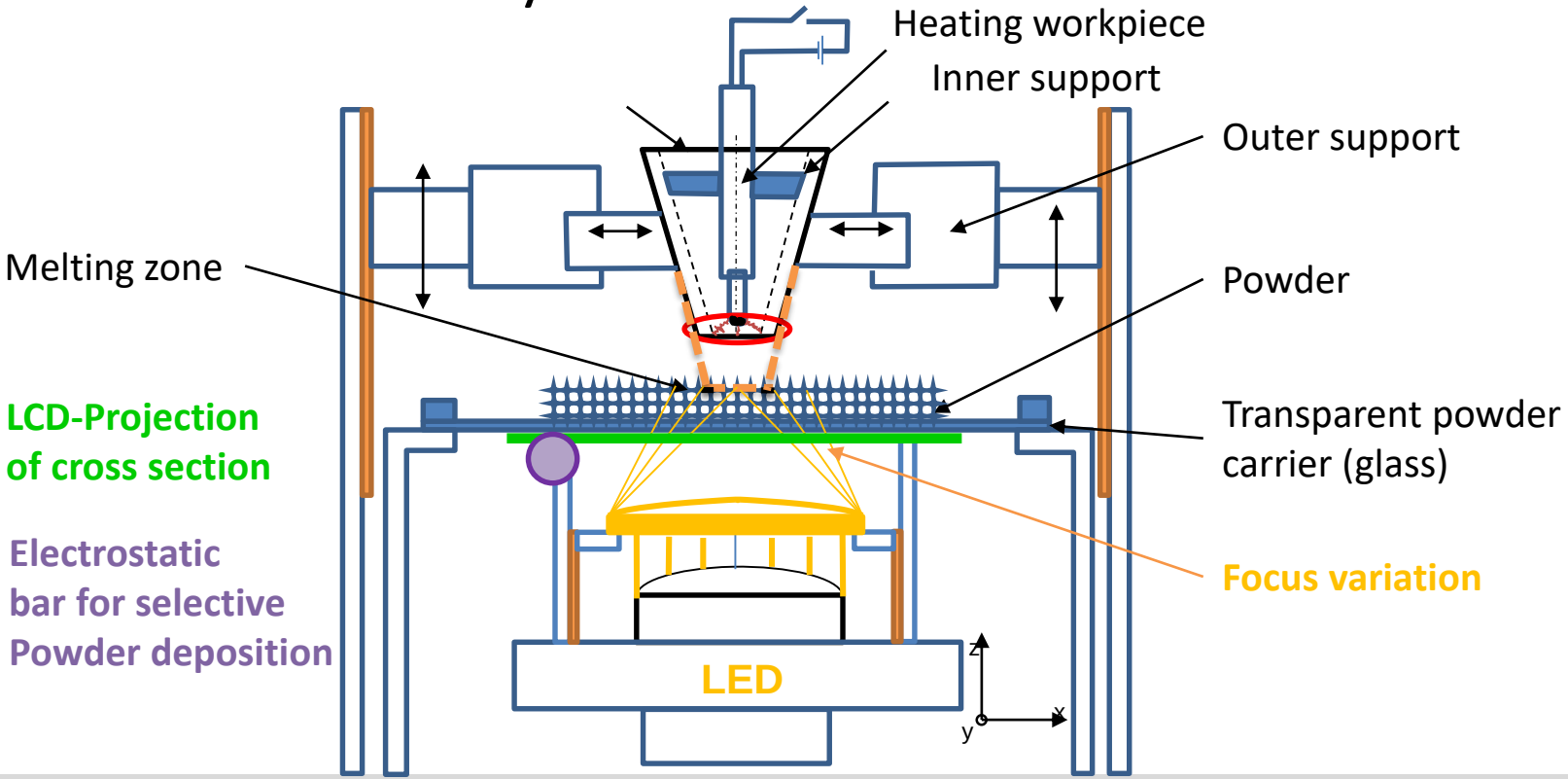
compared to

Powder Layer Fusion (PLF)



Laser, Electron Beam	**Energy Source**	LED
Bottom Up	**Build Direction**	Top Down
No	**Part Accessibility during Printing**	Yes
Limited in Powder Bed	**Heat Transfer**	Adjustable
High	**Thermal Gradient**	Low
High	**Pre- and Post Processing Effort**	Low
High (with waste)	**Metal Powder Consumption**	Low (no waste)
Low	**Scalability**	High

Invention “Powder Layer Fusion - PLF”



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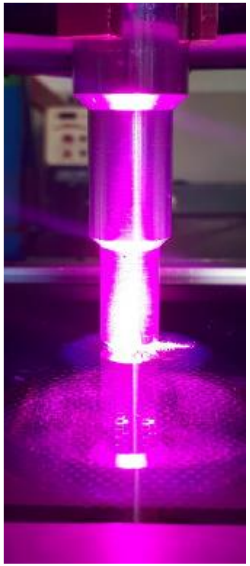
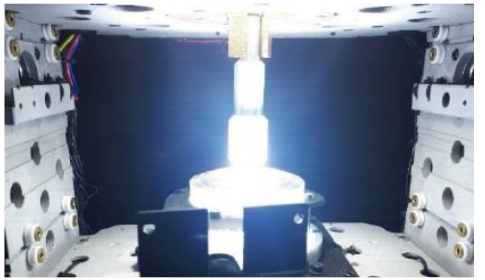
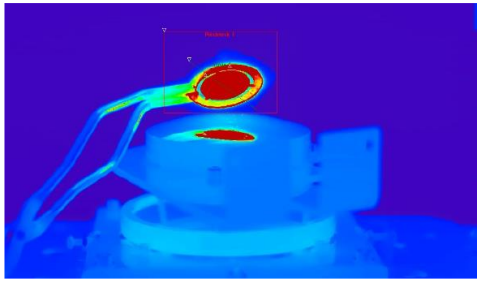
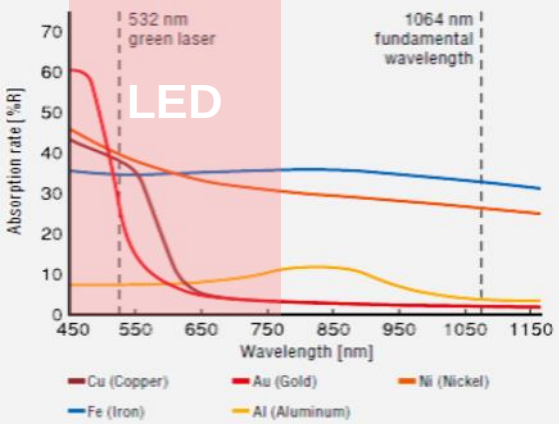


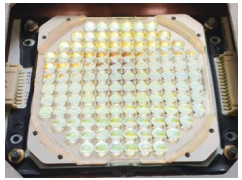


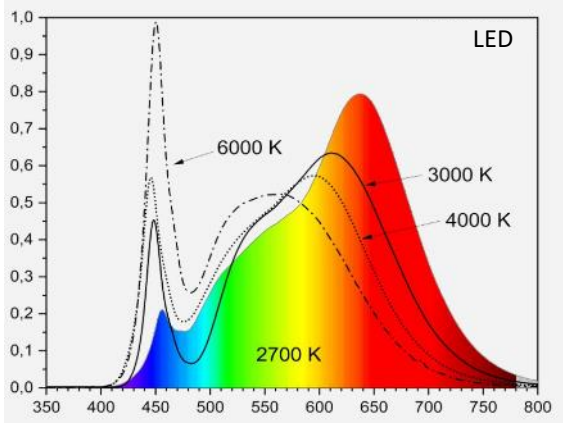


LED vs. Laser/Electron Beam



vs.

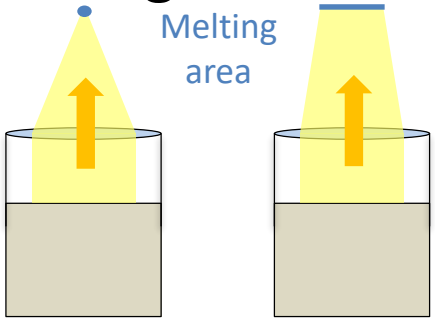




Single Wavelength (Monochromatic)	**Light Characteristics**	Multiple Wavelengths (Spectrum)
Fixed	**Absorption Rate in Metals**	Adjustable
High along the whole beam length	**Energy Density**	Maximum in focal point
0,05 – 0,7 mm	**Focus Variation**	0,05 – 15 mm

SLEDM – Technical Advantage

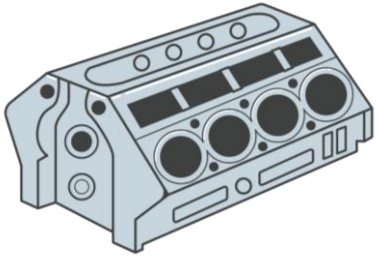
Safety



Variable melting area

Time & costs

Low active powder volume



Powder handling

Ready for mass production

Agenda

- Initial Situation
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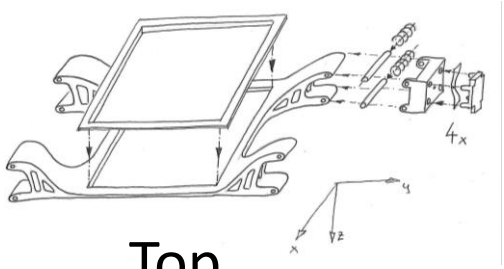
- LED vs. Laser/Electron Beam
- **Design Process**
- Summary and Outlook

Design Process



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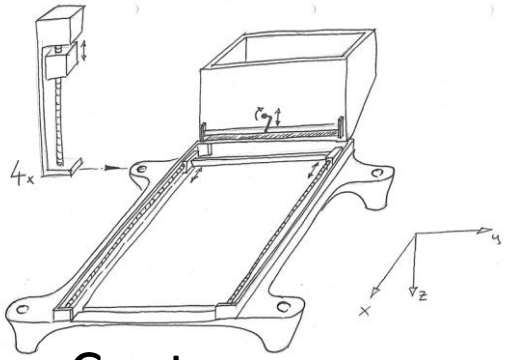
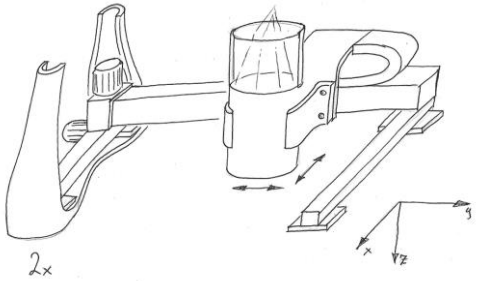


Centre



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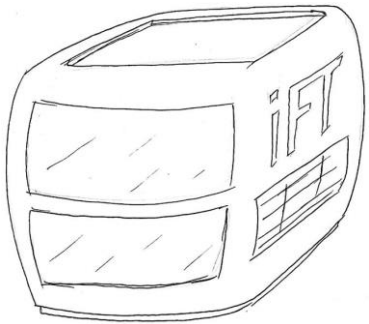
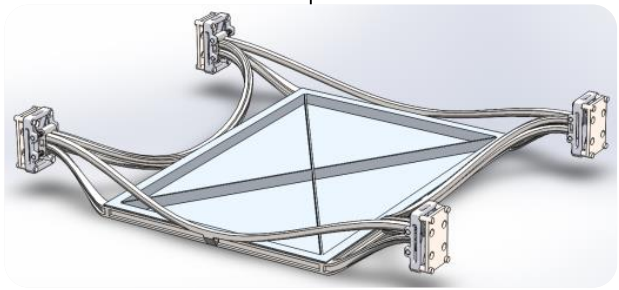


Housing

Final product

SLEDM – Assemblies

Assemblies



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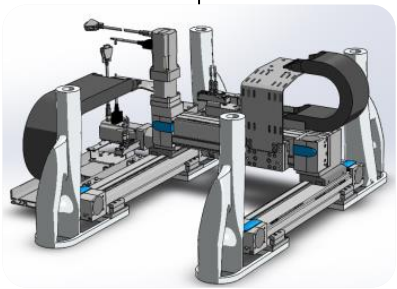
Centre



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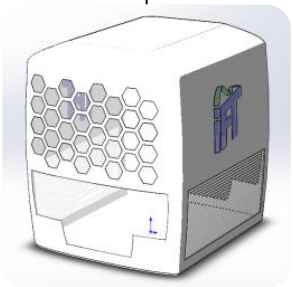
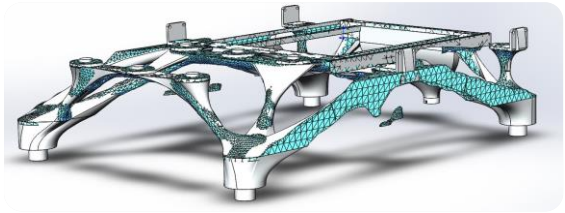
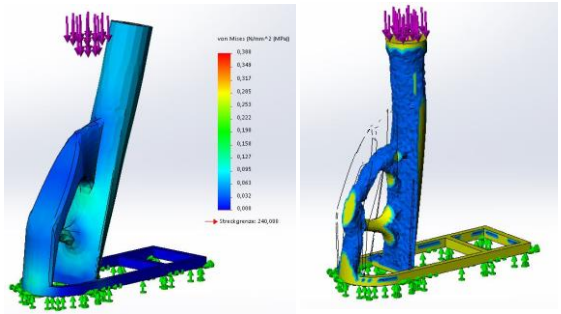


Housing

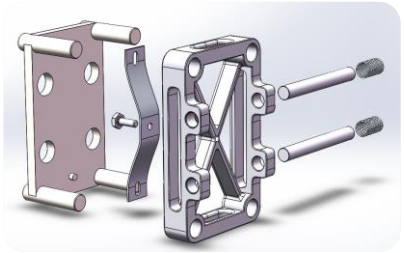
FEM-Analyses

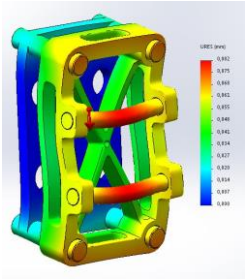
Topology Optimization

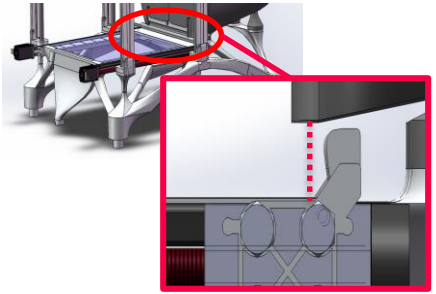


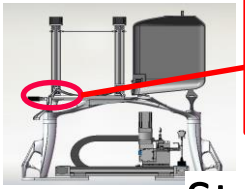


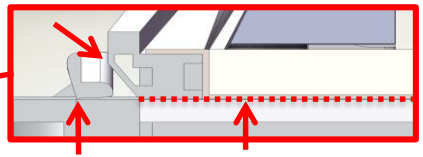
Static/Dynamic/Thermal Studies

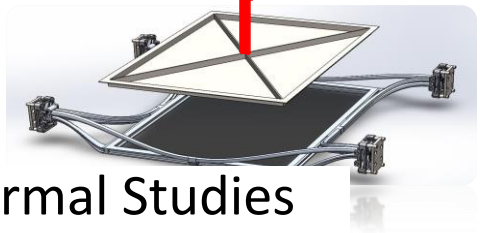


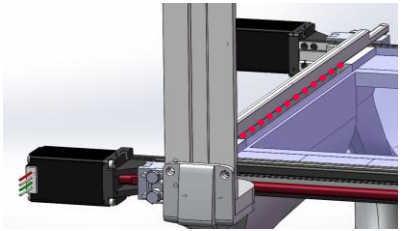


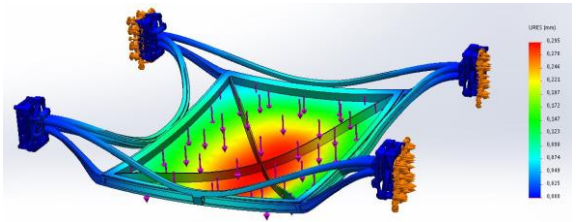






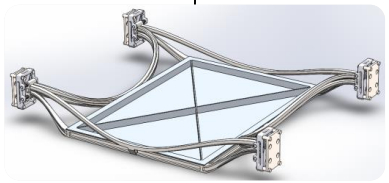






SLEDM – Construction

Assemblies



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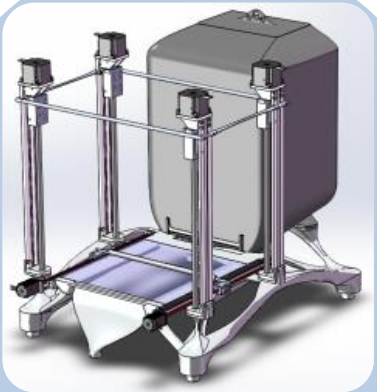
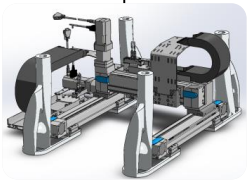


Centre



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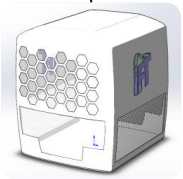
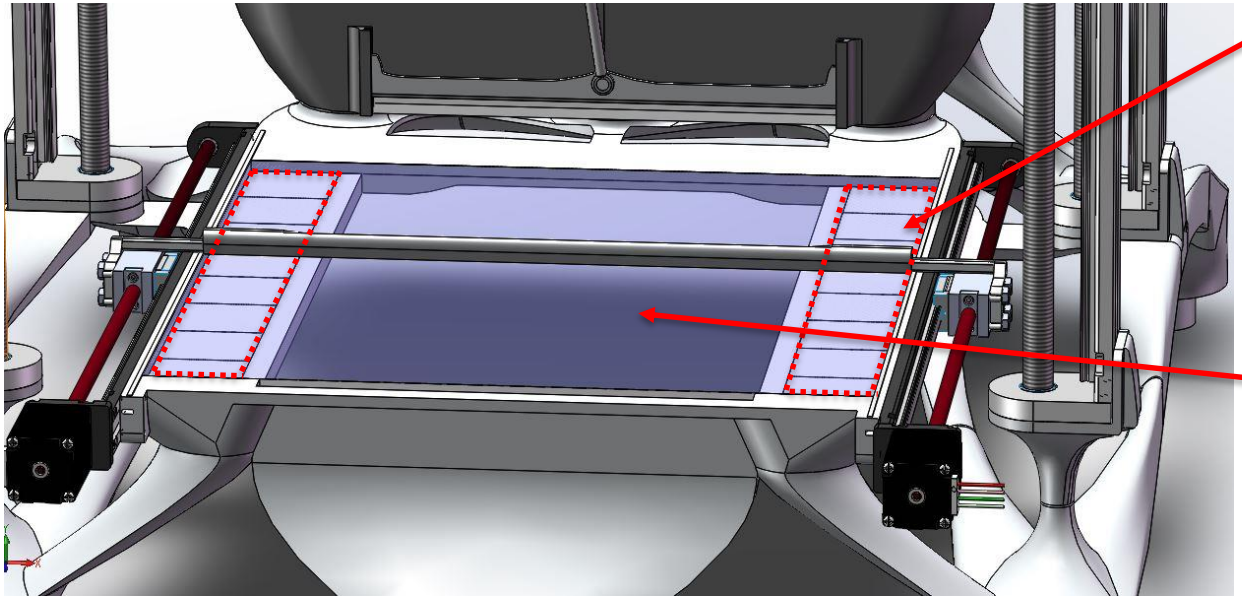
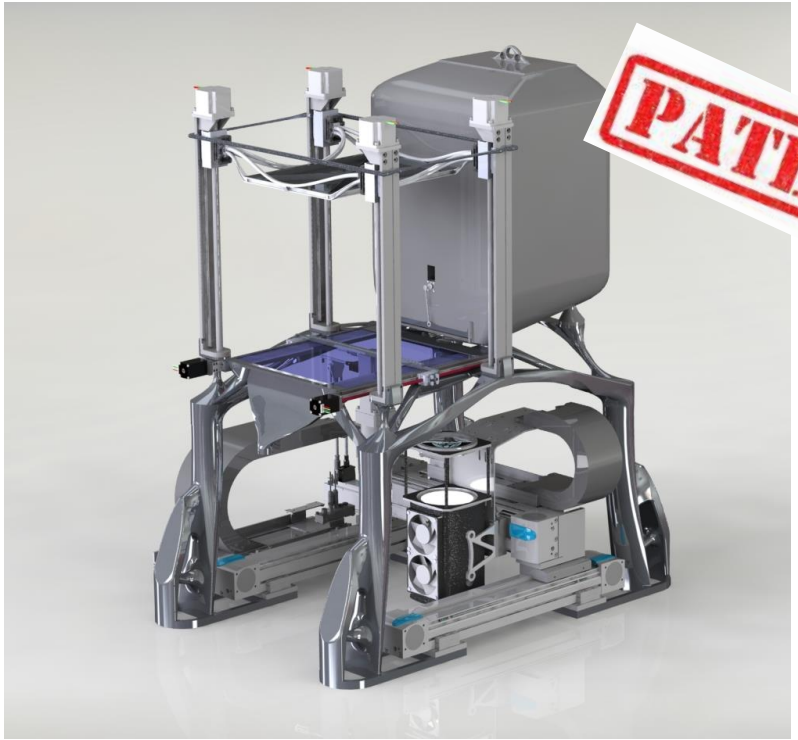


Housing

Thermal Management - Centre



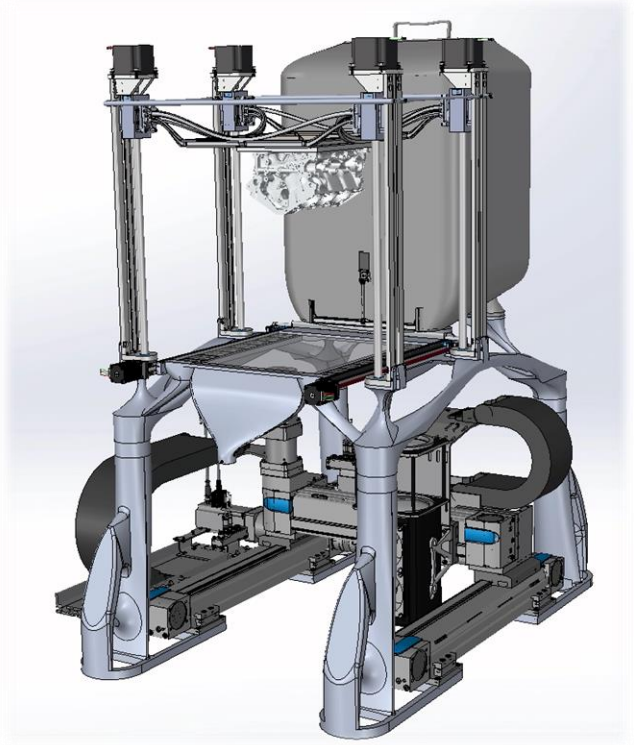
SLEDM-Prototype



PATENTED

Summery and Next Steps

- „SLEDM“ and „PLF“ will be deeper developed.
- Product for Medical Engineering will be very soon available for testing.
- Next Generation of High-Power LEDs (1000 W LED-matrix) will be integrated.
- Materials for medical applications (Mg-alloys, Peek, Titanium) are promising for SLEDM.
- Integration of Metal 3D-Printing into hospital.
- Open for collaboration and inputs.



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www.smartfactory.tugraz.at

Virtuelle Innovationstage Medizintechnik
10.11. bis 13.11.2020

KEYNOTE: 3D-Druck mit LED-Strahlen – Neue Technologie revolutioniert 3D-Metalldruck

Referent Prof. Franz Haas

11. November 2020, 09.35 Uhr bis 10.00 Uhr

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Innovationstage
Medizintechnik

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