



29 September -1 October / 29 Eylül - 1 Ekim 2016
TÜYAP Fair, Convention & Congress Center, İstanbul

8. Uluslararası Döküm Kongresi / 8th International Foundry Congress by TUDOKSAD Academy
In conjunction with Ankiros / Annofer / Turkcast fairs

«Döküm Sektöründe 3 Boyutlu Yazıcılar İle Kalıp ve Maça Üretimi»
«3D Printing Of Cores and Molds For Foundry Application»

Eduard Meier
(ExOne GmbH)

1.Oturum: Döküm Sektöründe Rekabet Gücü
1st Session: Competitiveness of Foundry Sector

Oturum Başkanı/Session Chairman: Memiş Sağıroğlu (Trakya Döküm Sanayi Tic. A.Ş.)

Oturumlarda yer alan sunumlar 3 Ekim 2016 Pazartesi tarihinde akademi web sayfasına (akademi.tudoksad.org.tr) yüklenecektir.



WHO ARE WE?



3D metal and
sand printers for
industrial use



Functional and
concept metal parts

Sand molds
and cores



WHO ARE WE?



2003

**ExOne Group
Locations in USA,
Germany and Japan**

1995

**Prometal LLC,
Pittsburgh PA
(Metal printing)**

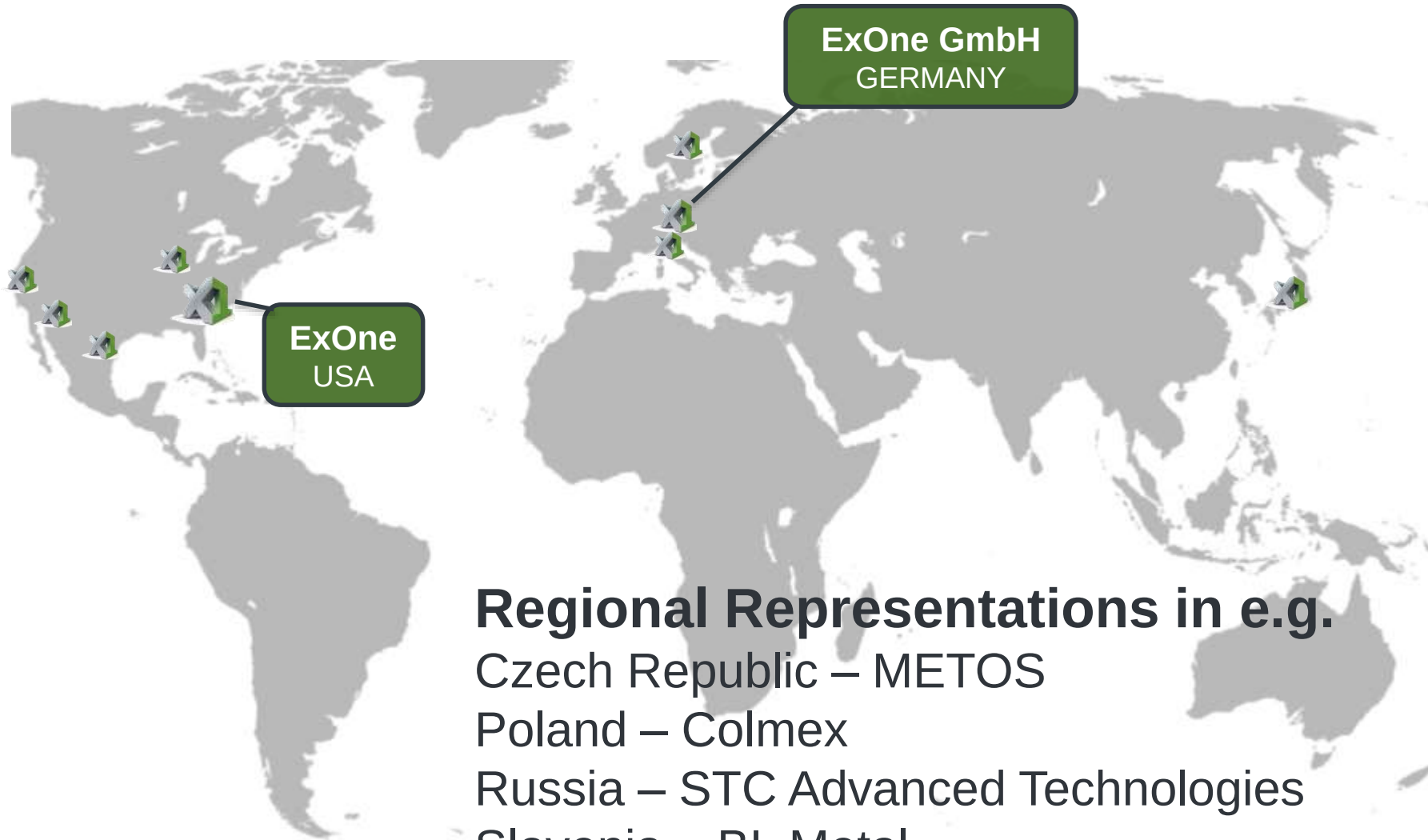
1999

**Generis GmbH,
Augsburg
(Sand printing)**

2013

**Initial Public Offering
New York Stock
Exchange Listing
XONE**

WHO ARE WE?



ExOne GmbH
GERMANY

ExOne
USA

Regional Representations in e.g.

Czech Republic – METOS

Poland – Colmex

Russia – STC Advanced Technologies

Slovenia – BL Metal

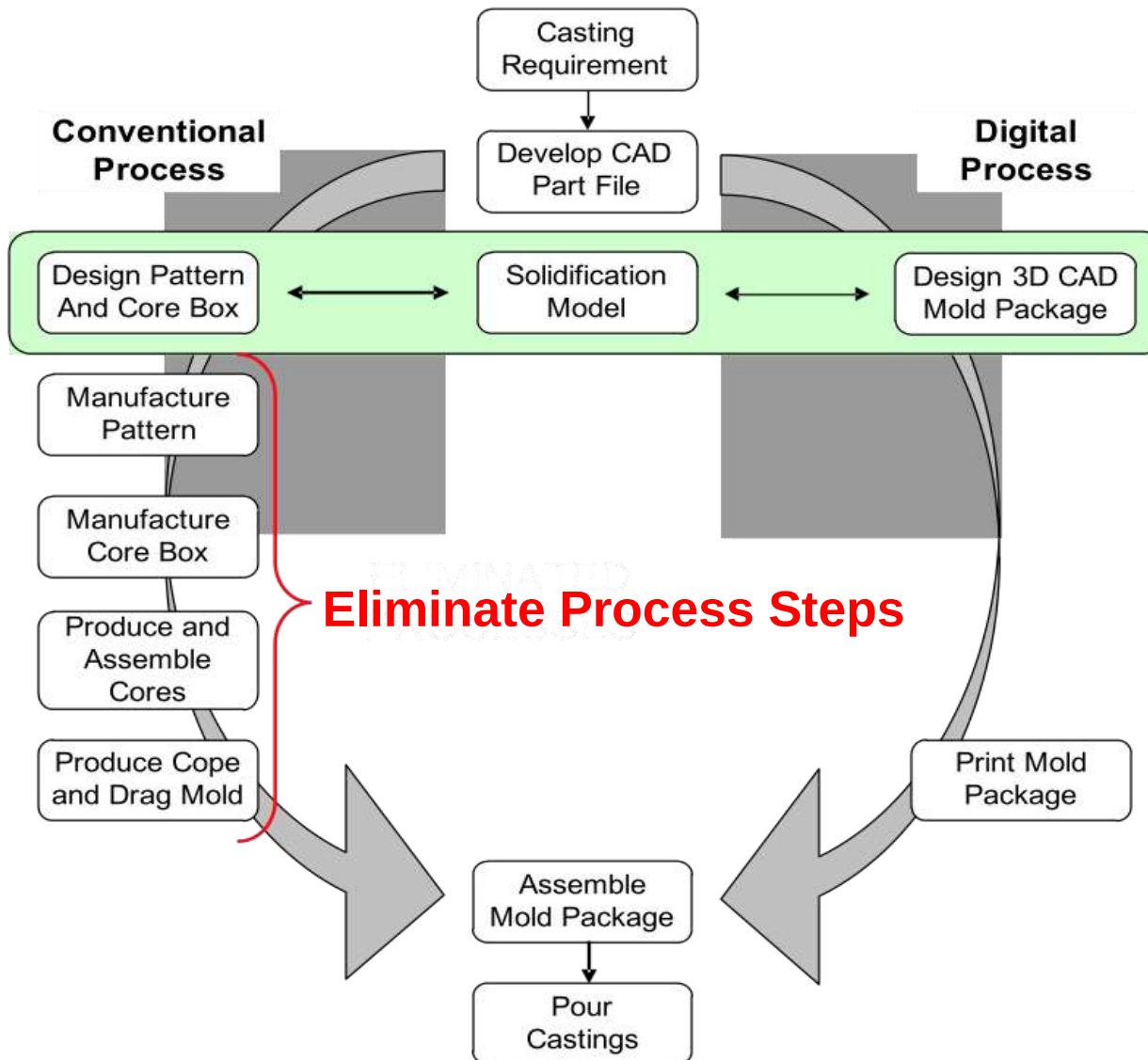
Turkey – Hasmak



ExOne

WHAT BENEFITS DO WE OFFER?

WHAT BENEFITS DO WE OFFER?



From This ...



Traditional Pattern Storage



... To This



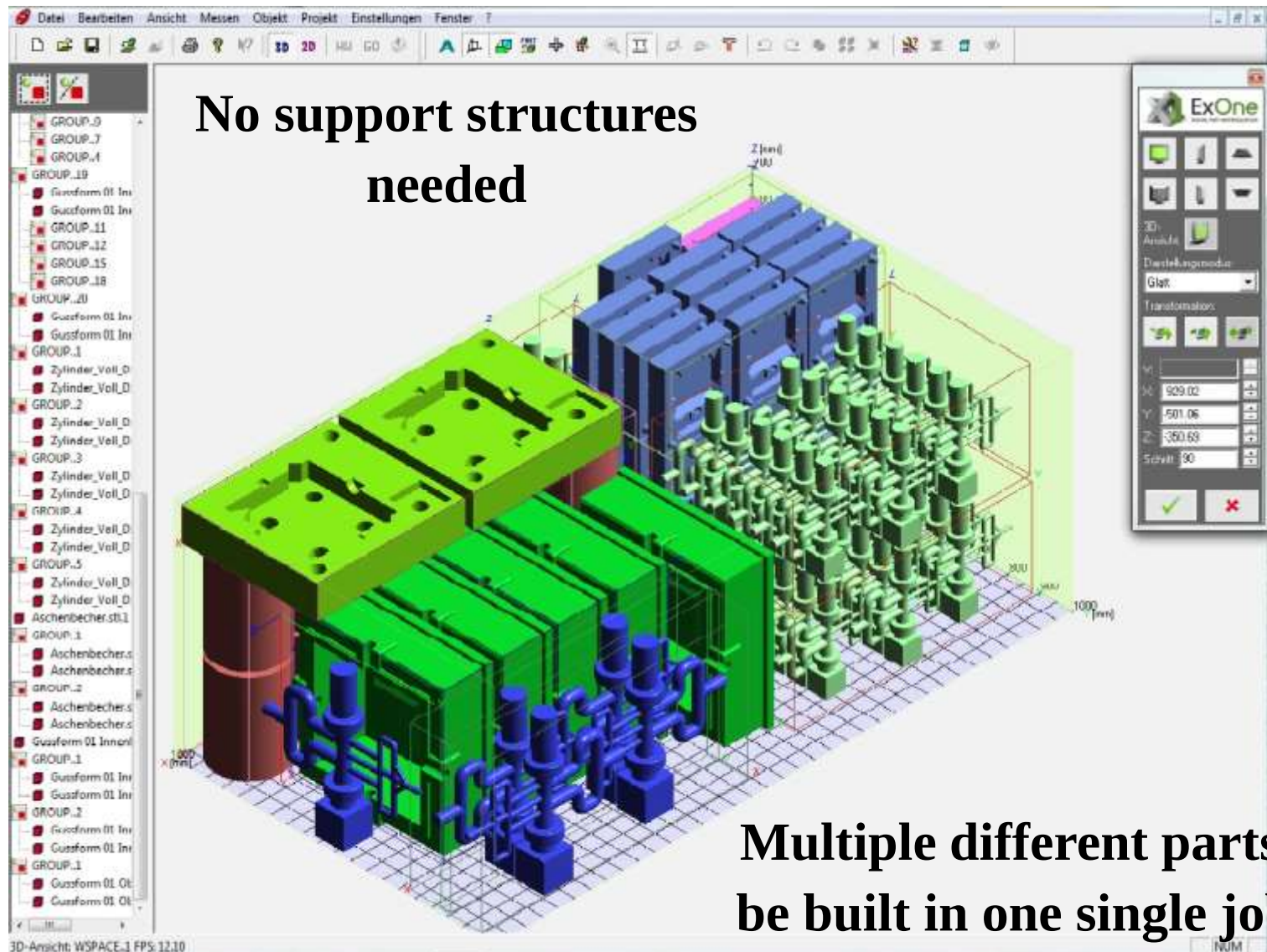
"Digital Patterns"

WHAT BENEFITS DO WE OFFER?

- Design freedom
- No pattern required
- Rapid re-design
- Reduction of single pieces
- Thin-wall / thin sections / high complexity
- Increased accuracy – digital approach
- Vented cores
- Undercuts
- Design unique chill pockets
- No amine gas required



WHAT BENEFITS DO WE OFFER?





Our 3D Printers

WHICH SYSTEMS ARE AVAILABLE?

WHICH SYSTEMS ARE AVAILABLE?

3D Sand Printers



Exerial®

S-Max+®

S-Max®

S-Print®

	Furan	Silicate	CHP	Phenol HHS	Silicate	Furan	CHP	Furan	CHP	Furan	Phenol HHS	Silicate	CHP
Build Volume (L x W x H)	2200 x 1200 x 700 mm			1800 x 1000 x 600 mm				1800 x 1000 x 700 mm		800 x 500 x 400 mm			
Volume	3,696 L			1,080 L				1,260 L		160 L			
Build Speed	300-400 L/h	300-320 L/h	-	60-85 L/h	65-85 L/h	-	-	60-85 L/h	-	20-36 L/h	16-36 L/h	16-18 L/h	-
Layer Thickness	380-500 µm	280-380 µm	-	280-500 µm	280-380 µm	-	-	280-500 µm	-	280-500 µm	240 µm	280-340 µm	-
Print Resolution X/Y/Z	100 µm	100 µm	-	100 µm	100 µm	-	-	100 µm	-	100 µm			-
External Dimensions	8380 x 4030 x 4950 mm			3860 x 2890 x 3470 mm				6900 x 3520 x 2860 mm		3270 x 2540 x 2860 mm			
Weight	12,000 kg			5,800 kg				6500 kg		3,500 kg			

WHICH SYSTEMS ARE AVAILABLE?

Binder Types

Furan

- no curing
- air-drying
- ready for immediate casting

Phenol

- cured by microwave technology
- high temperature casting
- high flexural strength of up to 800 N/cm²
- realization of extremely thin walls and channels

Silicate⁴

- cured by microwave technology
- flexural bending strength
- low gas emissions
- non-hazardous
- economical



Silica Sand



Cerabeads®



WHICH SYSTEMS ARE AVAILABLE?

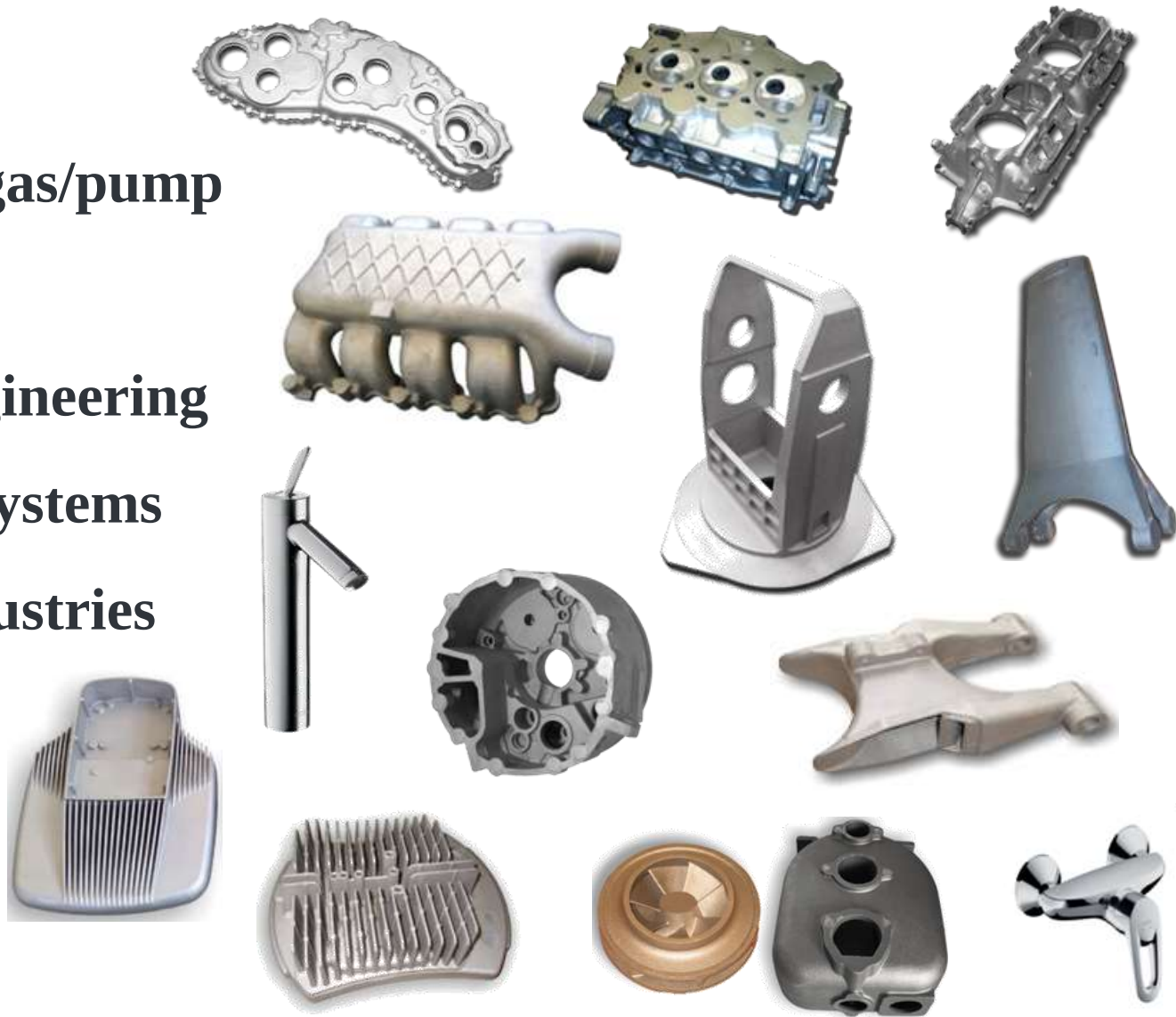
Microwave Oven



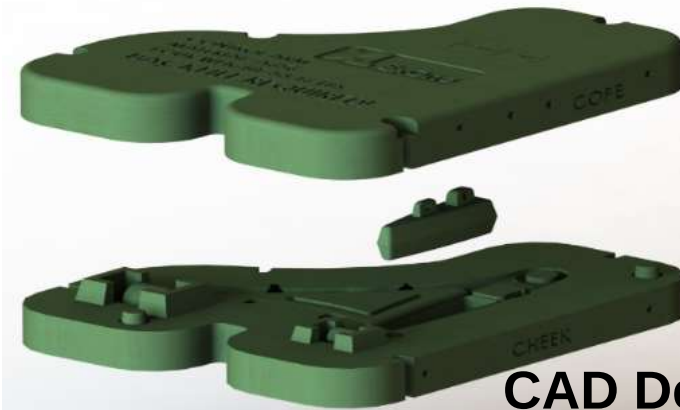
MW.T

WHO CAN WE HELP?

- **Aerospace**
- **Energy/oil/gas/pump**
- **Automotive**
- **Reverse engineering**
- **Hydraulic systems**
- **Faucets industries**
- **Marine**
- **Institute**
- **Foundries**



From CAD to Casting



CAD Design



Printed Package



Shakeout



Final Product

WHO CAN WE HELP?

From CAD to Casting



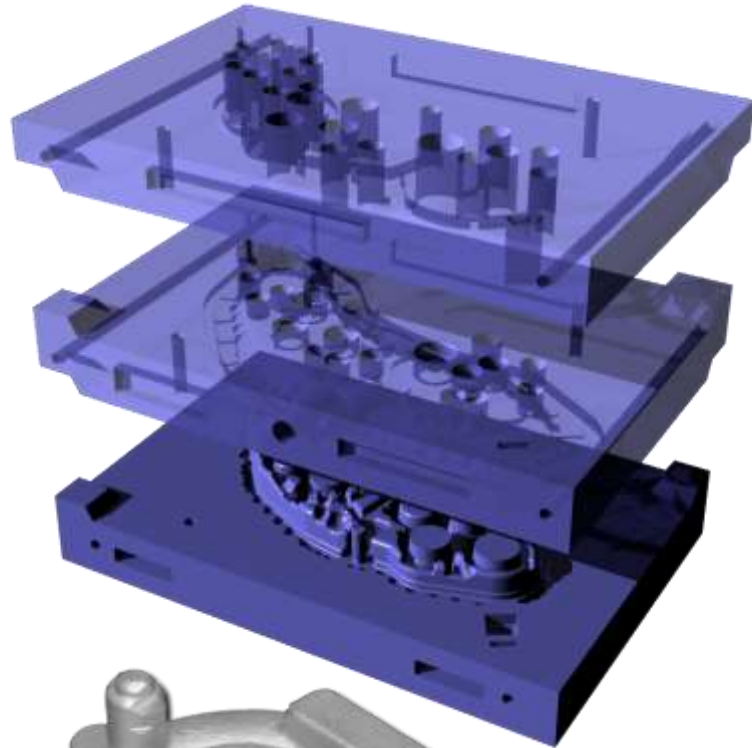
**CAD files can be modified
within seconds and
reprinted without tooling
changes**

Impeller



WHO CAN WE HELP?

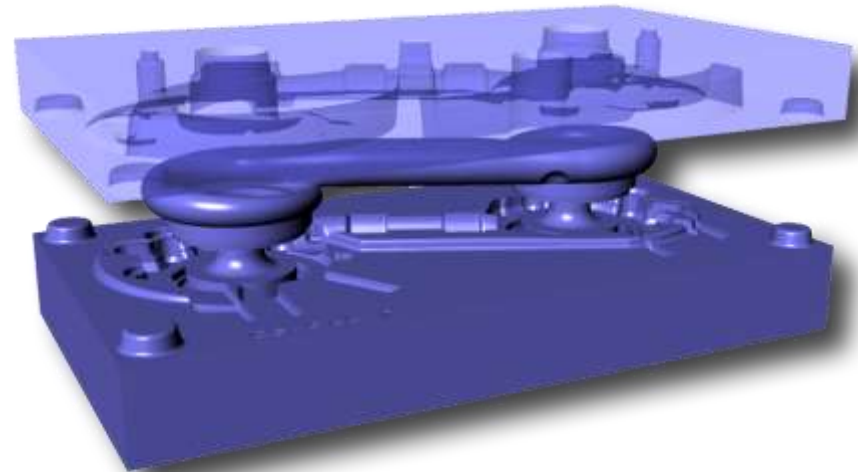
From CAD to Casting



Gearbox Housing

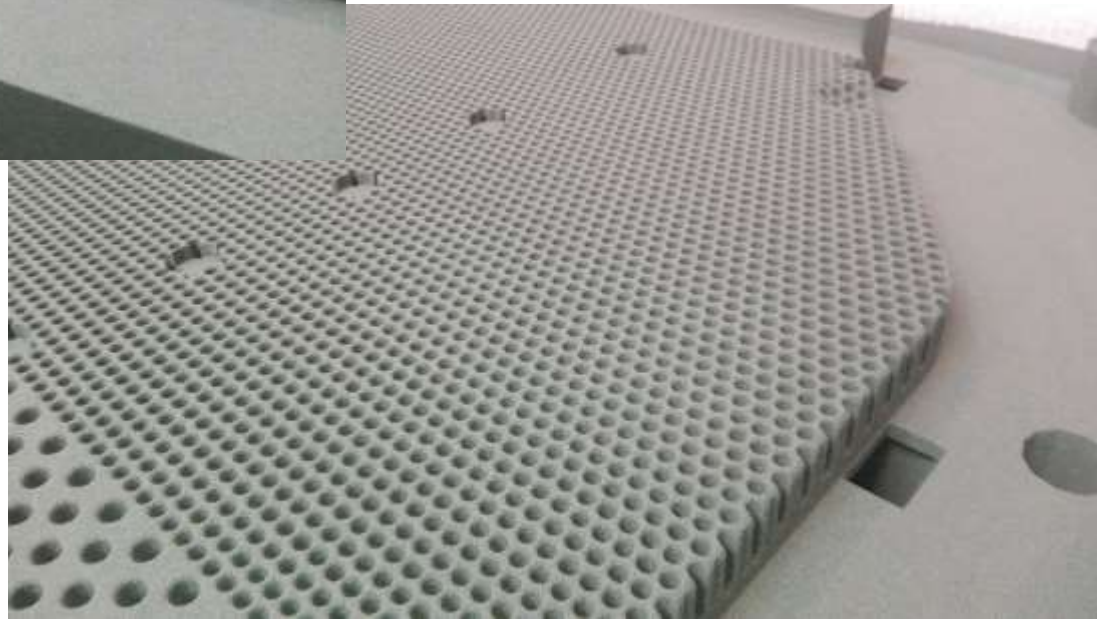
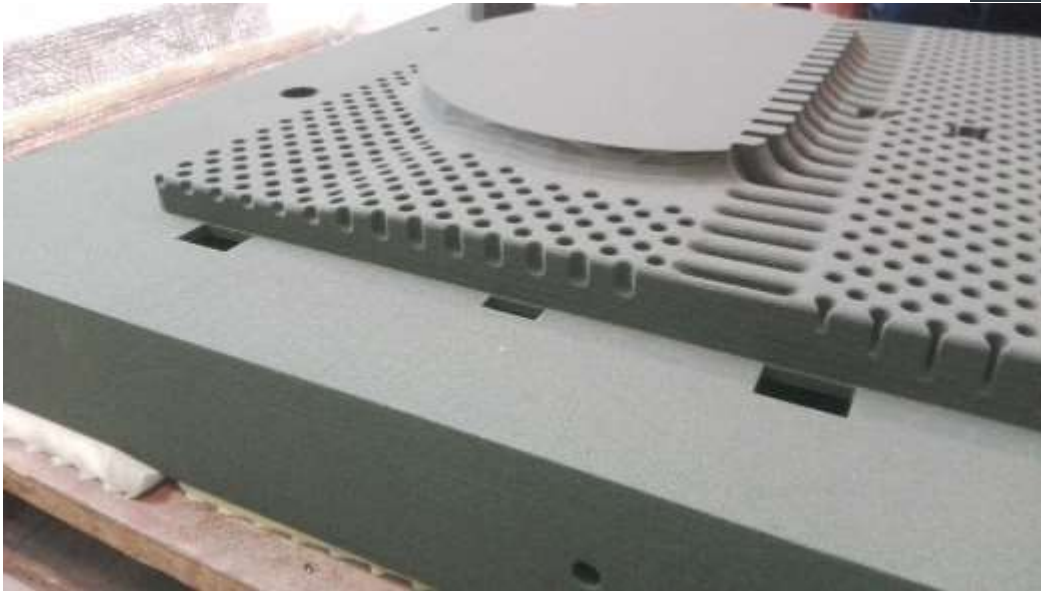


Pump Housing



Complex Prototyping

Heat exchanger

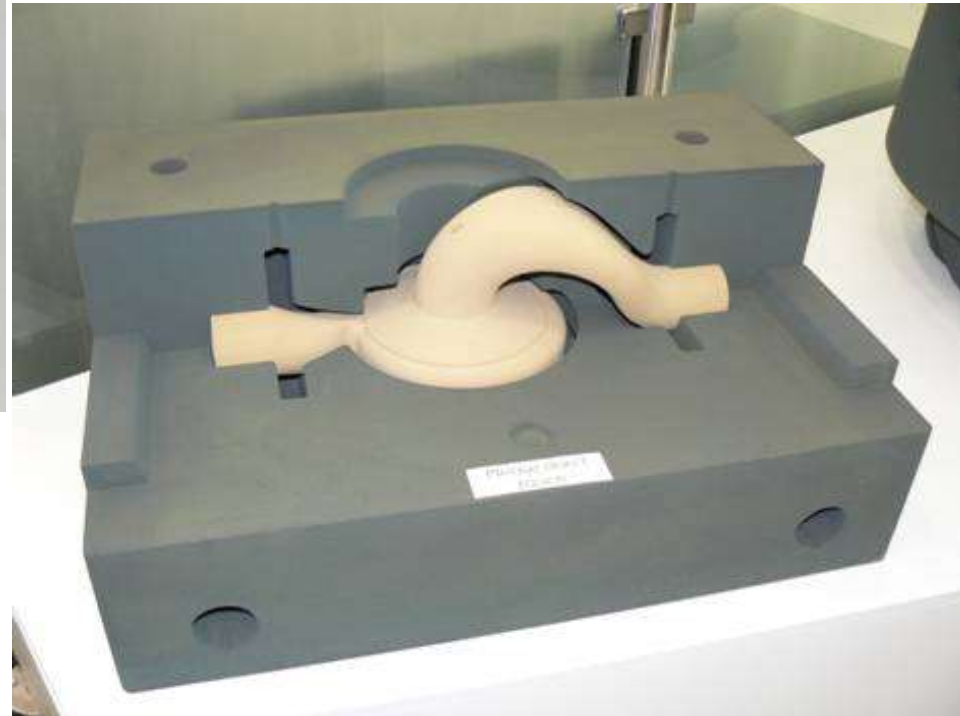


Spare Parts on Demand and Low Batch Production



Hydraulic castings

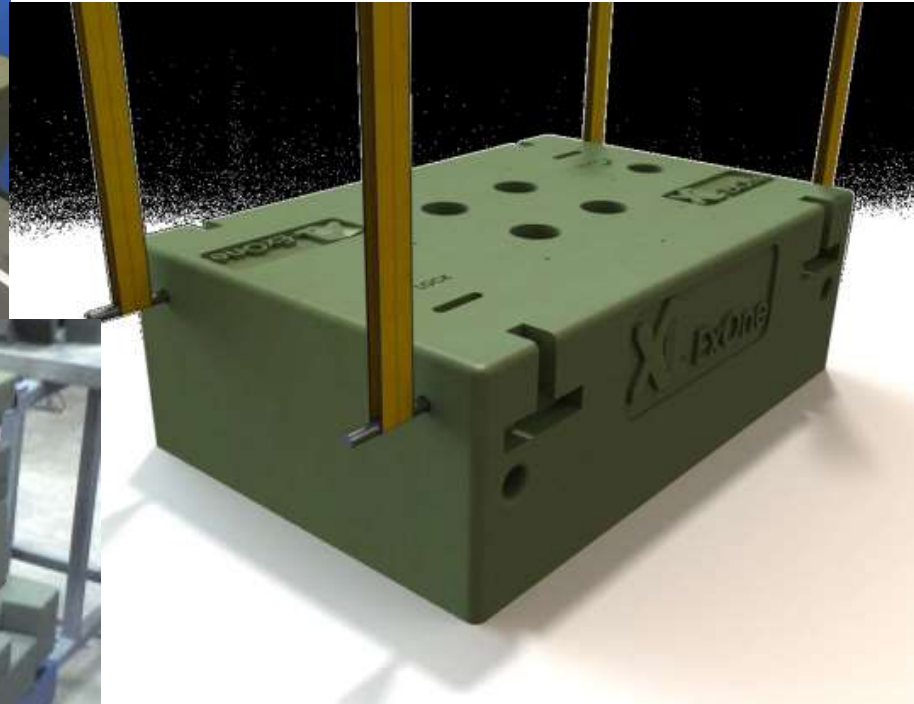
Pumps



WHO CAN WE HELP?

Large Parts

Turbocharger



WHO CAN WE HELP?

Automotive



No additional costs caused by complexity!

WHO CAN WE HELP?

New design possibilities

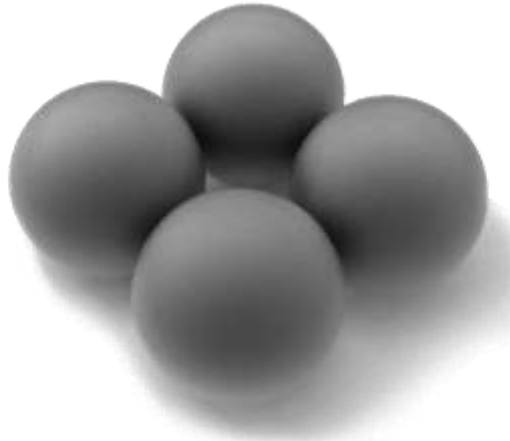


Design freedom without limitations!

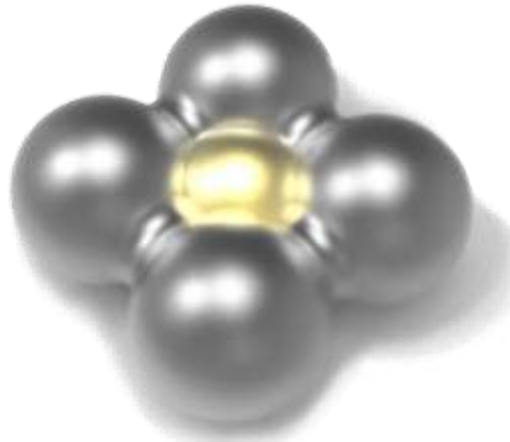
Art Design

3D Printed table

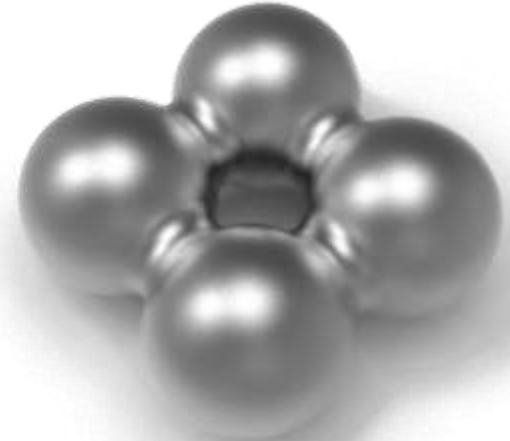




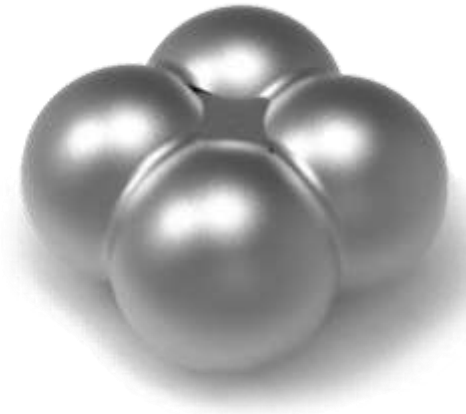
Bonded



Infiltrated



Partially sintered



Highly sintered

3D Metal Printers



M-Flex
400 x 250 x 250 mm
30-60 seconds/layer



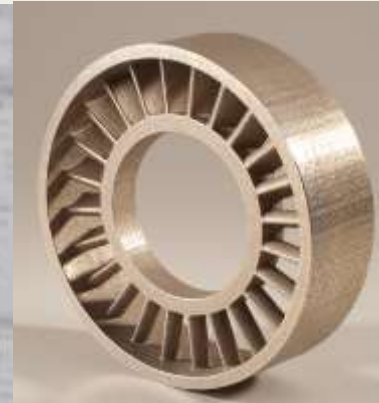
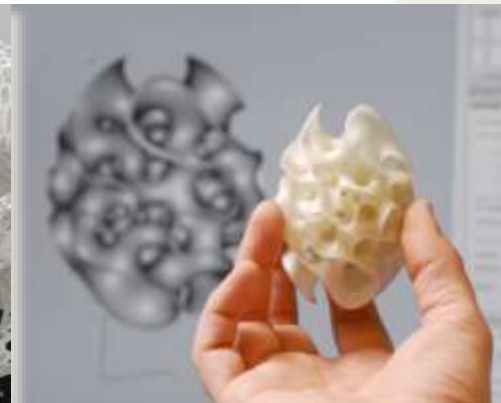
M-Print
800 x 500 x 400 mm
~ 60 seconds/layer



Innovent
160 x 65 x 65 mm
30-60 seconds/layer

METAL PRINTING

- 420 Stainless steel/bronze
- 316 Stainless steel/bronze
- Inconel 625
- Other metals in development



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**Thank you very much for
your attention!**