

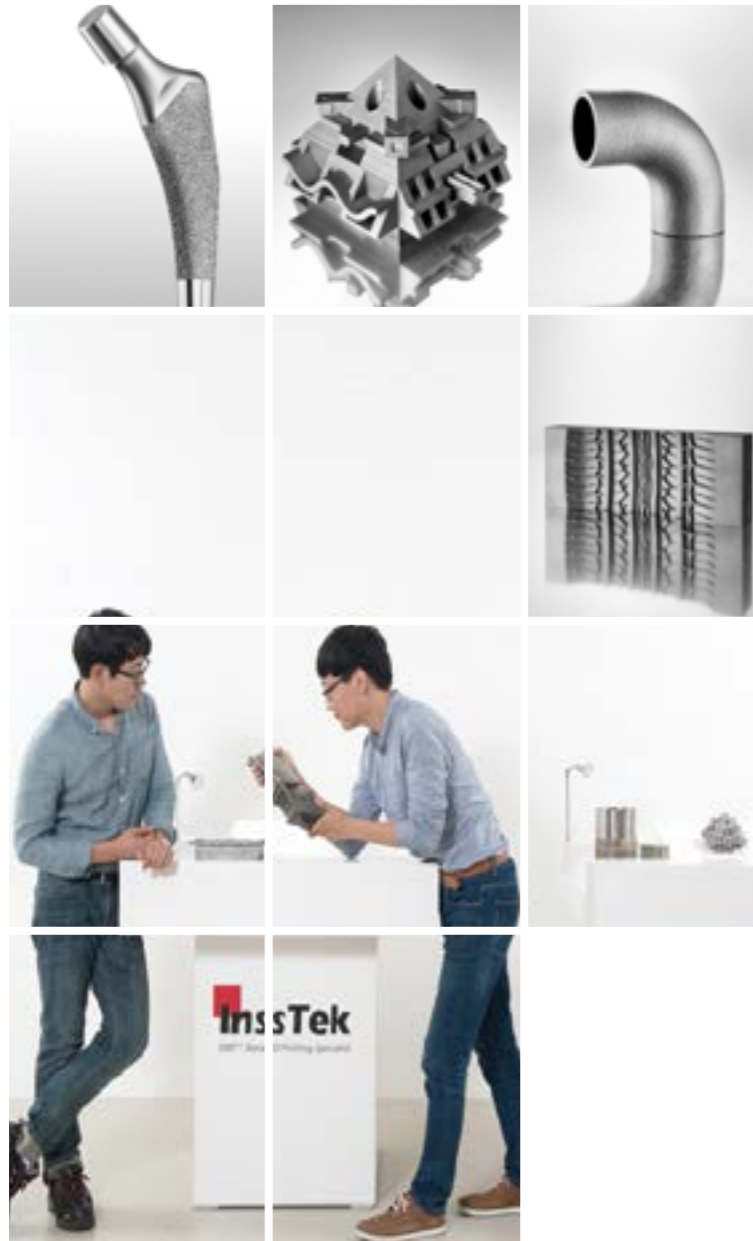
DMT® Metal 3D Printing

The way we go



Metal 3D Printing Leader

Laser-aided Direct Metal Tooling



2018

Jan. Selected as Top 100 Future Technologies by The National Academy of Engineering of Korea

2017

Mar. Design, development and manufacture of industrial metal 3D printer certified to ISO 9001:2015

Feb. Market expansion into South America
MX-600 was sold to an Argentine Science Organization

2016

Oct. MX printer for material development was sold to a university in Germany

Sep. World's largest metal 3D printer in DED MX-Grande was sold to Europe

2015

Jun. Appointed as one of the most high-tech companies in Korea by Ministry of Science, ICT and Future Planning

Mar. Market entry into Japan
Sold MX-450 to a leading electronic company in Japan

2012

May. MPC development for medical application
Developed a customized system for porous coating for artificial hip & knee joint with approval from Ministry of Food and Drug

2010

Dec. Industrial application of DMT®
Succeeded in industrial application of Direct Metal Tooling® (DMT) to home appliances and aerospace industries

2008

Sep. US, Japan and EPO Patents
Obtained patents of real-time monitoring and controlling the intensity of laser power

2007

Dec. Provided solutions with DMT® for automotive application

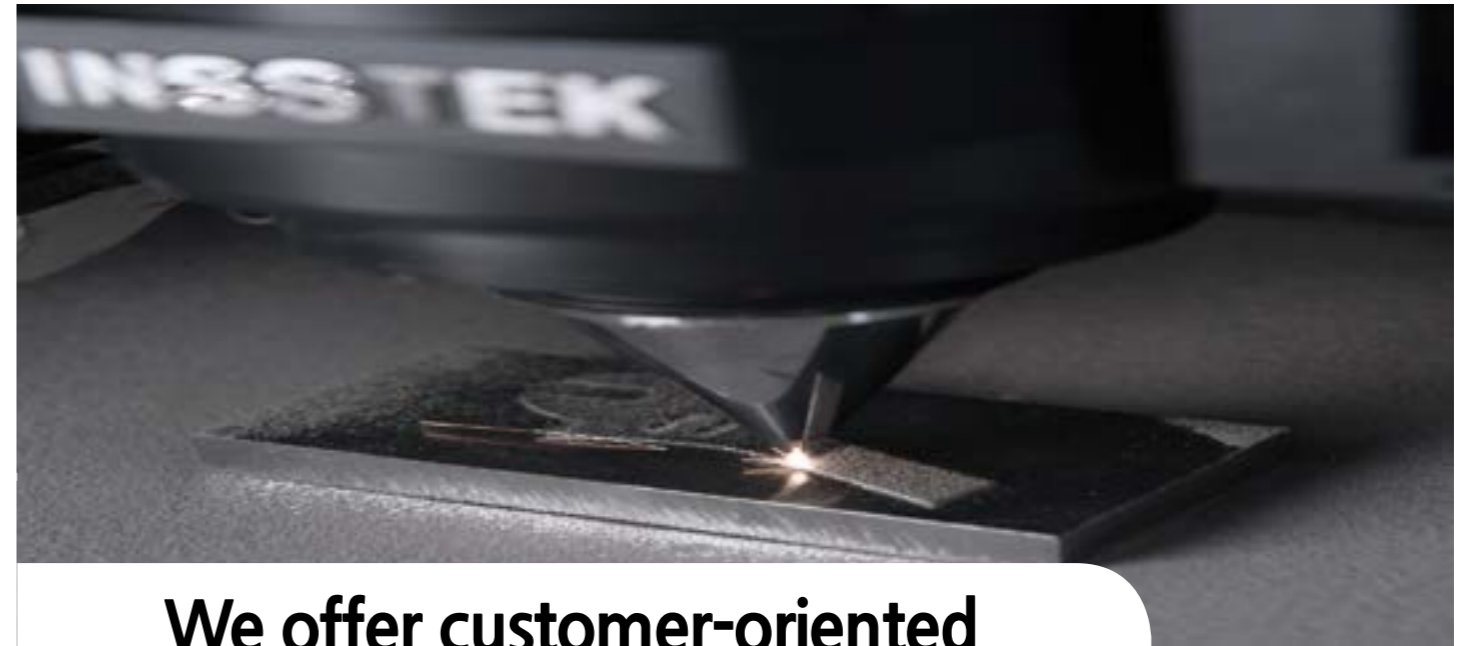
2003

Jun. Registration of DMT® trademark

2001

Nov. Completion of the standard DMT® 3D printer MX-1

Aug. Company Foundation
InssTek was established with metal 3D printing technologies for the 1st time in South Korea



We offer customer-oriented systems and services

Metal 3D Printing Systems

Standard Model		Custom Model	
MX-600		MPC	
MX-1000			
MX-Grande			

*MPC: Machine for Porous Coating

Services

Manufacturing, Remodeling, and Repair:

- 3D conformal cooling channels for mold and die cores
- High-performance multi-metal parts
- Repair of damaged molds and machine parts
- Special porous coating and surface modification
- Large-scale parts fabrication





Creating innovative solutions for challenges in industries

Examples of industry applications



Home Appliance

A fan mold made by 3D cooling channels: Improvements in cooling efficiency and noise reduction



Aerospace & Defense

Air seal repair: cost reduction and life cycle enhancement compared to the original



Medical

Porous coating of artificial hip joint: Reduction of lead time & cost, and functional enhancement



Aerospace & Defense

Jet engine part repair: longer life cycle and reduction of delivery time



Automotive

30% life cycle enhancement by printing corrosion-resistant material



Automotive

Headlamp mold remodeling: lead time improvement and cost reduction

DMT® Direct Metal Tooling, the most precise DED technology

Features

- Highly functional component production, re-modeling, repair and special coatings
- Excellent mechanical properties
- Using commercially available metal powders
- Enables to manufacture of complex shapes structure
- Enables to repair parts without original CAD or CAM data



3D conformal cooling channels

Manufacturing complex shapes with quality enhancement

Applying 3D cooling channels by DMT® can not only **manufacture complex shaped 3D printed parts** but also **significantly improve quality**.



Dashboard Mold

Advantages

- Solving corrosion and blockage problem
- Reducing thickness variation and bubbles rise
- Reducing production cycle times

Industry application

Plastic injection molding, die casting, hot-stamping and mass production

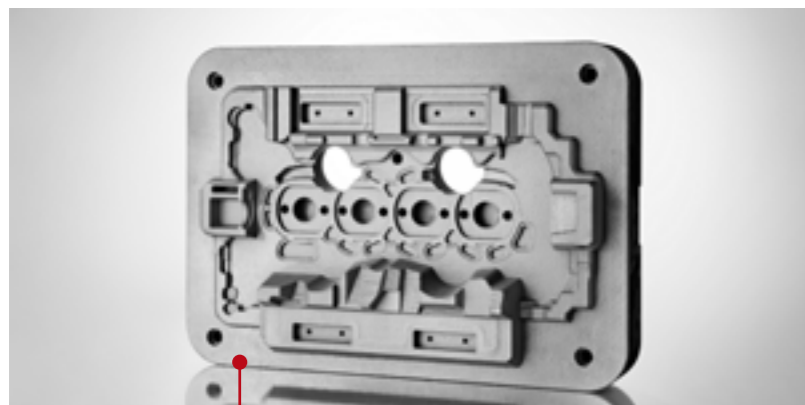
Multi-metal 3D Printing

DMT® enables multi-material 3D printing

Multi-material 3D printing can maximize performance through wear resistance, heatproof, and thermal conductivity enhancement.

Advantages

- Cost reduction by depositing alloys to the right place where functional properties are required
- Able to apply for a new concept product development
- Functionally gradient materials that enables to have high density and excellent mechanical properties



Automotive engine cylinder head low pressure mold

Using industrial metal powders

We use **commercially available metal powders**.

Price comparison by metal powders

Customers can reduce material cost by three to five times when compared with other metal 3D printing companies.

Nickel 718	1.0	Industrial Metal Powder	3.9	Company A	Ti 64	1.0	Industrial Metal Powder	3.7	Company A
Steel 316	1.0	Industrial Metal Powder	5.3	Company A					

(Unit: Ratio/kg)

Metal powders by alloy class

Steel	P20, P21 (DIN 1.2311)	Nickel	713
	H13 (DIN 1.2344)		718 (DIN 2.4668)
	D2 (DIN 1.2379)		738
	304 (DIN 1.4301, 1.4303)		Hastelloy X (DIN 2.4665)
	316 (DIN 1.4401, 1.4436)		CoCr
Copper	420 (DIN 1.4021, 1.4007)	Cobalt	Stellite 6
	Al Bronze (DIN 2.09XX)		Stellite 21 (DIN 2.4979)
Titanium	CP Ti (DIN 3.7024)		Stellite 25
	Ti-6-4 (DIN 3.7164/3.7165)		

- Powders are supplied from Advanced Powders & Coatings, Inc., Sandvik Osprey Ltd., Carpenter Technology Co., Praxair Technology, Inc., and so on.
- Able to use metal powders from other producers as well.

Excellent mechanical properties

Printing metal parts by DMT® has superior mechanical properties, high density and fine microstructures.



Materials		UTS (MPa)	YS (MPa)	Elongation	Hardness (HRC)
H13 (SKD 61)	DMT® Vertical	1,927	1,400	5%	54
	DMT® Horizontal	1,998	1,477	5%	
	Forging Part	1,821	1,385	9%	51

*The data represents the condition with no heat treatment

Standard Model



MX-600

Small to mid-size printing

Laser

1kW Ytterbium fiber Laser
(Optional Max. 2kW)

DMT® Motion

- X/Y/Z Linear Gantry 3 Axes motion
- Stroke : 450 X 600 x 350 (mm)
- A/C, Tilt & Rotation
- A/C Motion : -100° ~ +5° / 360°
 - Tilt & Rotate Table : φ 350 (mm)

DMT® Module

Standard DMT Module 800
(Optional SDM 500 or 1200)

Weight(kg)

4,500

Others

CAM Software fro DMT Process Only
DMT® Closed loop feedback Control System
Auto-Tracking System with Semi teach-to Learn Function
Up to 3 additional Powder Feeding system can be added



MX-1000

Mid to large-size printing

2 kW Ytterbium fiber laser
(Optional Max. 3kW)

DMT® Motion

- X/Y/Z Linear Gantry 3 Axes motion
- Stroke : 1,000 X 800 x 450 (mm)
- A/C, Tilt & Rotation
- A/C Motion : -100° ~ +5° / 360°
 - Tilt & Rotate Table : φ 450 (mm)

DMT® Module

Standard DMT Module 800
(Optional SDM 1200)

Weight(kg)

6,000

Others

CAM Software fro DMT Process Only
DMT® Closed loop feedback Control System
Auto-Tracking System with Semi teach-to Learn Function
Up to 3 additional Powder Feeding system can be added

MX-Grande

The customized DMT® metal 3D printer that is designed and manufactured for customers' large scale printing.



Laser

3kW Ytterbium fiber Laser
(Optional Max. 5kW)

DMT® Motion

- X/Y/Z Linear Gantry 3 Axes motion
- Stroke : 4,000 X 1,000 x 1,000 (mm)
 - Fixed Table : 2,000 X 1,000 x 1,000 (mm)
- A/C, Tilt & Rotation
- A/C Motion : -100° ~ +5° / 360°
 - Tilt & Rotate Table : φ 450 (mm)
- U Rotation
- Max. Speed : 25RPM
 - Max. Workpiece Diameter : φ 650 (mm)

DMT® Module

Standard DMT Module 1200

Weight(kg)

17,500

Others

CAM Software fro DMT® Process Only
DMT® Closed loop feedback Control System
Auto-Tracking System with Semi teach-to Learn Function
Up to 3 additional Powder Feeding system can be added

Custom Model

MPC for Medical Application

MPC (Machine for Porous Coating) is developed to apply for orthopedic implant surface coating. The system is currently being used for artificial knee & hip joint coating.



Laser

300W Ytterbium fiber Laser

DMT® Motion

- X/Y/Z Linear Gantry 3 Axes motion
- Stroke : 300 X 300 x 200 (mm)
- A/C, Tilt & Rotation
- A/C Motion : -100° ~ +5° / 360°
 - 2 Work Table Available

DMT® Module

Special Porous coating DMT® Module 200

Weight(kg)

1,500

Others

CAM Software fro DMT® Process Only
Chamber(Glove Box) Structure
Up to 2 additional Powder Feeding system can be added

Complex product manufacturing and supply chain simplification

Our **services** include:

- Manufacturing
- Remodeling
- Repair

Manufacturing

DMT® metal 3D printers enable manufacture of **high-performance** and **multi-material parts** that are composed of **two or more different alloys**.



- Extending product life cycle
- Reducing manufacturing cost
- Manufacturing complex shaped parts
- Applied for new product development such as thermal conductive molds

Remodeling

Remodeling by DMT® technology enables enhancement of operational effectiveness including low cost and time reduction.

- Using reverse engineering to repair molds
- Removing unnecessary shapes and remodeling molds
- Able to apply to large-sized test jobs



Mold Remodeling: 2 to 4 stripes

Headlamp Mold Remodeling

- It was originally required to manufacture new mold for headlamp
- Remodeling by DMT® metal 3D technology
- Customer could have operational effectiveness:
 - Lead-time simplification
 - Material cost reduction

Repair

Mechanical properties of repaired parts are same as or superior to original.

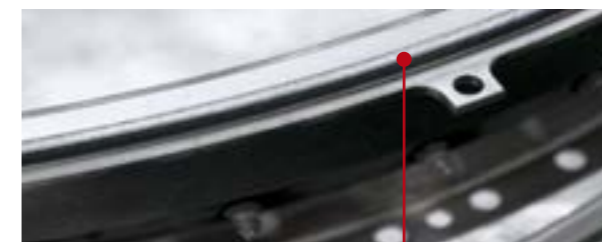


- No visual distinction between original and repaired parts by using alloy powders with the same composition
- Have better mechanical properties compared to original parts
- Using 'Auto-tracking' technology to repair damaged parts without CAD/CAM data



Repairing F110 engine part of F-15K for Korea Air Force

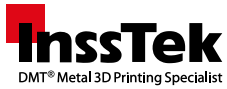
- Extended life cycle of jet engine part by DMT® metal 3D technology
- Printed with multi-materials to gain better mechanical properties
- Lead time and cost reduction



Repairing worn our part of F110 engine

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