DOLPHIN

Disruptive pemfc stack with n**O**vel materia**L**s, **P**rocesses, arc**H**itecture and optimized **IN**terfaces

Flow-Field manufacturing by additive manufacturing

(MOHCINE BENCHERIFI, DMG MORI ADDITIVE)

DMG MORI

ADDITIVE

COMPANY PRESENTATION 2021

DMG MORI

- \+ > 12.000 employees
- \+ > 100.000 customers from 54 industries and 86 countries
- \+ 138 sales and service locations
- \+ 14 production plants

DMG MORI Aktiengesellschaft

DMG MORI Company Limited

DMG MORI SEGMENTS

Advanced Technologies

Turning Technology

Drive Shaft | Hydraulic component

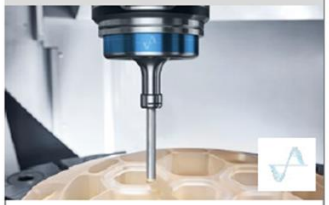
+ Universal turning machines
+ Turn & Mill
+ Production turning machines

Milling Technology

Compressor disk | Landing gear

+ Vertical machining centres
+ Horizontal machining centres
+ 5-axis milling machines and Mill & Turn

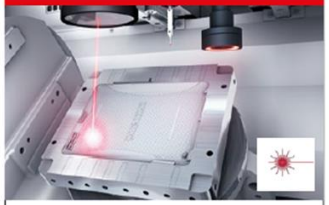
ULTRASONIC



Gyro-compass | Watchcase

+ Grinding
+ Grinding & milling
+ Hard-brittle and Advanced Materials up to 40% reduced process forces

LASERTEC



Steering wheel cap mould | Turbine vane

+ Shape
+ PrecisionTool
+ PowerDrill

Additive Manufacturing

Impeller | Drillbit

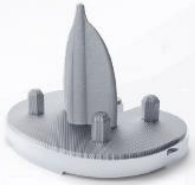
+ Powder bed (Selective Laser Melting)
+ Powder nozzle (Hybrid)

FOCUS INDUSTRIES

AEROSPACE

Blade

MEDICAL



Knee implant

MECHANICAL ENGINEERING

Coolant Nozzle

DIE & MOLD

Blow Mold

AUTOMOTIVE

Vehicle Components

Wheel Carrier
Machine: LASERTEC *SLM*
Material: Aluminium

ADVANTAGES

+ Highly complex parts with functional integration
+ Inner cooling channels
+ Weight optimization due to light weight structures
+ Simultaneous build up of different designs
+ Functional prototypes made of common materials

PRODUCT PORTFOLIO

LASERTEC 30 DUAL *SLM*

+ Build Volume: 300 × 300 × 300 mm
+ 2 × 600 W Dual Laser with 50 µm Spot Size
+ New Permanent Filtration System
+ rePLUG: Automated Powder Handling

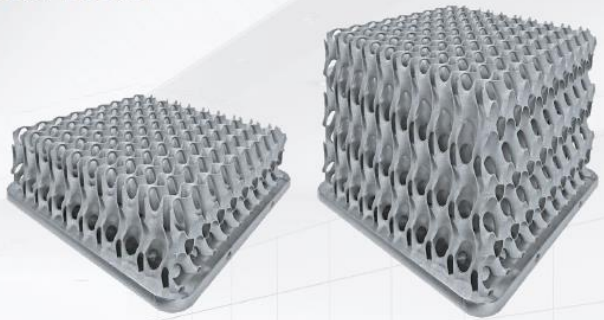
LASERTEC 12 *SLM*

+ Build Volume: 125 × 125 × 200 mm
+ Highest Precision: 35 µm Spot Size
+ rePLUG: Automated Powder Handling

FOCUS CUSTOMERS & APPLICATIONS

Build time comparison: 83% faster

Gyroid Heat Exchanger
Material: Stainless Steel
Build Time: 50 h



Build Time
50 h

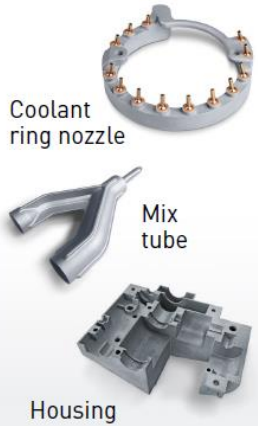
LASERTEC 30 *SLM* 2nd Gen.
1 × 600 W Laser
Achieved Build Height: 164 mm

LASERTEC 30 DUAL *SLM*
2 × 600 W Laser
Achieved Build Height: 300 mm

AEROSPACE

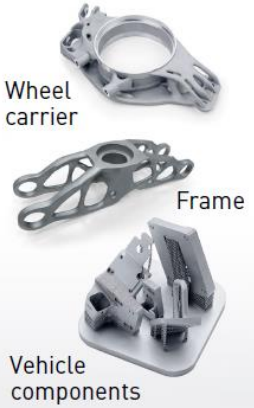
MEDICAL

MECH. ENGINEERING



DIE & MOLD

AUTOMOTIVE



Available Materials

+ 1.2709 (Tool Steel)
+ 1.4404 (Stainless Steel)
+ AlSi10Mg0,5 (Aluminium)
+ CoCr (Cobalt Chrome)
+ Inconel® 625 / 718
+ Scalmalloy®
+ Ti6Al4V (Titanium)

DMQP
DMG MORI QUALIFIED PRODUCTS

Easy Order Online!
shop.dmgmori.com

4 PROCESS CHAINS

Selective Laser Melting (*SLM*)

SLM + CNC

LASERTEC 30 DUAL *SLM*

DMU 50 3rd Generation

Powder nozzle holder

Dental applications

CNC + *SLM*

DMU 50 3rd Generation

LASERTEC 30 DUAL *SLM*

Knee implant

PKD Milling head

Direct Energy Deposition (*DED*)

DED hybrid

LASERTEC 65 *DED hybrid*

LASERTEC 4300 *DED hybrid*

Cutting knife

Rocket nozzle

DED + CNC

LASERTEC 65 *DED*

DMU 75 monoBLOCK

Turbine casing

Fan wheel

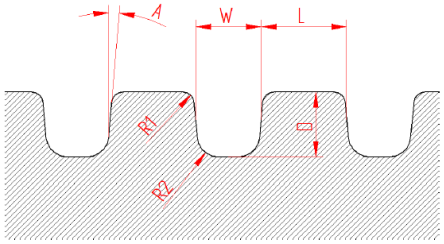
FLOW-FIELD MANUFACTURING BY ADDITIVE MANUFACTURING

Aim:

+ Developing a flow field with µ-fluidic patterns by using selective laser melting (SLM) for mass and electronic transports

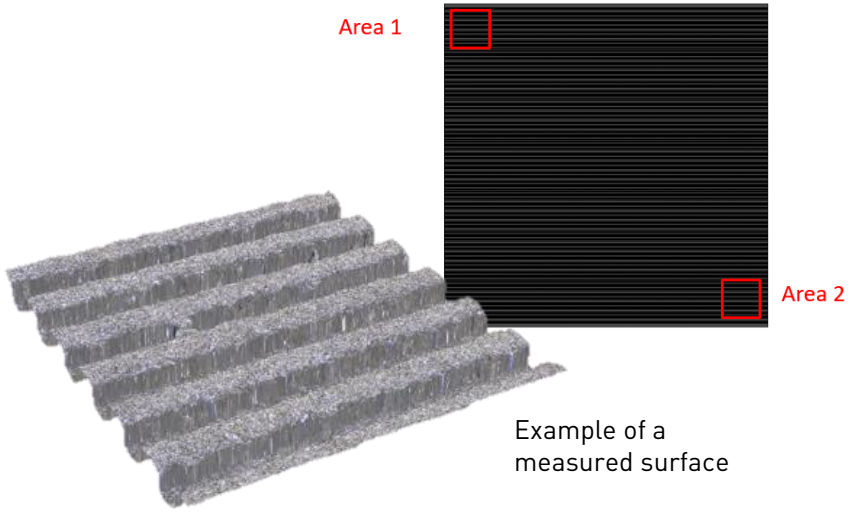
Measurement:

+ Analyzing the channel depth, width and cross section of the channels
+ Built out of **316L** (1.4404) stainless-steel with different flow field settings



	Channel depth D [mm]	Channel width W [mm]	Land width L [mm]	Flank angle A [°]	Radius R1 [mm]	Radius R2 [mm]
Version 4	0,3	0,4	0,2	5	0,05	0,1

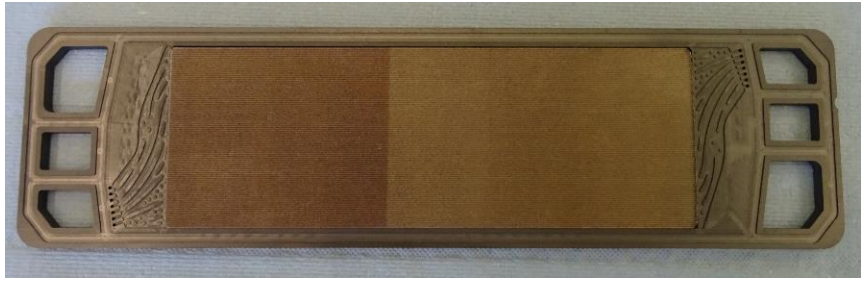
Flow Field Dimensions

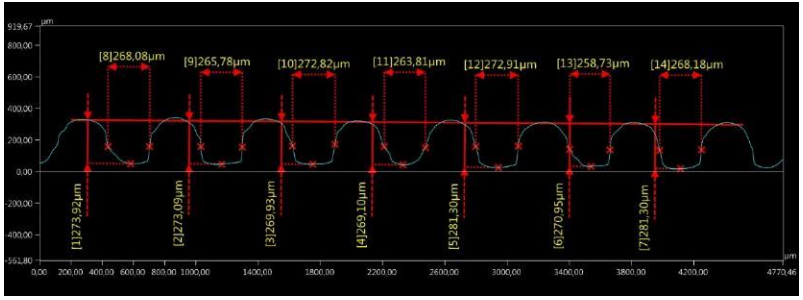


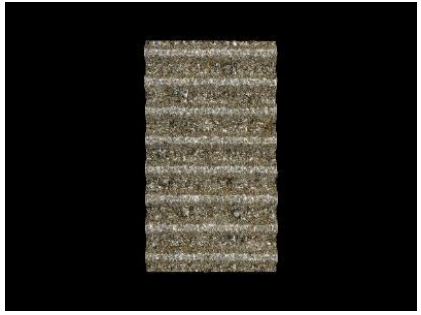
Example of a measured surface

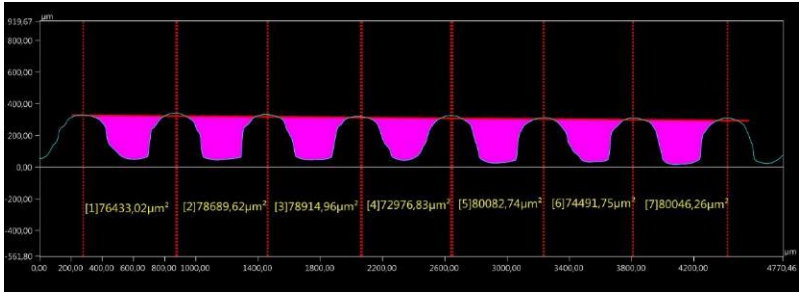
Flow-Field manufacturing by additive manufacturing

Characterization of manufactured sheets (corrosion resistance, electrical conductivity…)







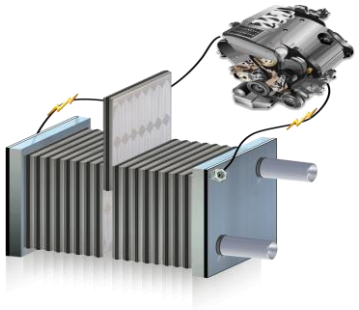


Flow-Field manufacturing by additive manufacturing

Thank you for your attention!

DOLPHIN

Disruptive pemfc stack with nOvel materiaLs, Processes, arcHitecture and optimized INterfaces



The DOLPHIN project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No. 826204. This Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation programme, Hydrogen Europe and Hydrogen Europe Research.