

Metal Additive Manufacturing Conference

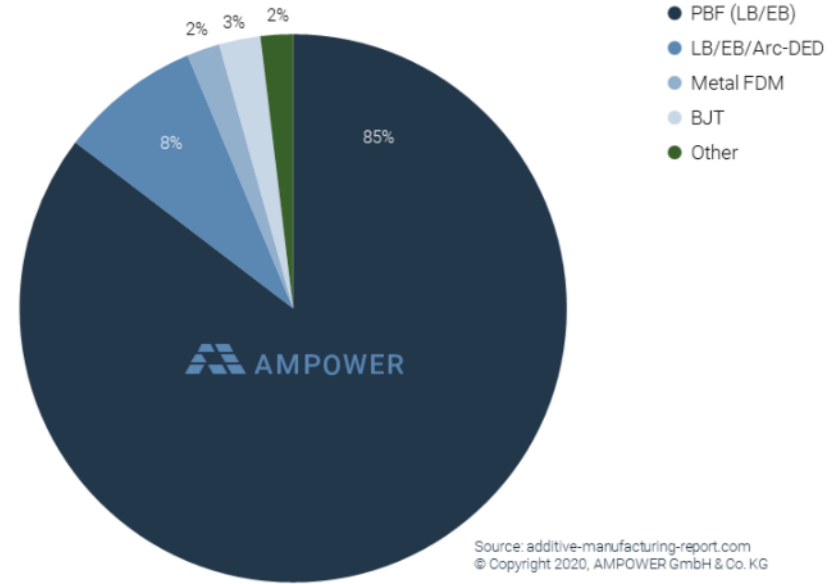
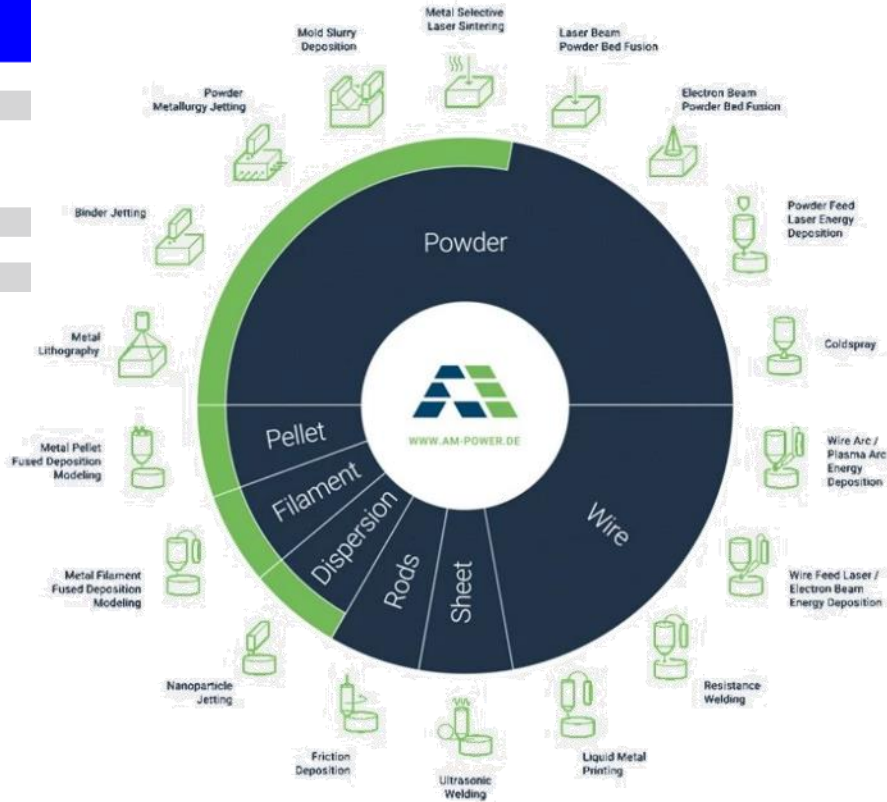
SELECTIVE MELTING OF METAL POWDER WITH HIGH- POWER LED ENERGY SOURCES (SLEDM)

Univ.-Prof. DI Dr. techn. **Franz Haas**
DI **Patrick Aschauer**
DI Dr. **Stefan Griesser**

02.10.2020

Institute of Production Engineering (IFT)
Graz University of Technology

Current Metal AM Landscape



Source: <https://www.3devaluate.com/post/metal-additive-manufacturing-technologies-used-today-1>



Production Time
Days/Weeks



Elaborate
Pre/Post Processing



Expensive
Machine & Operating Cost



Metal AM is still not yet established in mass production.

Our new Powder Layer Fusion (PLF) Process



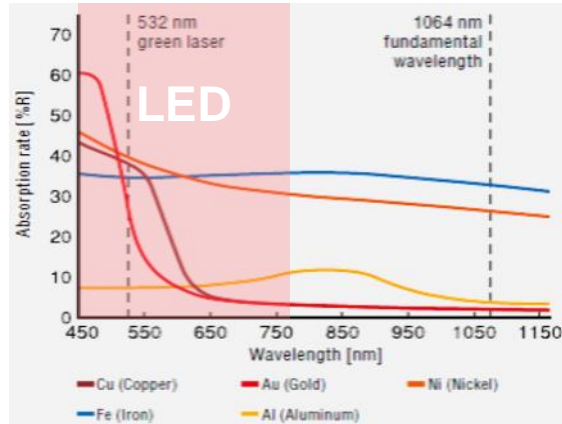
PATENTED

SLEDM – Selective LED-based Melting

... is a Powder Layer Fusion (PLF) Process for Powder-Based Materials

Our new Powder Layer Fusion (PLF) Process

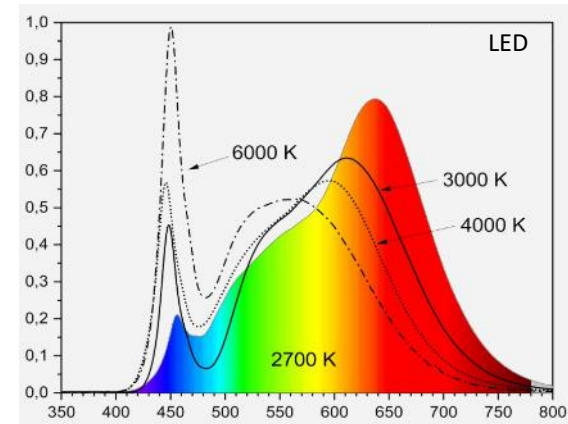
Laser



vs.



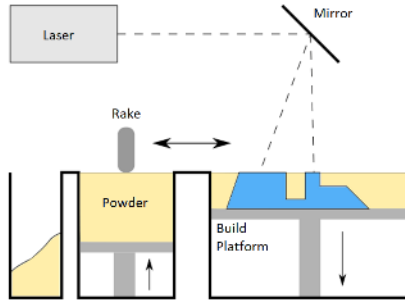
LED



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

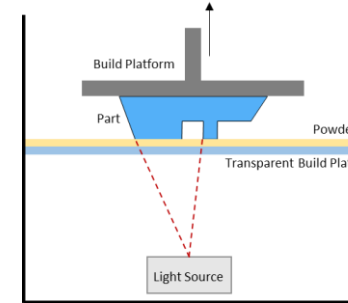
Our new Powder Layer Fusion (PLF) Process

Powder Bed Fusion (PBF)



vs.

Powder Layer Fusion (PLF)



PATENTED

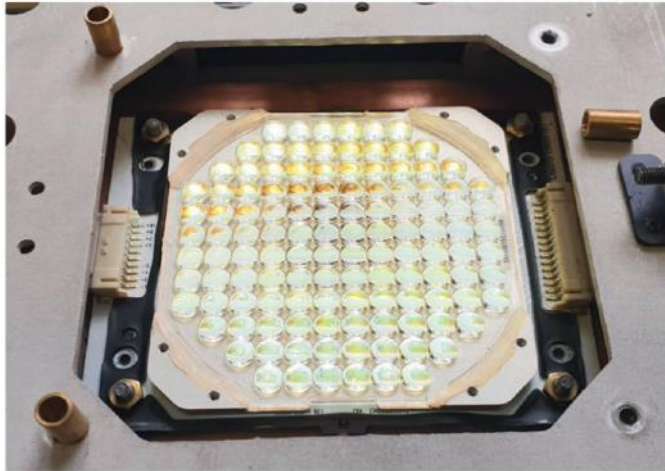
Laser, ElectronBeam	Energy Source	LED
Bottom Up	Build Direction	Top Down
No	Part Accessibility during Printing	Yes
Limited in PowderBed	Heat Transfer	Adjustable
High	Thermal Gradient	Low
High	Pre- and Post Processing Effort	Low
High (with waste)	Metal Powder Consumption	Low (no waste)
Low	Scalability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

Preconditions:

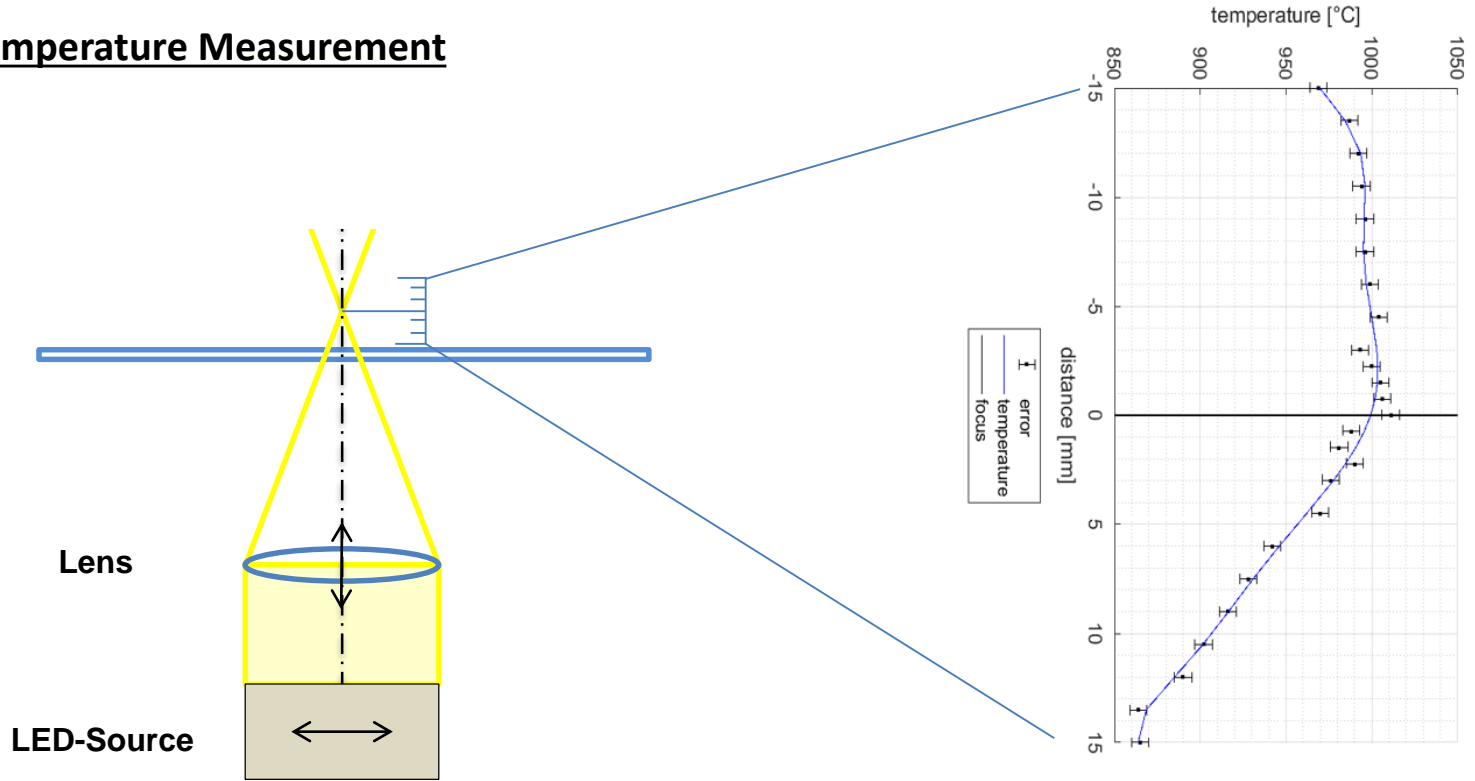
- Manual Powder Addition
- Manual Control of Melting Track
- No Inert Gas Atmosphere

Material:

- Air-Atomized Sn 99,9%
- Irregular Particle Shape
- 66% < 25 μm , 25% > 25 μm , 9% > 45 μm , 0% > 75 μm



First Temperature Measurement



Current/Next Steps:

- Foundation of a new company
- Filing of additional patents
- Development of a more sophisticated prototype
- Systematic investigations of process limits
- Upscaling
- Industrial Partners



Stay tuned...

Something really cool is coming soon!

Metal Additive Manufacturing Conference

SELECTIVE MELTING OF METAL POWDER WITH HIGH- POWER LED ENERGY SOURCES (SLEDM)

Univ.-Prof. DI Dr. techn. **Franz Haas**
DI **Patrick Aschauer**
DI Dr. **Stefan Griesser**

02.10.2020

Institute of Production Engineering (IFT)
Graz University of Technology