


Applications

Metal 3D printing

- 
- 1. Aerospace
 - 2. Automobile
 - 3. Heavy Industry
 - 4. Manufacturing
 - 5. Medical Coating
 - 6. Etc

Applications

Metal 3D printing



01. Aerospace

Multi Material Rocket Nozzle	05
FGM Rocket Nozzle	07
KARI 3ton Rocket Nozzle	08
Fuel Tank	09
Compressor Blade (Repair)	09
Jet Engine Air seal (Repair)	10
Jet Engine Shroud Support (Repair)	10

02. Automobile

Multi-Material Mold	11
Remodeling Headlamp Mold	11
Rack Bar & Pinion Shaft	12

03. Heavy Industry

Multi Material Valve	13
Multi Material Bearing	14

04. Manufacturing

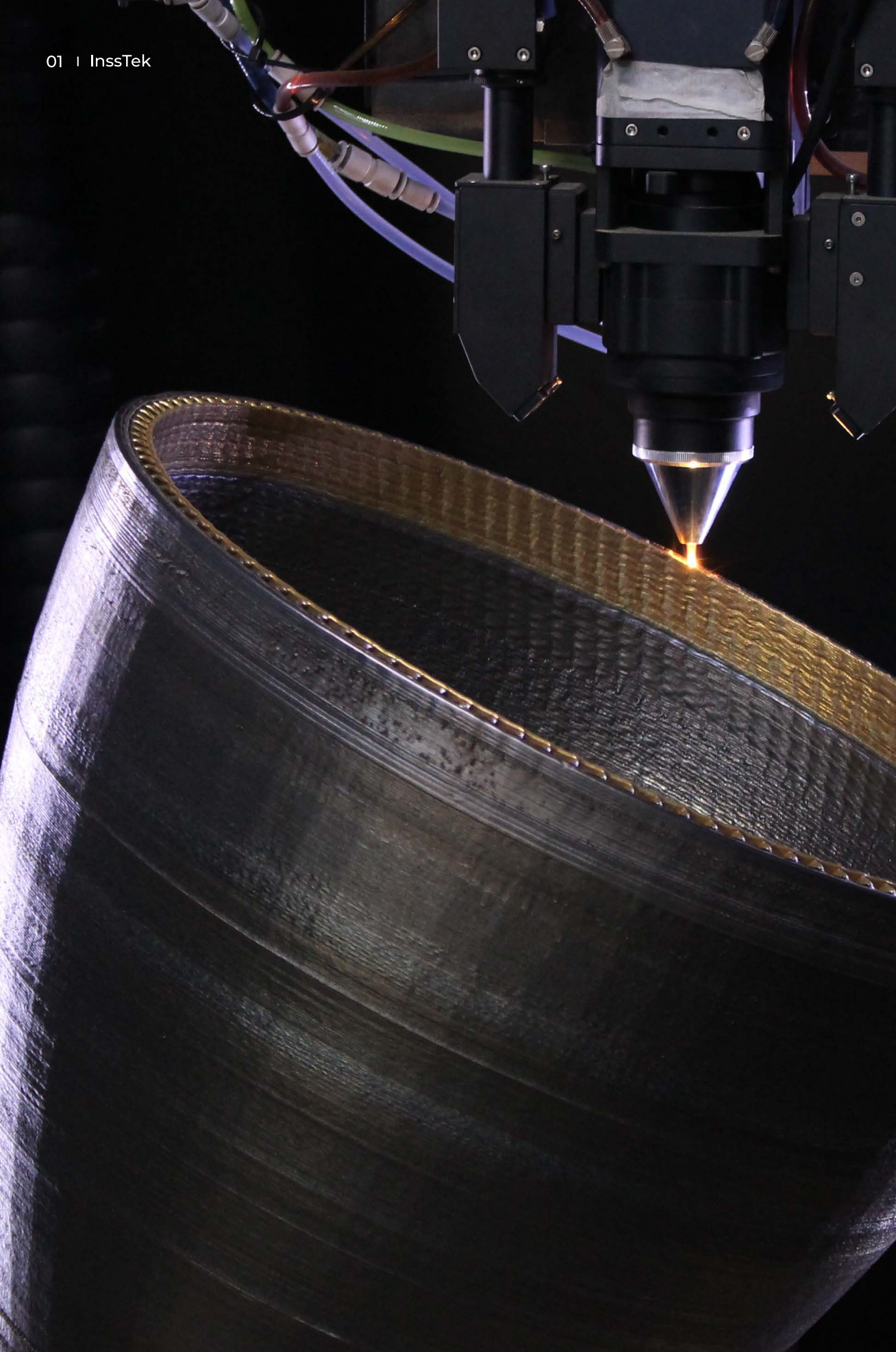
MIIT Disc	15
KTX Train Part	15

05. Medical Coating

Artificial Joint - Hip Cup	18
Artificial Joint - Knee & Ankle	18

06. Etc

Semiconductor Coating	19
Material Research	20





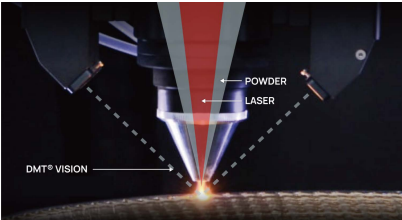
Aerospace

Multi-Material Rocket Nozzle (2022)

DMT® Technology

The most precise DED technology

DMT® (Direct Metal Tooling)
InssTek's own technology which developed and categorized as DED (Direct Energy Deposition) technology according to ASTM standards. DMT technology can analyze and control the height of the melt pool in real-time with a vision camera(s).



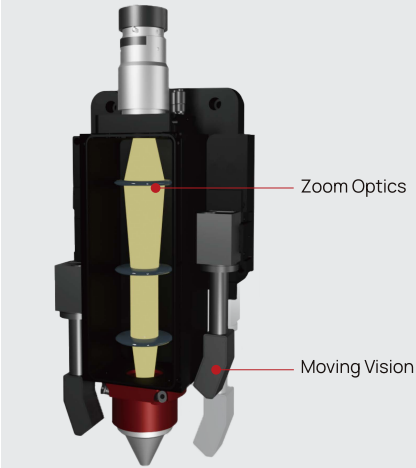
AM-Module

Compact optic and size-changeable beam

Various beam sizes up to 3x are available by replacing optic cartridge(LFM-1) or installing automatic zoom system(LFM-2).

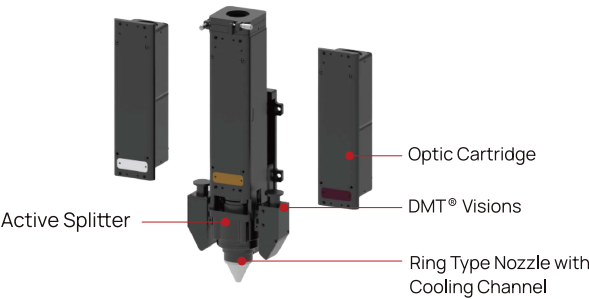
NEW LFM-2

Automatic zoom optics & moving vision



LFM-1

Select 4 different cartridge and change them easily

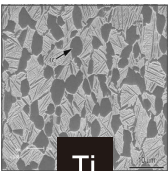
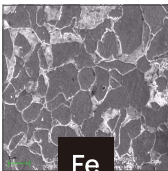
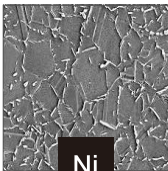
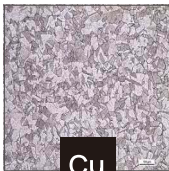
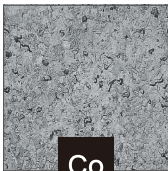



Technical Data

Type	SDM800	SDM1200	SDM1600	SDM2400
Beam Size (um)	800	1200	1600	2400
Build Speed (cm³/h)	5.8	16.4	27.4	66.6
Layer Height (um)	250	450	600	900

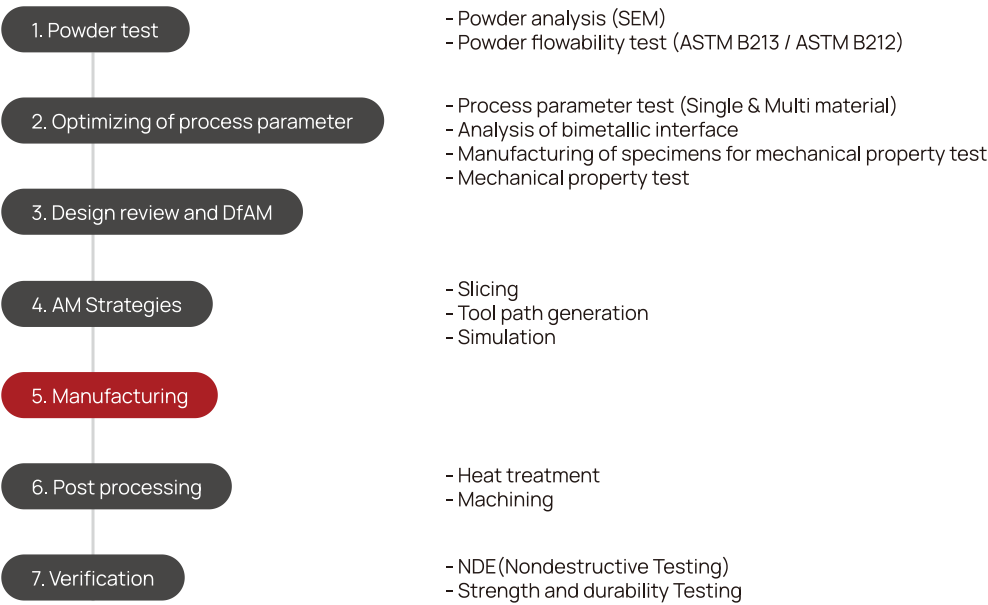
Applicable Materials

The table shows just the metals already printed with our technology so far. We are continuously studying various alloys.

					
Ti	Fe	Ni	Cu	Co	Nb
Titanium	Steel	Nickel	Copper	Cobalt	Niobium
CP Ti (Gd2)	P20	Inconel 600	Cu-Sn	CoCr	C-103
Ti6Al4V (Gd5)	P21	Inconel 625	Al-bronze	Stellite 6	
Ti6Al4V (Gd23)	H13	Inconel 690		Stellite 21	
	SS304L	Inconel 713		Stellite 25	
	SS316L	Inconel 718			
	SS420J2	Hastelloy 22			
	SDSS 2507	Hastelloy 276			
		Nimonic75			
		Invar36			

Service Process

Approach to customer satisfaction



Applications | Aerospace

Multi Material Rocket Nozzle

Applied multi-material to a complex type of actual-size rocket nozzle including a spiral-type cooling channel.



PART Information

- Size : (Diameter) 420mm, (Height) 552mm
- Weight : 80Kg
- Material: (Inner, Cooling channels) Al-bronze
(Outer) Nimonic 75 & Inconel 718
- Operating Time : 190Hour

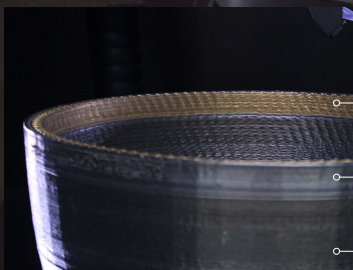
AM Process

- Machine : MX-Fab & PCM-Multi
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM2400 (DMT)

Customer  한국항공우주연구원
Korea Aerospace Research Institute



Multi-Material & Recycle Powder



- Al-Bronze
- Inconel 718
- Nimonic 75^(*)

* Nimonic 75

Recycled Nimonic 75 powder from lower part was used for the upper part.

After analyzing the mechanical properties of the final product, it was possible to confirm there is no difference in the chemical composition of both sections of the final print. (recycled vs pure material)

FGM Rocket Nozzle

Functionally Graded Material (FGM) technology applied to an Actual-size rocket nozzle.



PART Information

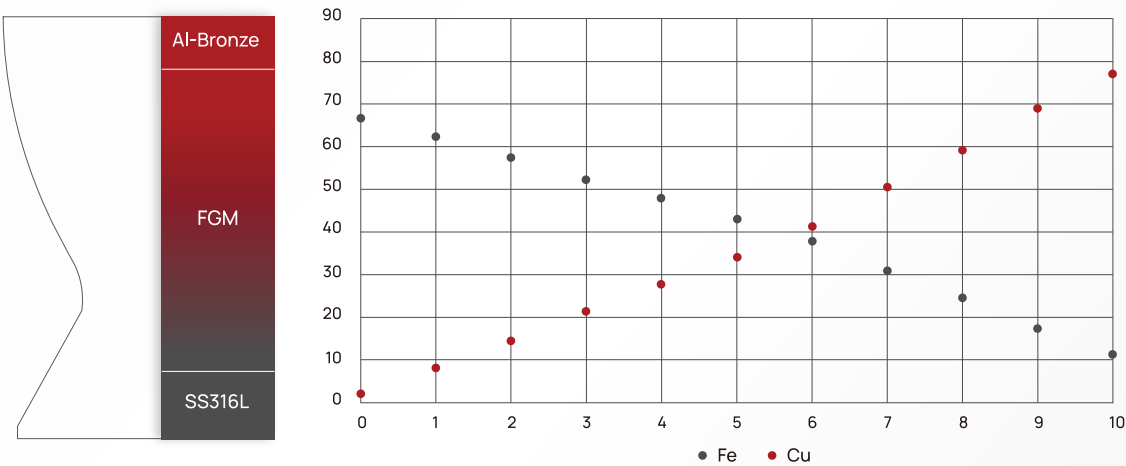
- Size : (Diameter) 420mm, (Height) 552mm
- Weight : 10Kg
- Material: (Top) Al-Bronze & (Bottom) SS316L
- Operating Time : 40Hour

AM Process

- Machine : MX-Fab & PCM-Multi
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM2400(DMT)

Customer 

Composition of 2 Different Materials



KARI 3ton Rocket Nozzle

Applied multi-material which is suitable for material characteristics of 3-ton combustion nozzle inner and outer side that requested for propulsion verification.



PART Information

- Size : (Diameter) 280mm, (Height) 257mm
- Weight : 20Kg
- Material: (Inner) Al-Bronze & (Outer) Inconel625
- Operating Time : 300 Hour

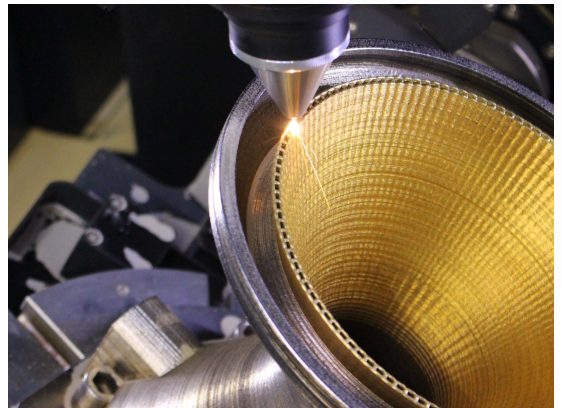
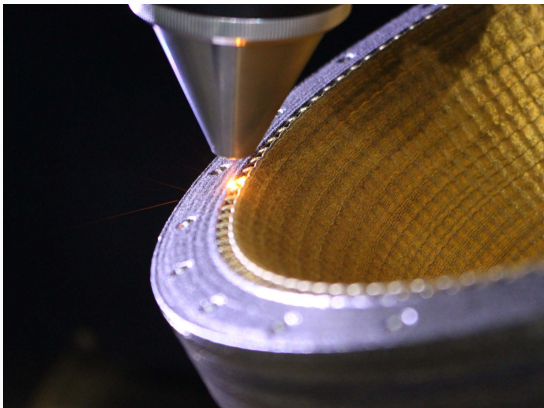
AM Process

- Machine : MX-Fab & PCM-Multi
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM800(DMT)

Customer



Multi-Material 3D Printing



Fuel Tank - Satellite System

Satellite fuel tank using Ti alloy with DED technology. Manufactured by adding two hemispherical shapes, internal machining, and final finishing work.



PART Information

- Size : (Diameter) 230mm, (Height) 280mm
- Weight : 10Kg
- Material: (Powder) Ti-6Al-4V
- Operating Time : 60 Hour

AM Process

- Machine: MX-Fab & PCM-Single
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM2400(DMT)

Customer  KARI 한국항공우주연구원
Korea Aerospace Research Institute

Compressor Blade (Repair)

DED restoration of blade surface damaged by external impact.



PART Information

- Size : 600 X 200 X 25mm
- Material: (Base) Titanium & (Powder) Ti-6Al-4V
- Operating Time : 4 Hour

AM Process

- Machine: MX-Fab PCM-Single
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM800(DMT)

Customer  KARI 한국항공우주연구원
Korea Aerospace Research Institute

Jet Engine Air Seal (Repair)

Restoring damaged parts of jet engines with DED technology.



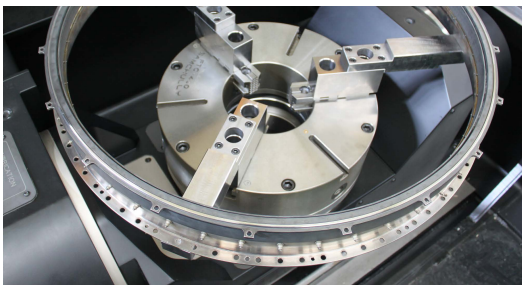
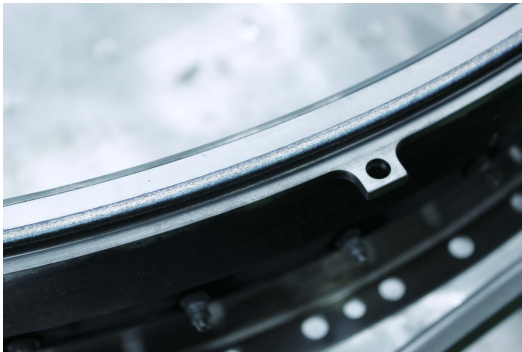
PART Information

- Size : (Diameter) 180mm, (Height) 65mm
- Material: (Base) Titanium & (Powder) Titanium
- Operating Time : 2 Hour

Customer  Hanwha Aerospace

Jet Engine Shroud Support (Repair)

Restoring damaged parts of jet engines with DED technology.



PART Information

- Size : (Diameter) 600mm, (Height) 100mm
- Material: (Base & Powder) Inconel 718
- Operating Time : 6 Hour

AM Process

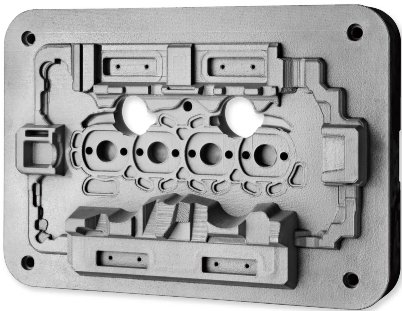
- Machine : MX-Fab / MX-Grande
- Software: MiXO Pro, MX-OS
- Printing Head: LFM1 & SDM800/1200(DMT)

Customer  대한민국공군
REPUBLIC OF KOREA AIR FORCE

Applications | Automobile

Multi Material Mold

3D printed where corrosion occurs in the car engine cylinder head mold.



PART Information

- Size : 470 X 320 X 120mm
- Material: (Base)H13/Steel & (Powder)Hastelloy/C22
- Operating Time : 70 Hour

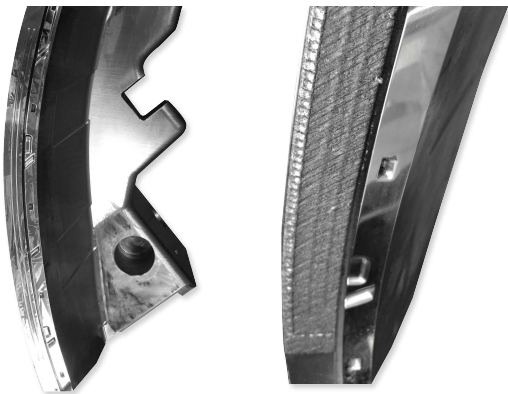
AM Process

- Machine : MX-Fab, PCM Single
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM1200(DMT)

Customer **HYUNDAI MOBIS**

Remodeling Headlamp Mold

3D printing repair method applied to design change on the mold.



PART Information

- Size : 750 X 450 X 550mm
- Material: (Base & Powder) P21/Steel
- Operating Time : 2 Hour

AM Process

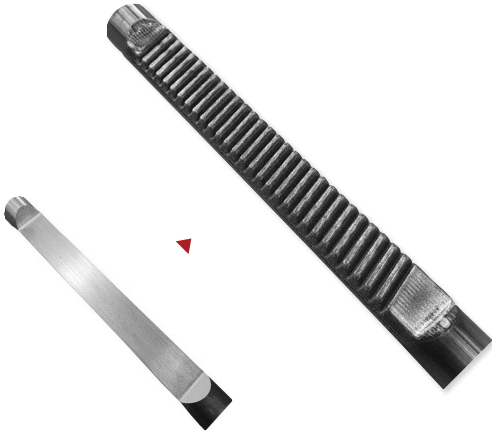
- Machine : MX-Fab
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM1200(DMT)

Advantage

- Lead time (4 weeks to 1 day) saved
- 80% material costs saved

Rack Bar & Pinion Shaft

Manufacturing case to improve strength and performance of Rack Bar, Pinion Shaft, parts of automotive steering system.



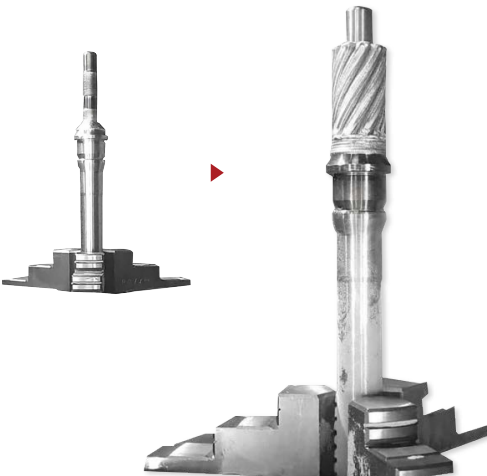
Rack Bar

- Size : (Diameter) 28mm, (Length) 690mm
- Material: (Base) SNCM439 & (Powder) H13
- Operating Time : 2.5 Hour

AM Process

- Machine : MX-Fab
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM1200 (DMT)

Customer **HYUNDAI MOBIS**



Pinion Shaft

- Size : (Diameter) 30mm, (Length) 260mm
- Material: (Base) SNCM439 & (Powder) H13
- Operating Time : 3 Hour

AM Process

- Machine : MX-Fab
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM1200 (DMT)

Customer **HYUNDAI MOBIS**

Applications | Heavy Industry

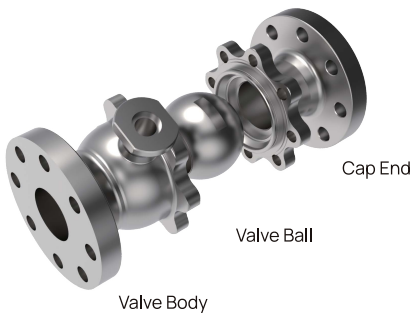
Multi Material Valve

Material with excellent corrosion resistance(inner) and relatively inexpensive and easy machining material (outer) are used.



PART Information

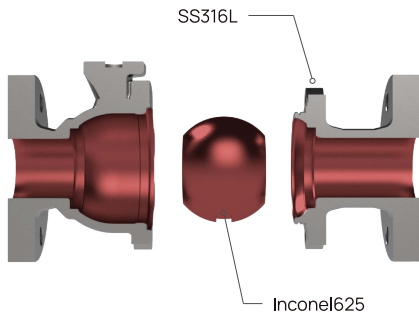
- Size : (Diameter) 210mm, (Length) 282mm
- Weight : 8kg
- Material: (Inner) Inconel625 & (Outer) SS316L
- Operating Time : 120 Hour



AM Process

- Machine : MX-Fab
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM1200(DMT)

* DNV-GL product production (AOM) certification in progress



Multi Material Bearing

Reducing manufacturing time and cost with directly cladding white metal to bearing parts used in heavy industry.



PART Information

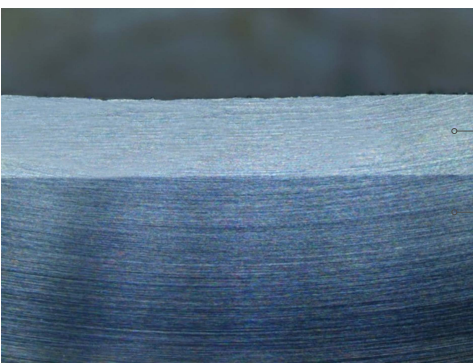
- Size : (Width) Top : 420mm, Bottom : 382mm
(Diameter) Inner : 110mm, Thickness : 1.5mm
- Material: (Base) Carbon Steel & (Powder) White metal
- Operating Time : 30 Min.

AM Process

- Machine : MX-Fab
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM2400(DMT)

Customer **VOITH**

Section of Multi Material Bearing



White Metal

Carbon Steel

White metal lamination for metal bearing fabrication.

Applications | Manufacturing

MIIT Disc

3D printed overhang and fully closed hollow Structure with DMT technology.



PART Information

- Size : (Width) 450mm, (Height) 85mm
- Weight : 12kg
- Material: Al Bronze / Stellite21 / P21
- Operating Time : 75 Hour

AM Process

- Machine : MX-Fab
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM1200 (DMT)

Customer **KORAIL** KOREA RAILROAD

KTX Train Part

Manufactured the train toilet bowl for maintain and repair due to discontinuation. Applied DfAM (Design for Additive Manufacturing) considering assembly and fluid flow.



PART Information

- Size : (Width) 450mm, (Height) 85mm
- Weight : 4kg
- Material : SS304L
- Operating Time : 5 Hour

AM Process

- Machine : MX-Fab
- Software: MiXO-Pro, MX-OS
- Printing Head: LFM1 & SDM2400 (DMT)

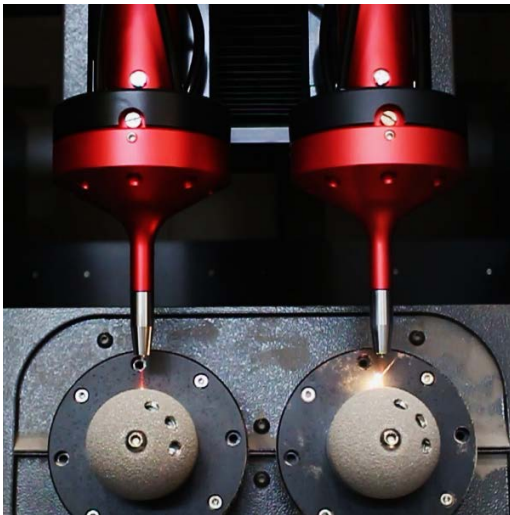
Customer **KORAIL** KOREA RAILROAD



Applications | Medical Coating

Metal Porous Coating

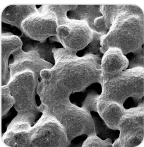
InssTek's MPC technology is able to coat pure titanium on various metals. In case of artificial joint, Hip system is made with Ti-6Al-4V and knee systems are made with CoCr. InssTek successfully made Ti porous layer on both Ti-6Al-4V and CoCr products.



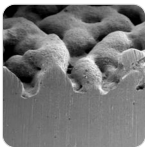
MX-Med Dual Module Coating

Advantages

- Superior performance [Strong bonding]
- Consistent result
- Productivity
- Customizable pattern [Porosity, Shape, etc.]
- Multi-Material



Top



Cross section



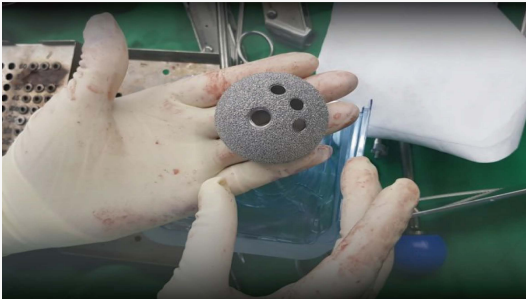
Surface

FDA Approved

Clinical trial

These artificial joints have been tested and approved by our partners for its quality and excellence. And finally, we have successfully implanted one of these joints for a hip replacement surgery.

Since 2021, it has entered the Clinical Test, and 250 surgeries have been performed so far. It's been about a year since the surgery, and the prognosis of the patients is quite good. Surgeons are also highly satisfied with their quality.



Medical Implant

- Machine : MX-Med
- Software: MiXO-Pro, MX-OS
- Printing Head: Porous Coating Module

Hip System

- Material: Base - Ti-6Al-4V / Coating - CPTi
- Operating Time : 30 Minute



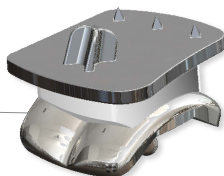
Knee System

- Material: Base - CoCrMo / Coating - CPTi
- Operating Time : 30 Minute



Ankle System

- Material: Base - CoCrMo / Coating - CPTi
- Operating Time : 30 Minute



Applications | Etc

Semiconductor Coating

Case of multi-material coating to improve roughness of the coating surface for wafer deposition process.



PART Information

- Size : (Diameter) 345mm , (Thickness)20mm
- Material : (Base) Steel & (Powder) Cp-Ti
- Operating Time : 2hr 23m

AM Process

- Machine : MX-Med
- Software: MiXO-Pro, MX-OS
- Printing Head: Porous Coating Module
- Key Tech: Porous Coating

Customer **SAMSUNG**

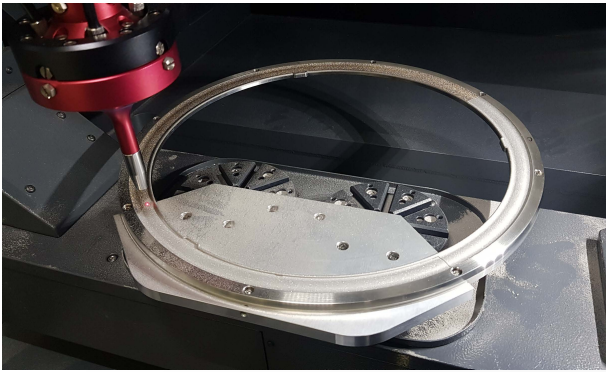
Metal Porous Coating process



Before coating



After coating



[MX-Med] Multi material coating process

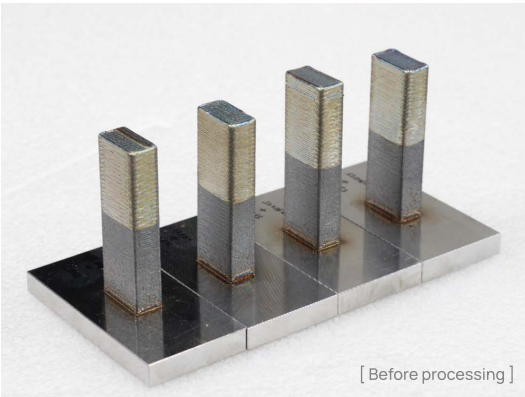
Material Research

InssTek's core technologies such as Hexa Powder Feeder, Optic Module, Meltpool Monitoring, and Material Designer are providing lots of research convenience.

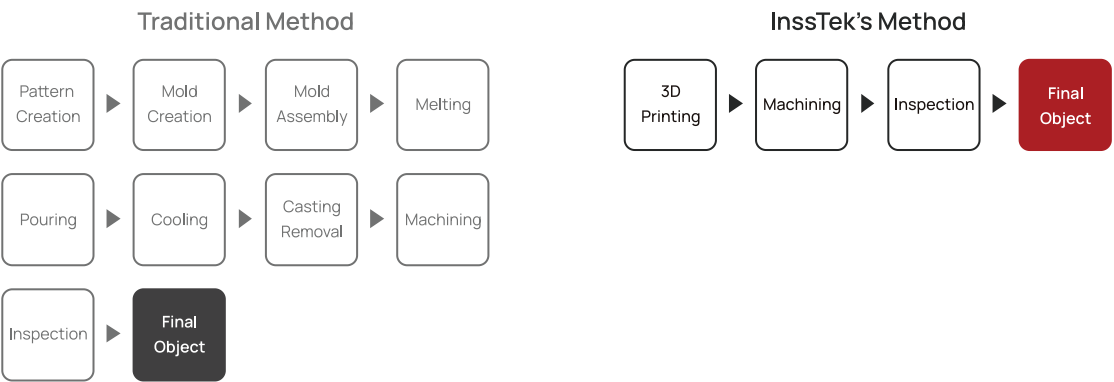


MX-Lab Material Research

- Machine : MX-Lab
- Software: MiXO, Material Designer



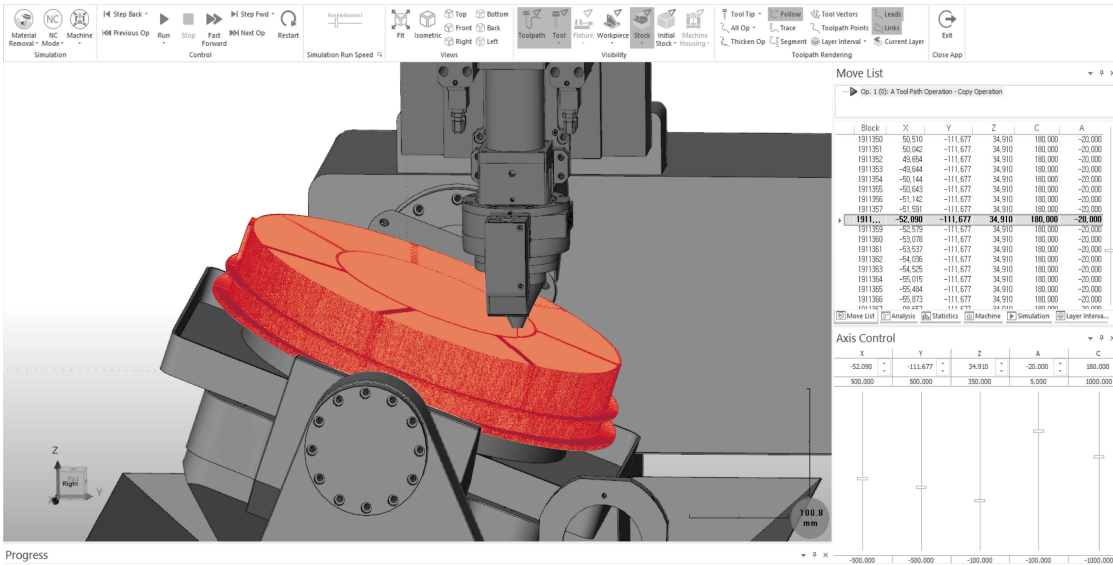
Advanced Material Research



* For more information, please read InssTek's [Material Research Report with MX-Lab]

Simultaneous 5-Axis AM CAM

Simultaneous 5-Axis AM CAM is one of the most important technology of InssTek's DED Additive Manufacturing. Combine of InssTek's years of Know-how, Simultaneous 5-Axis AM CAM enables us to overcome the limitations of existing DED technology. We are breaking the limits of the Additive Manufacturing.



Product Lineup

Please contact us for more information. In addition, you can customize each equipment through consultation (laser power, size, number of hoppers supplied with powder, etc



MX-Fab

DED system
with DMT & 5-Axis system

Laser Power(W) 1,000(Max. 2,000)
X/Y/Z Stroke(mm) 800/1,000/700
Atmosphere Control System(*Option)



MX-Lab

DED system &
Material research machine

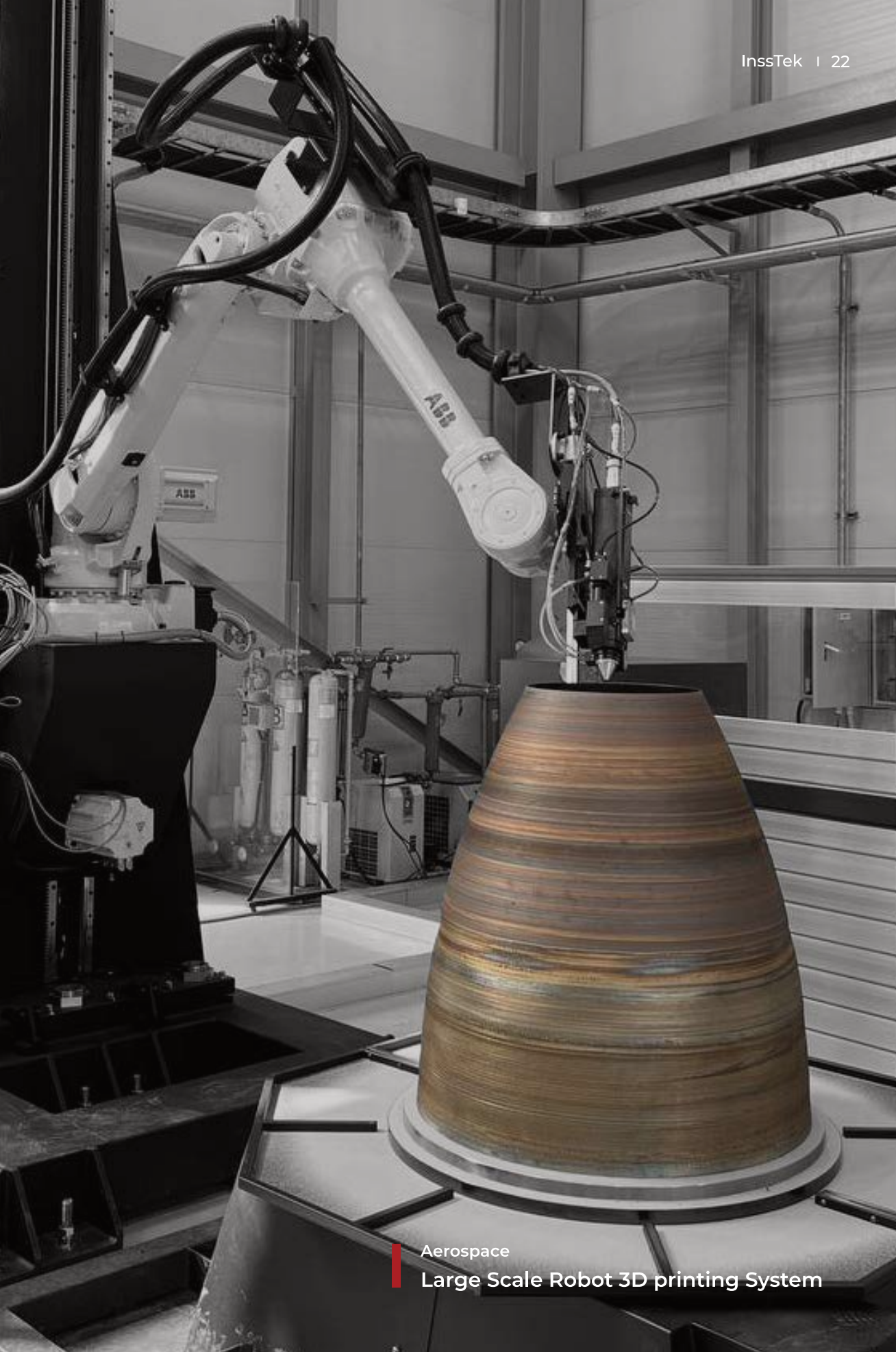
Laser Power(W) Max. 500
X/Y/Z Stroke(mm) 150/150/150
Atmosphere Control System(*Option)



MX-Med

Medical metal
porous coating machine

Laser Power(W) Max. 100
X/Y/Z Stroke(mm) 300/300/230
Atmosphere Control System(*Option)



Aerospace

Large Scale Robot 3D printing System



— "Difference is Value"

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