



Accelerating Industrial Additive Manufacturing

with process automation and integration

Formnext Forum

Harry Kleijnen

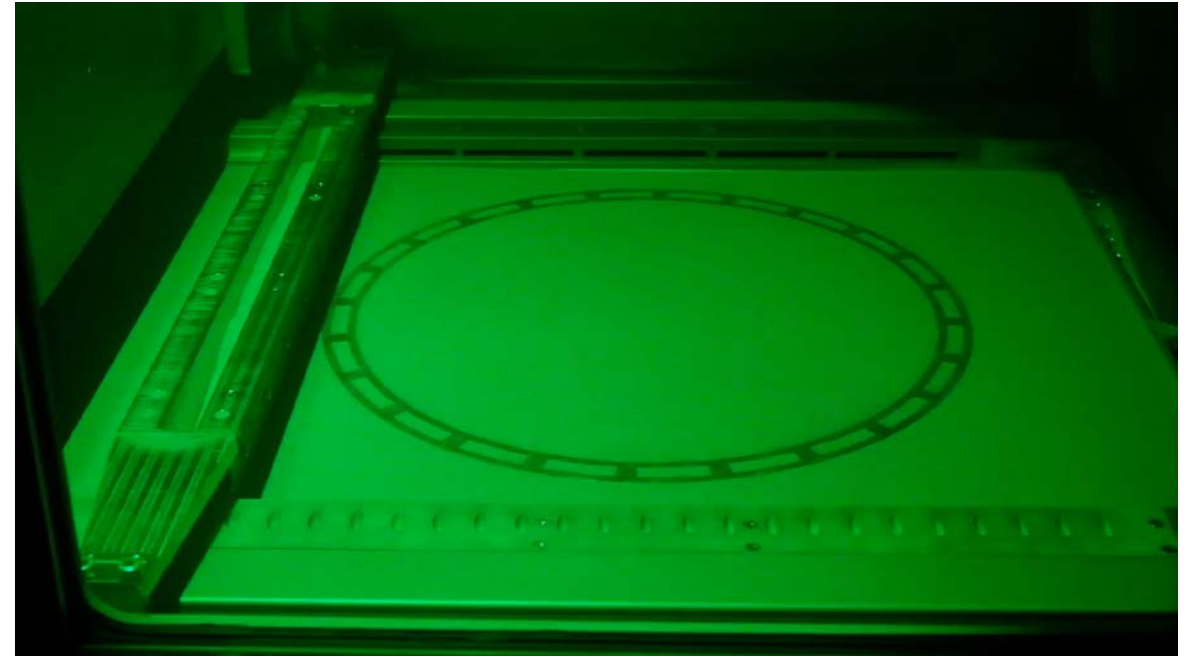
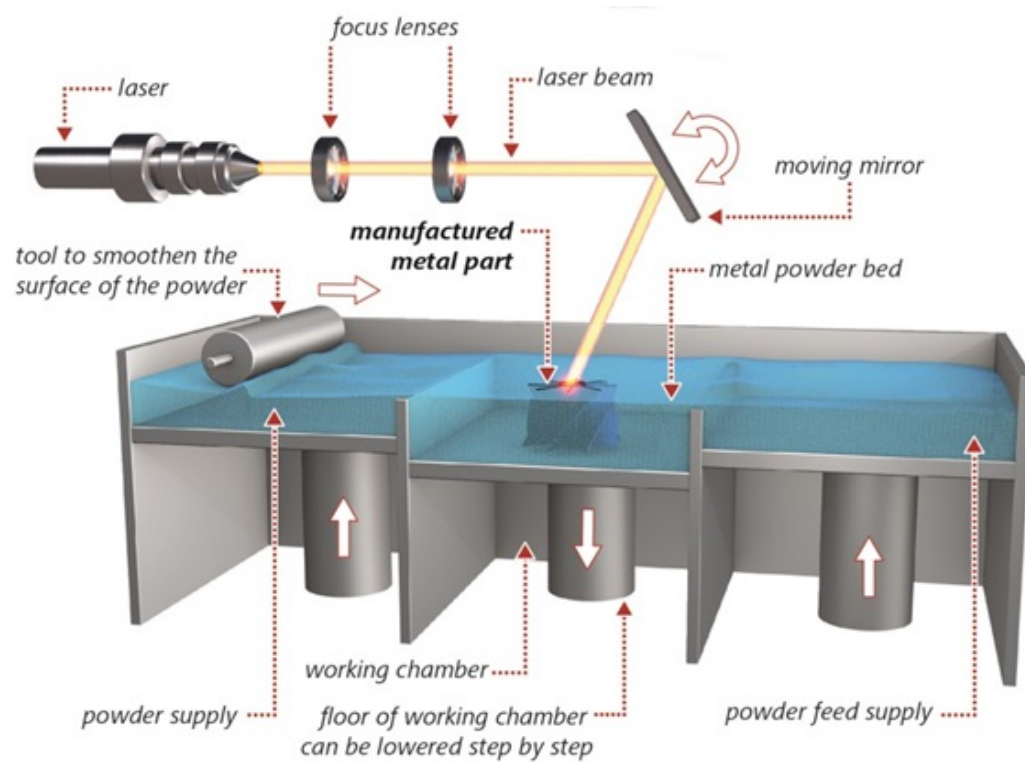
Sola City Conference Center
Tokyo, September 10th, 2019

ADDITIVE MANUFACTURING TECHNOLOGIES



Diagram courtesy of 3D HUBS

Additive Industries equipment uses laser powder bed fusion technology



In medical applications the additive manufacturing technology is matured and commonly used for large volume production

- Proven cases of large volume production of 3D printed hip implants, knee joints, spinal cages
- Commoditized dental crown / implants
- Strong growth in patient specific implants
- Medical certification and compliance
 - ISO 13485
 - ISO/TC150



Knee implant



Jaw implant

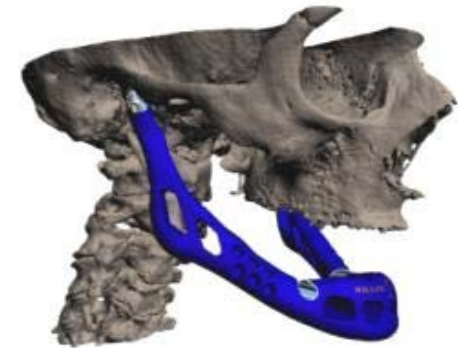


Image courtesy of Xilog



Dental crowns

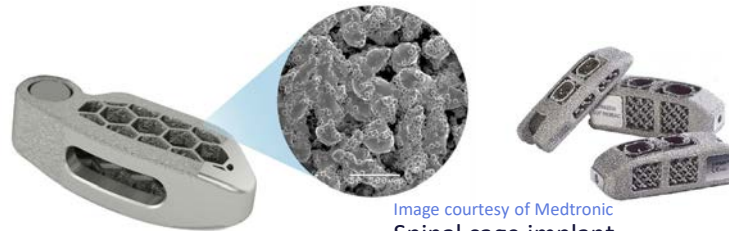


Image courtesy of Medtronic
Spinal cage implant



Hipcup

Image courtesy of 3ders.org

Key challenge: Regulatory compliance

AM introduction in large series automotive needs significant cost down

- Most car manufacturers are in exploration phase
 - Setting-up competence centres
 - Comparing different processes/vendors
- Obsolete sparepart production
 - Volkswagen W12 engine hose
- Small series production
 - Prototyping
 - Drive trains
- Weight saving in fossil fuel powered vehicles
- Optimized cooling for electrical engines
- Tooling for production equipment



Volkswagen W12 engine spare parts

Image courtesy of 3ders.org



Light Hinge+ lightweight hood hinge with integrated pedestrian protection



Liquid cooled housing for hog power density electrical cart engines



Image courtesy of EOS

Optimised knuckle design

Key challenge: beat the €2-3 Average price/kg for a middle class car

Weight saving drives the aerospace business case

- Promise : flight operational cost savings €2000-4000/kg
- Assembly tooling
- ‘Temporary’ part production to avoid production interruptions
- Certified process capability is a key asset and drives competitive advantage
- **Criticality Potential Effect or Failure classification**
 - 1 → Loss of life or vehicle.
 - 2 → Loss of mission or next failure of any redundant item could cause loss of life/vehicle.
 - 3 → All others.

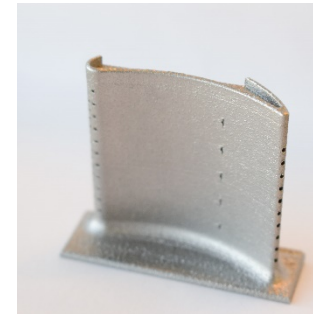


Image courtesy of Additive Industries

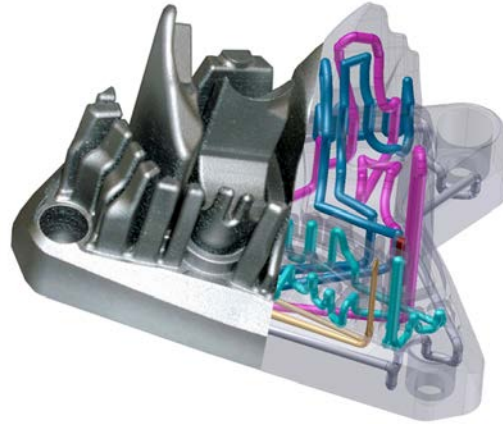


Key challenge: Flight qualified parts

Increased awareness in equipment manufacturers, tooling, high tech, and energy industries drives the adoption of additive manufacturing



Turbine burner Image courtesy of Powerengineering



Injection mold with optimized internal cooling channels



Pump impeller

Image courtesy of Additive Industries



Image courtesy of 3DMetalprinting

Heat exchanger



Faucet



Hydraulic block

Image courtesy of Additive Industries

Use case: food processing equipment, cost savings in dough cutting



Contact:
Varsseveldseweg 20a
7061 GA Terborg (NL)
+31 (0)315 339432

info@k3d.nl

<https://www.k3d.nl/en/>

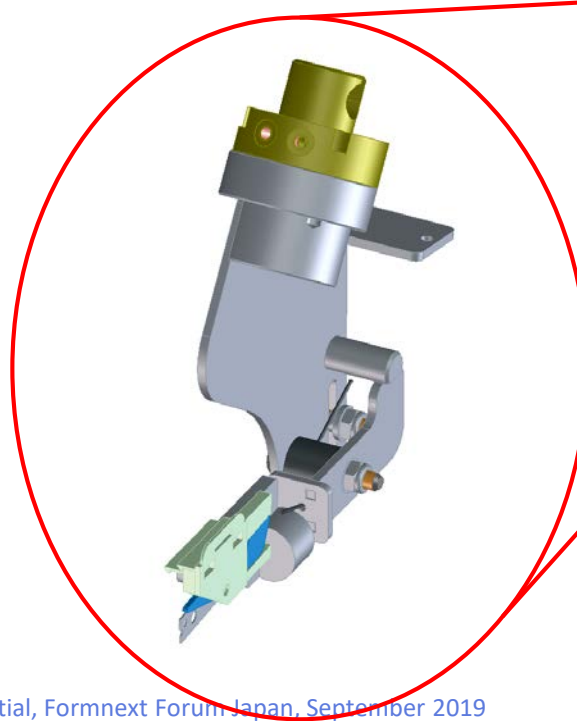
- K3D, a Dutch company is one of the first Additive Industries beta customers
- K3D explores multiple 3D print competence centres, offering application development, design for AM and 3D print services
- Actually use two MetalFAB1 systems



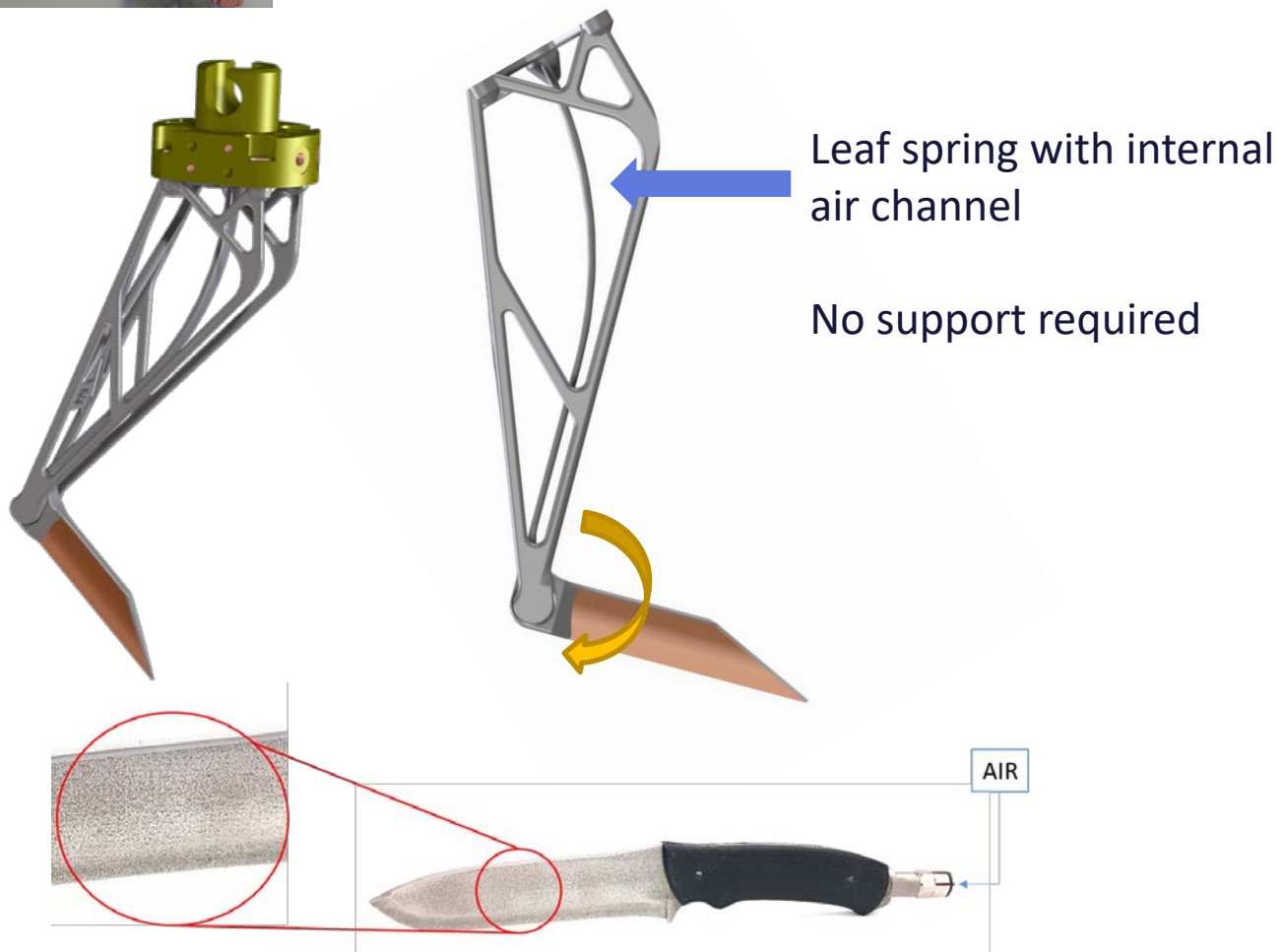
Use case: food processing equipment, cost savings in dough cutting


Actual design characteristics

- Many parts and heavy
- Long lead time and many assembly steps
- Dough sticks to knife, frequent cleaning needed
- Limited stiffness
- Not reliable due to complex design



2019 winner of Additive World Design award



 **-90%** weight reduction
from 811 gr to 80 gr

 **-60% up to - 1000%**

Cost reduction price: -/- 60%
Financial impact: Higher acceleration of robot possible. Instead of 8 robots we can use 6.
Less cleaning and less downtime

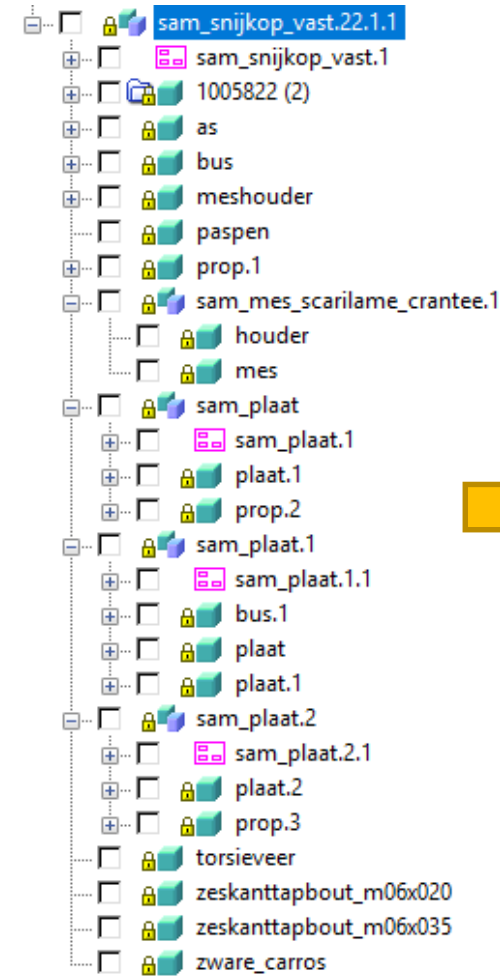
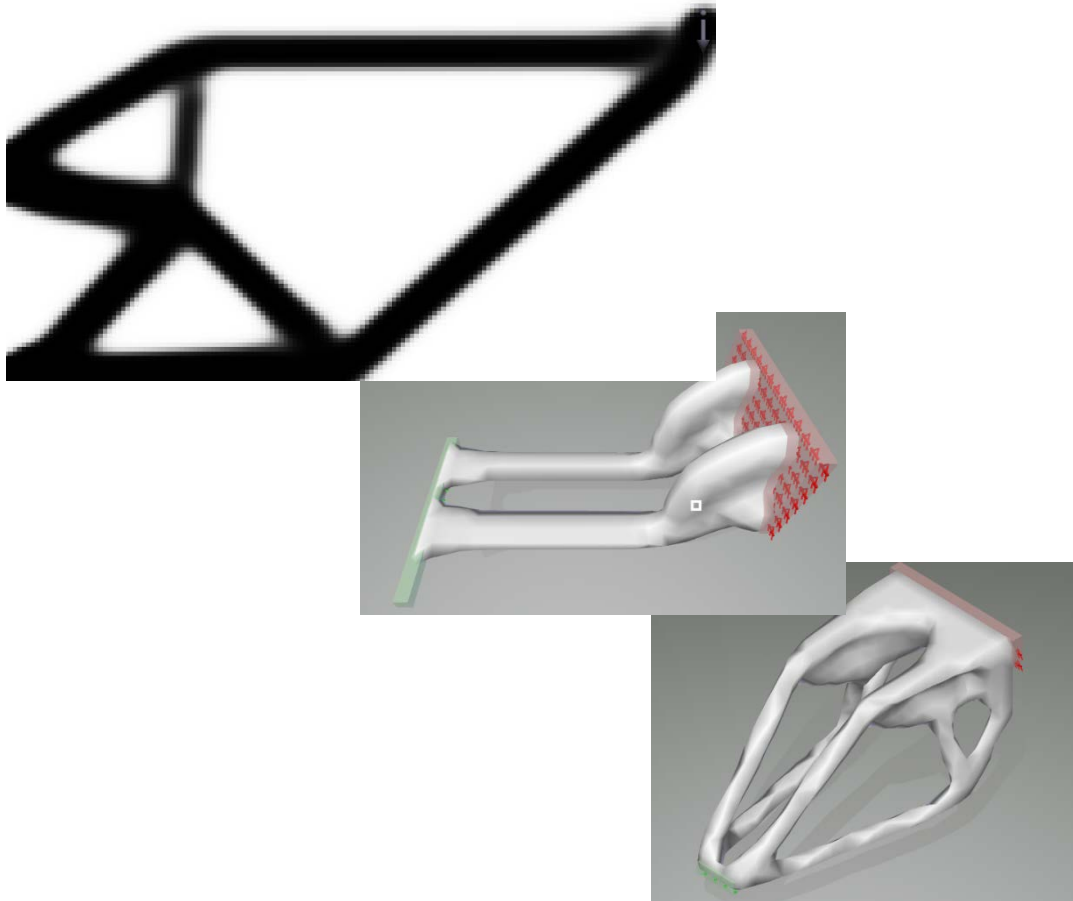
 **-60%**

Lead time reduction

 **-95%**

Number of parts Parts from 20 to 1

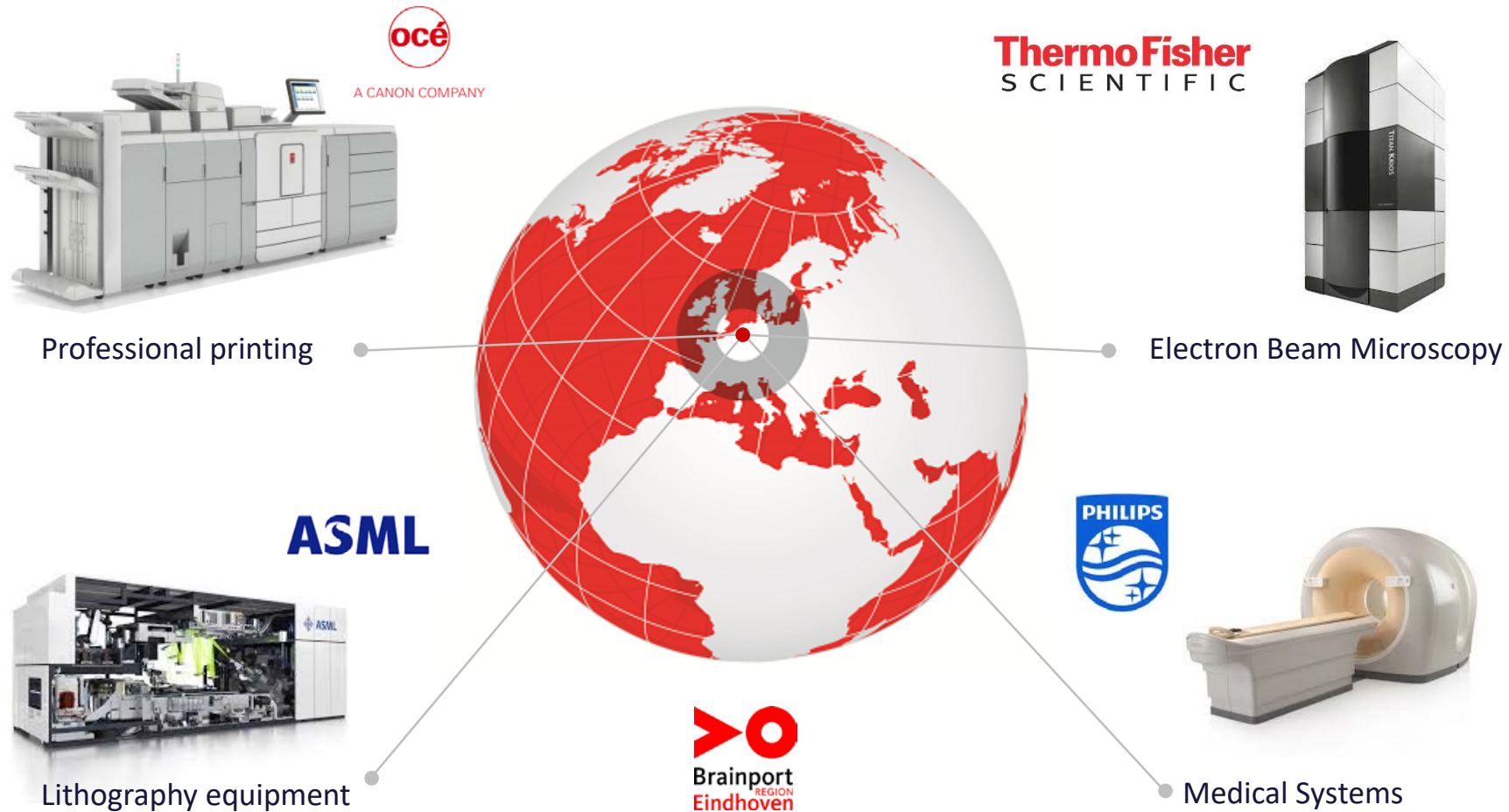
Freedom of shape allows topology optimization and function integration



3D_print_cutting_knife

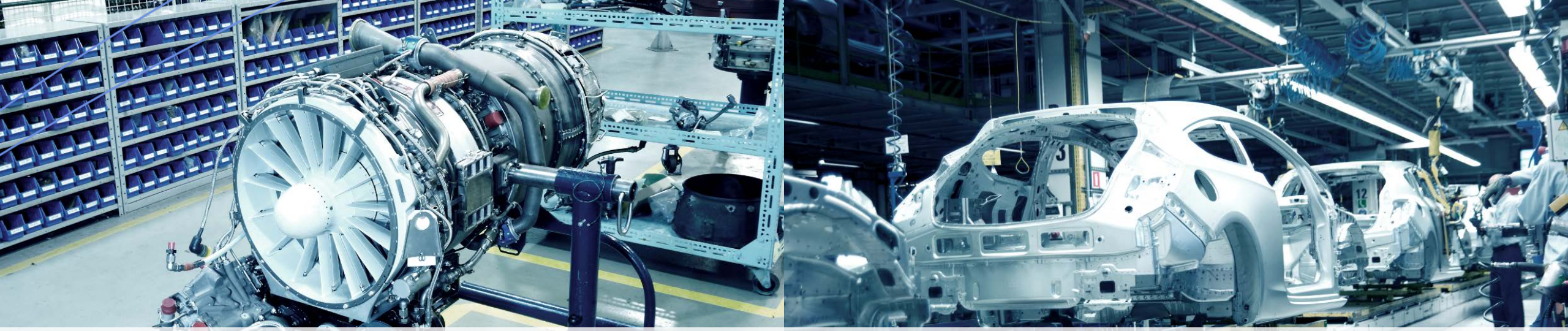
Bill of material reduction:
From 20 parts to 1

Additive Industries is born in Brainport, a region in The Netherlands around Eindhoven, famous for its high tech systems & electronics



The Additive Industries team is growing industrial additive manufacturing worldwide from locations in Europe, Asia & North America





We are accelerating industrial additive manufacturing
of high quality, functional, metal parts
by offering modular end-to-end 3D printing systems



The MetalFAB1 system defines a new category in additive manufacturing



Additive Industries is the only dedicated OEM for integrated industrial 3D metal printing systems and the MetalFAB1 system defines a new category

MetalFAB1

Industrial Additive Manufacturing System



Process & Application
Development, Prototyping



Small series
Full automation



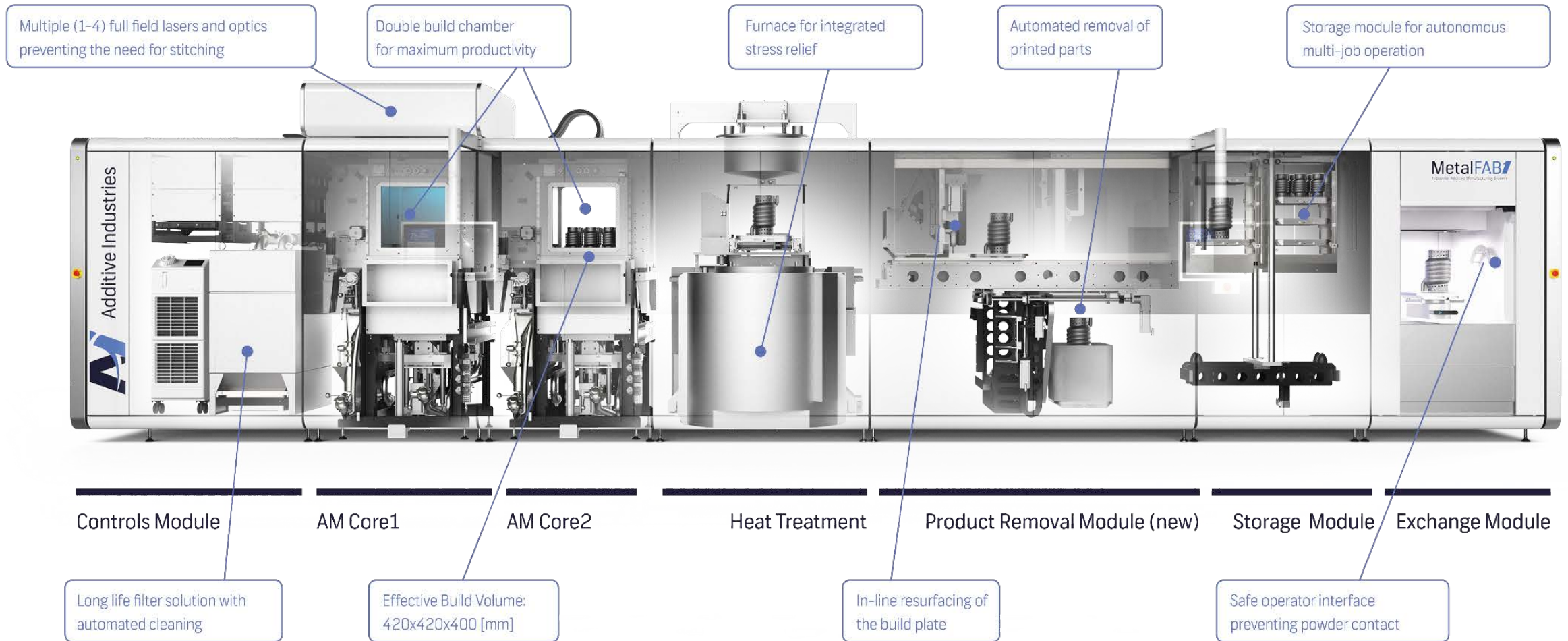
Larger capacity, multiple materials
Additional functionality



Additive Industries

Confidential, Formnext Forum Japan, September 2019

The MetalFAB1 integrates multiple process steps in a modular system design ...

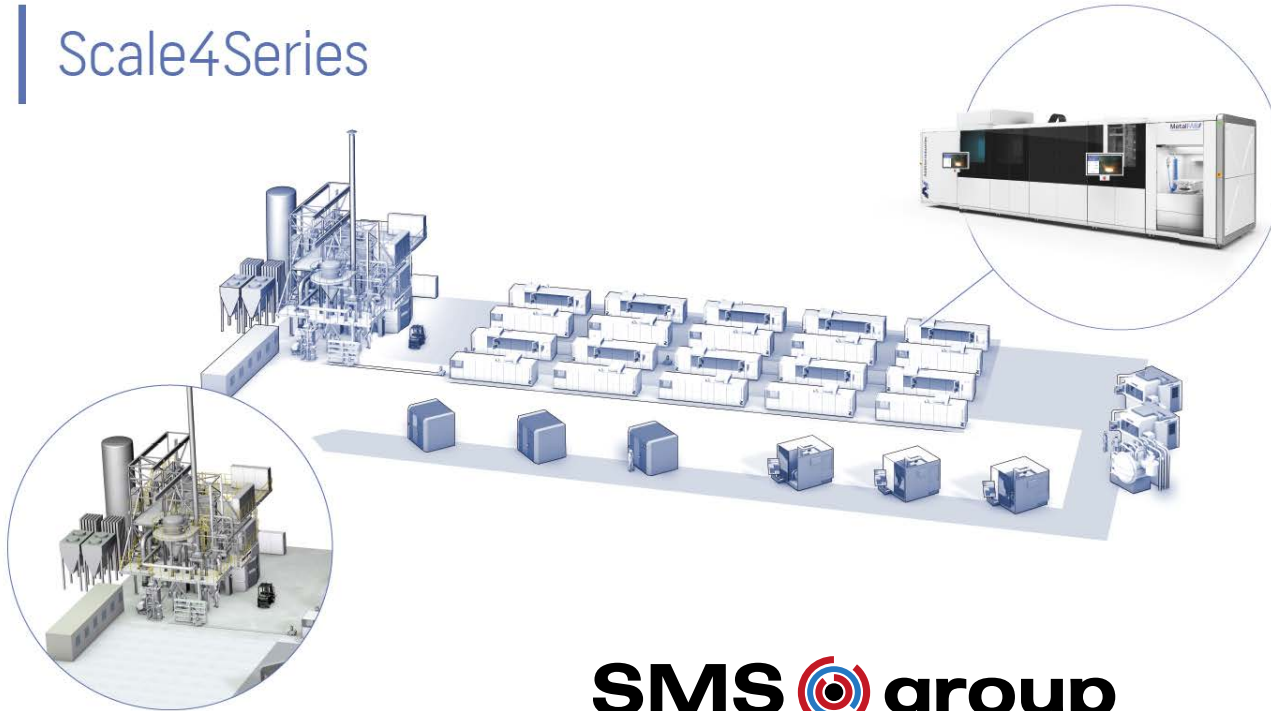


... in combination with automated handling by a robot
for integration and unmanned operation ...



... even looking beyond our system boundaries
to offer further process integration and automation

Scale4Series



SMS  **group**



Additive World

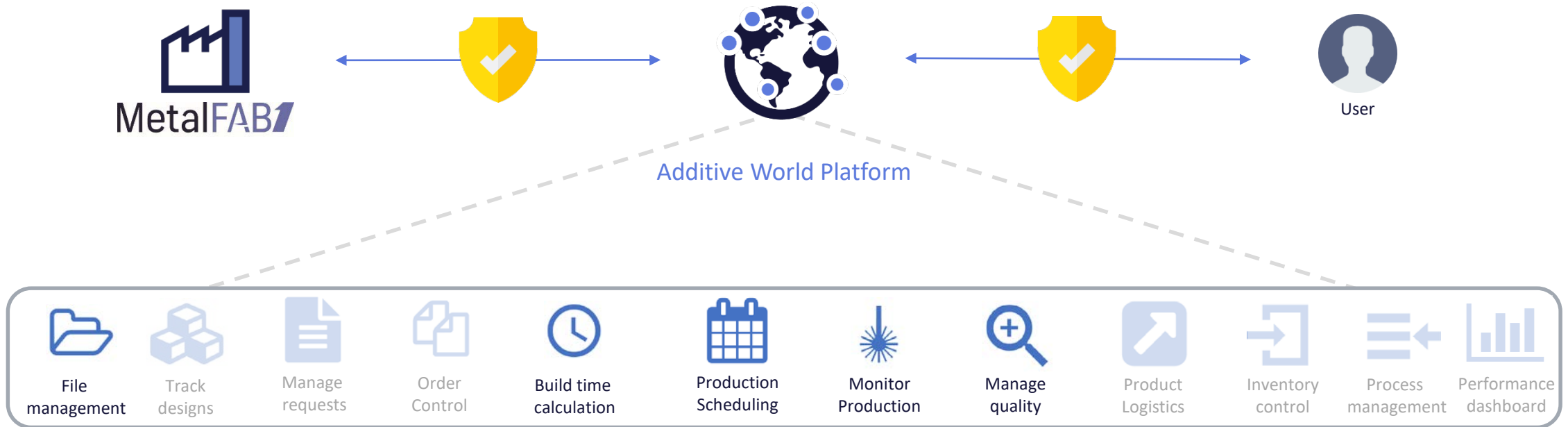
Platform

The Additive World Platform supports the complete workflow, allows for a steep learning curve and distributed manufacturing



The current platform is focused on the core process...

We use focus to create the tools you need right now for production and introduce the additional functions when your organization is ready for them. Allowing the software to grow with your production process.



...with the objective to cover the entire value chain

Creating a single place for all data and tools needed in manufacturing. Allowing the user to focus on what is important: producing functional parts with the right quality and traceability.



Our world class (remote) service & support consists of 3 support levels and a comprehensive toolkit



Since 2012 we have grown a team of over 100 talented professionals
in a customer focused, open and collaborative culture



Additive Industries is accelerating industrial additive manufacturing with leading customers in automotive, aerospace, healthcare & high tech ...

APWORKS
by Airbus Group



Leading Steel
Manufacturer


INTECH DMLS PVT LTD
Sinteneering Innovations

Innovative
space company



Jet engine
manufacturer



SMS  **group**



Thank you for your attention!



Additive Industries

