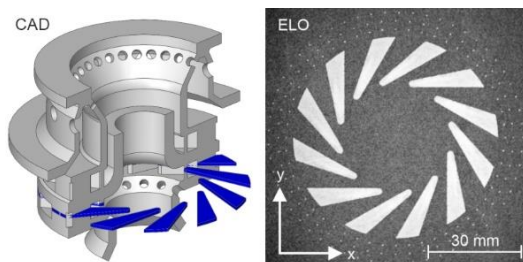
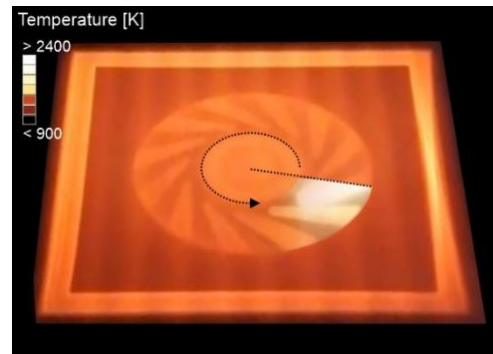


ADDITIVE MANUFACTURING / Electron beam powder bed fusion of metals

GENERAL ADVANTAGES OF THE PROCESS

- Design freedom and reduced lead times (manufacturing without tools / moulds)
- Improved material performance (rapid solidification, fine microstructure)
- Fast and accurate beam deflection (magnetic lens system)
- Efficient use of raw material (recirculation of unmolten powder)



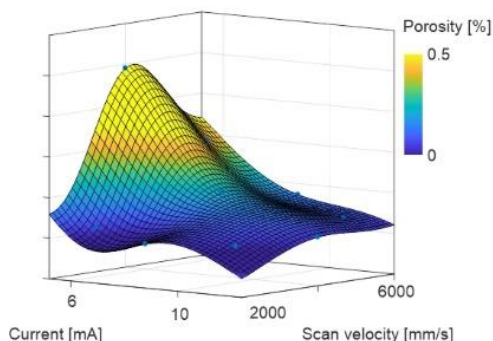
IN SITU PROCESS OBSERVATION

- Detection of backscattered electrons (BSE) and generation of high-resolution electron optical (ELO) images
- Reliability of the detector system (BSE detector is unaffected by temperature or metallization)
- No further post-process inspection (e.g., X-ray detection) necessary

HIGH PERFORMANCE MATERIALS

- Processing of non-weldable superalloys, intermetallics, refractory metals and highly reflective copper and copper-based alloys
- Avoidance of crack formation due to high preheating temperatures
- Vacuum conditions restrict contamination (e.g., oxygen uptake)

Atomic Number	22	47.90	Atomic Mass, u					
Name	Ti Titanium 1941		Symbol					
			Melting Point, K					
	26	55.85	27	58.93	28	58.70	29	63.55
	Fe Iron 1811		Co Iron 1768		Ni Nickel 1728		Cu Copper 1358	
73	180.95	74	183.85					
Ta Tantalum 3290		W Tungsten 3695						

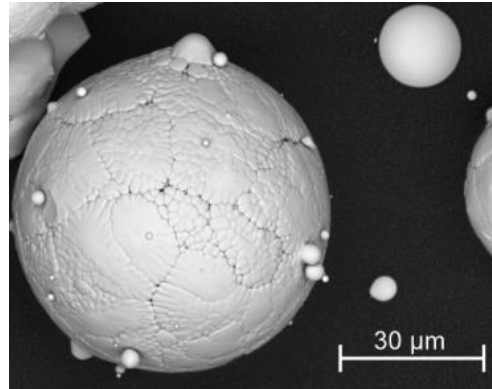


PROCESS OPTIMIZATION

- Design of experiments (DoE)
- Regression and correlation analysis for creating multidimensional process maps
- Multi-criteria process optimization
- Adaption of calculation tools (algorithm) to customer requirements

MATERIALS CHARACTERIZATION

- Chemical analysis
(N-/O-/C-/S-analyser, microprobe, etc.)
- Physical analysis
(laser flash device, dilatometer, etc.)
- Optical analysis
(laser diffraction particle size analyser, scanning electron microscope, etc.)
- Mechanical testing
(testing machines for dynamic and static applications, micro hardness tester, etc.)



PBF-EB EQUIPMENT

- ARCAM A2X and ARCAM Q10:
60 kV acc. voltage, 3 kW beam power, medium-sized build envelope
- Retrofit S12 and Retrofit A2:
ELO, 60 kV acc. voltage, 6 kW beam power, medium-sized build envelope
- Freemelt ONE:
ELO, 60 kV acc. voltage, 6 kW beam power, small-sized build envelope
- Pro beam K20-2 and Pro beam 30S:
ELO, 150 kV acc. voltage, 45 kW power, large-sized build envelope

CONTACT



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