



# **LASER METAL FUSION (LMF)**

**Additive Manufacturing at TRUMPF**

**10/9/2018**

# LMF Machines

## The TruPrint series

### TruPrint 1000



#### Compact and robust 3D printing

Compact and robust LMF machine for the generative production of small industrial single parts and series

### TruPrint 3000



#### Flexible solution for industrial 3D printing

Universal medium-format LMF machine for industrial manufacturing with external part and powder management

### TruPrint 5000

Preview



#### Highly productive 3D printing for industrial series production

Highly productive, semi-automatic LMF machine for the highest of industrial production requirements

#### Industrial part and powder management

unpacking station, sieving station, vacuum conveyor and powder silo

# LMF Machines

## The TruPrint series

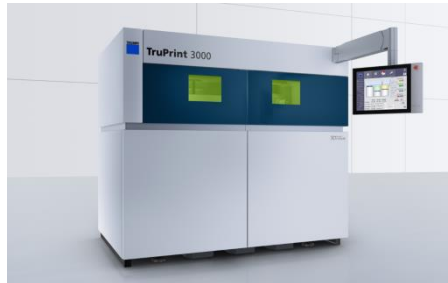
### TruPrint 1000



**Compact and robust 3D printing**

- **Build cylinder:** Ø 100 x 100mm
- **Laser:** 1x / 2x 200W fiber laser
- **Beam diameter:** 30 / 55µm

### TruPrint 3000



**Flexible solution for industrial 3D printing**

- **Build cylinder:** Ø 300 x 400mm
- **Laser:** 1x 500W fiber laser
- **Beam diameter:** 100-500µm
- **Preheating:** up to 200°C

### TruPrint 5000

Preview



**Highly productive 3D printing for industrial series production**

- **Build cylinder:** Ø 300 x 400mm
- **Laser:** 1x / 3x 500W fiber laser
- **Beam diameter:** 100-500µm
- **Preheating:** up to 500°C
- **Autom. process start:** yes

### Industrial part and powder management

Powder removal station, sieving station, vacuum conveyor and powder hopper

# TruPrint 1000

## At a glance



### Description

Compact and robust LMF machine for the generative production of small industrial single parts and series

Video, Presentation TruPrint 1000, visualization LMF process:  
<https://www.youtube.com/watch?v=62DfJkZX7-Y>

### Technical data

- Build cylinder with Ø 100 x 100mm
- 200W laser (Option: Multilaser 2x 200W)
- Beam diameter 55µm (Option: 30µm)
- Materials: Weldable metals in powder form, such as stainless steels, tool steels, aluminum, nickel-based, cobalt-chrome, copper, titanium or precious metal alloys

# TruPrint 1000

## Technical data

TruPrint 1000		
Build volume (cylinder)	mm x mm	Ø 100 x 100 Optional: Smaller build volume <sup>[1]</sup> Ø 100, Ø 63,5 or Ø 34,5 x 80
Processible materials <sup>[2]</sup>		Weldable metals in powder form, such as: Stainless steels, tool steels, aluminum <sup>[3]</sup> , nickel-based, cobalt-chrome, copper, titanium <sup>[3]</sup> or precious metal <sup>[3]</sup> alloys
Build rate <sup>[4]</sup>	cm <sup>3</sup> /h	2 – 18
Layer thickness <sup>[5]</sup>	µm	10-50
Laser source (TRUMPF fiber laser)	W	200 Optional: 2x 200 (2x 2 D Scan heads + 2x F-Theta lens)
Beam diameter	µm	55 Optional: 30 <sup>[1]</sup>
O <sup>2</sup> concentration	ppm	Down to 3000 (0,3%) Optional: down to 100 (0,01%)
Scan speed (powder bed)	m / s	max. 6
Shielding gas		Nitrogen, argon
Power supply	V / A / Hz	230 – 7 – 50/60
Dimensions	mm	1445 x 730 x 1680
Weight	kg	650

<sup>[1]</sup> not combinable with the option multilaser <sup>[2]</sup> Exact material and parameter availability upon request <sup>[3]</sup> Available with option packages <sup>[4]</sup> Build rate includes laser exposure and recoating. Depends on machine configuration, process parameters, material and melted volume per layer <sup>[5]</sup> Individually adjustable. Subject to alteration. Only specifications in our offer and order confirmation are binding.

# TruPrint 3000

## At a glance



### Description

Universal medium-format LMF machine for industrial manufacturing with external part and powder management

Video:

<https://www.youtube.com/watch?v=zoX873e1ITQ>

### Technical data

- Interchangeable cylinder principle
- Build cylinder with Ø 300 x 400mm
- 500W laser
- 200°C preheating
- Beam diameter 100 - 500µm
- Materials: weldable metals such as stainless steels, tool steels, aluminum, nickel-based, cobalt-chrome, copper, titanium or precious metal alloys

# TruPrint 3000



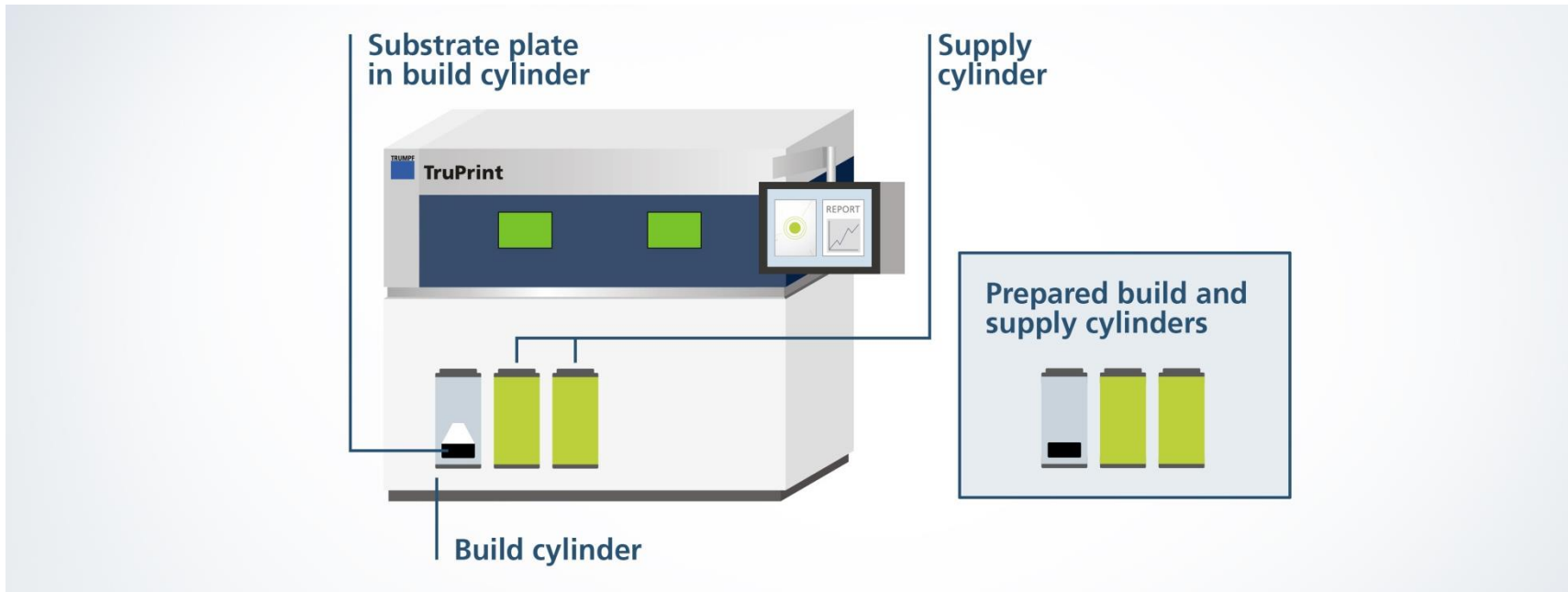
## Technical data

Build cylinder	mm x mm	Ø 300 x 400
Laser source	W	500
Preheating	°C	200
Layer thickness	µm	Typically 20-150 <sup>[1]</sup>
Focus diameter	µm	100 – 500 <sup>[1]</sup>
O <sup>2</sup> concentration	ppm	Down to 100 (0,01%)
Scan speed	m / s	Max. 11
Gas		Nitrogen, argon
Electrical connection	V / A / Hz	400 - 32 - 50/60
Width	mm	3385 x 2005 x 1475
Weight	kg	4300
Building material		Stainless steel, tool steel, cobalt-chromium, aluminum, nickel-based alloy, titanium precious metals, bronze

<sup>[1]</sup> Individually adjustable

# TruPrint 3000

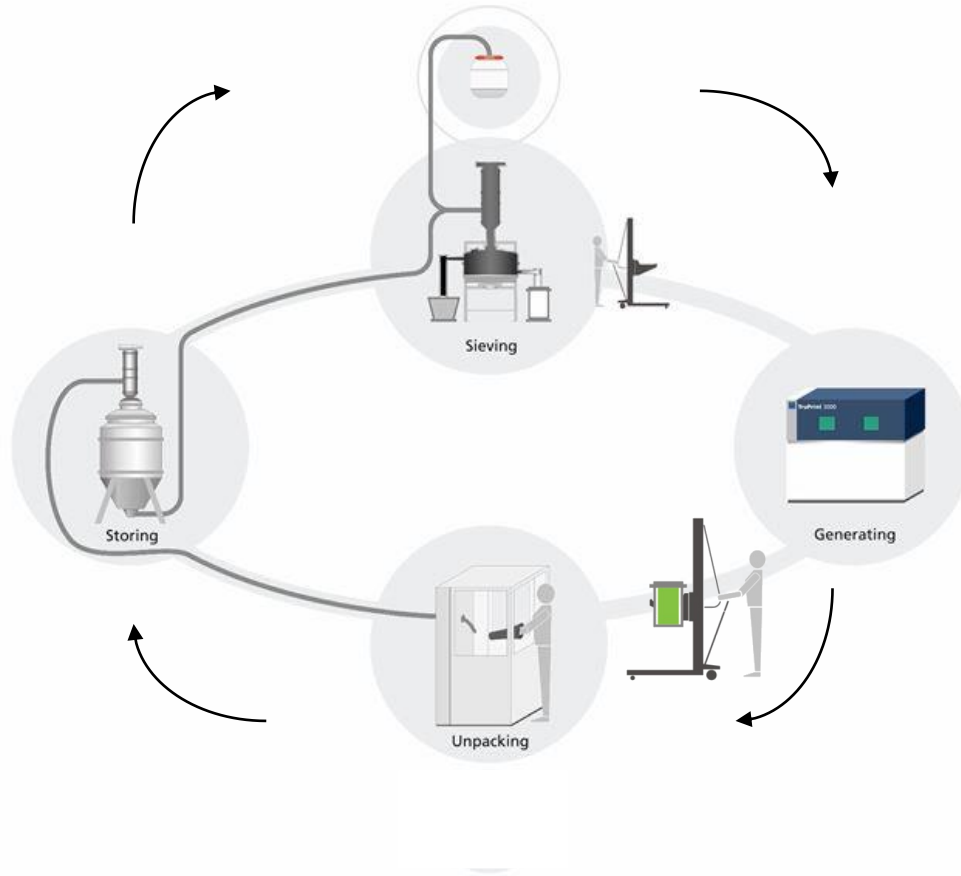
Differentiation through efficient interchangeable cylinder principle



- Quickly replaceable exchangeable build and supply cylinders
- Facilitates working parallel to production for high machine availability
- Cylinder change without contact to the powder
- Spatial separation of production and powder field
- External unpacking of build jobs in the unpacking station



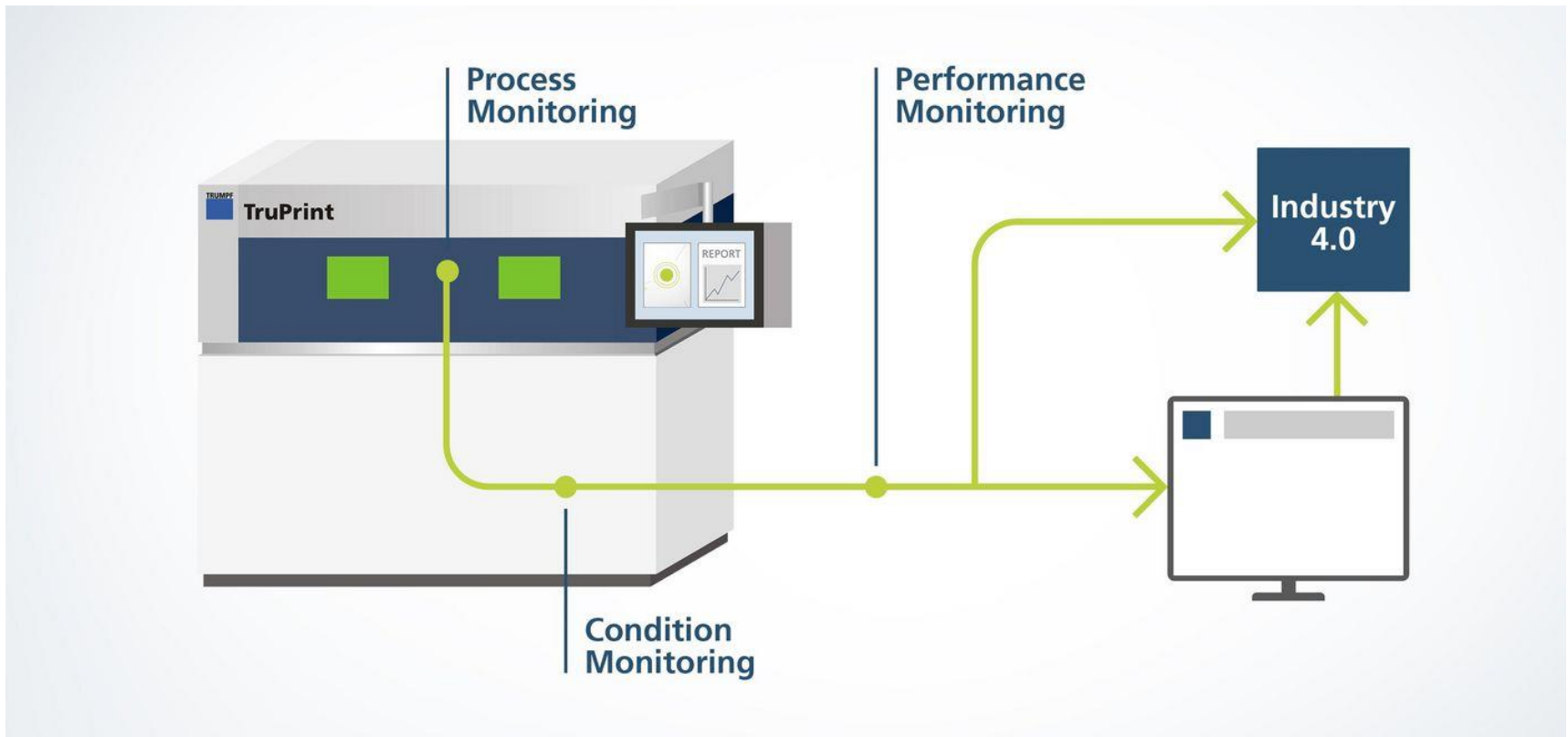
# Industrial Powder and Part Management Process



- Main components: unpacking station, sieving unit, powder silo
- Facilitates set up and unpacking parallel to production with one or multiple machines

# Digitization: example Monitoring solution

## Product landscape

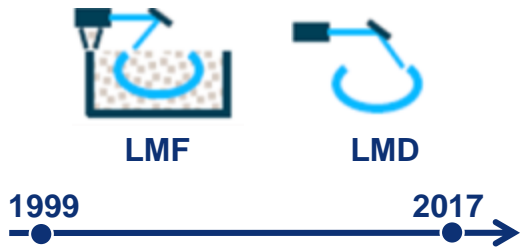


It allows to have an overview and full control at all times. The monitoring solution makes sure there are no gaps in the data chain. Intelligent solutions enable the user to not only supervise and analyze the printing process, but also control it remotely.

# Additive manufacturing at TRUMPF at a glance

TRUMPF as a reliable partner and full-service provider within AM

## Pioneer in 3D printing



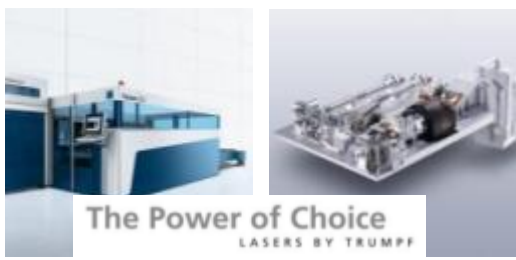
More than 15 years of experience in additive technologies

## High-performance Portfolio



Robust AM machines for industrial series production

## Experienced industrial partner



Global market leader for machine tools and laser technology

## Global proximity to customers



International sales and service network

## Wholesome solutions



Complete solution provider for machines and services

## Industry 4.0



Connected machines and technologies