

Session “The Added Value of a Digital Twin”

SIEMENS
Ingenuity for life

www.incase2seas.eu/events/helloindustry40



07
03
18

**SLIMME
TECHNOLOGIE
LUIDT EEN NIEUWE
TOEKOMST IN**

VO
Ka
Kamer van
Koophandel
Oost-Vlaanderen

Oude Vismijn, Gent

**NON-STOP TECH TALKS: PETER HINSSEN |
FRANK KNAFLA | BART DEMAEGDT | XANDER
STEENBRUGGE | KATHLEEN PHILIPS**

**RONDLEIDING ‘HELLO, ROBOT’
IN DESIGN MUSEUM GENT**

Design museum Gent

Oude
Vismijn
Bar | Brasserie | Feestzaal

provincie
Oost-Vlaanderen

Interreg 
2 Seas Mers Zeeën
INCASE
European Regional Development Fund



Digitalization changes everything

NO CASH NO CHECKS
NO CREDIT

JUST WALK OUT

SHOPPING



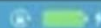
The Technology behind...



a changed user experience

No SIM

8:37 AM



Workplace Safety

Where is a jackhammer

There is a jackhammer in the construction yard.

Show me non employees on the job site

Delivered

I saw the following people on the job site recently.



+99 more photos



+99 more photos



+99 more photos



Only credentialed employees can use |

Send

q

w

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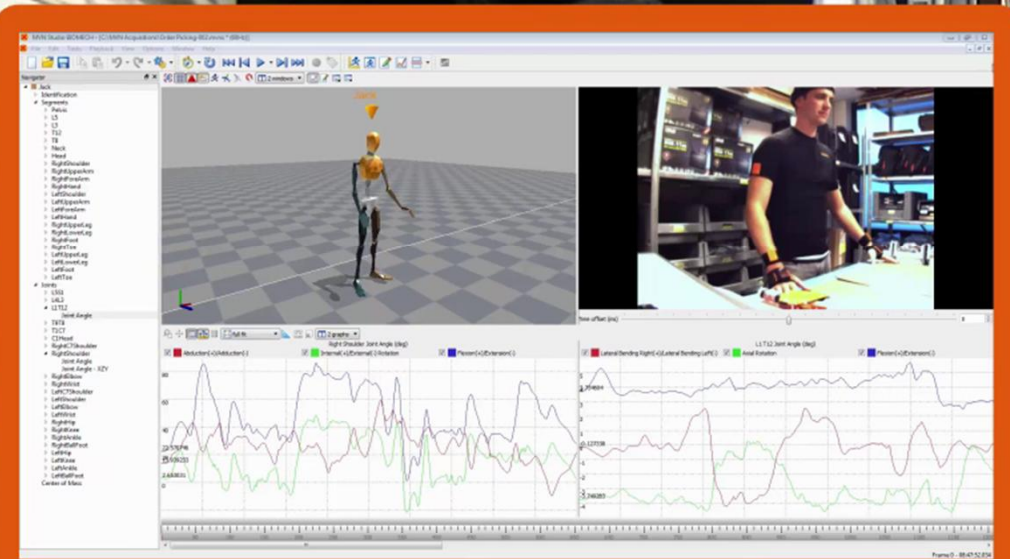
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b

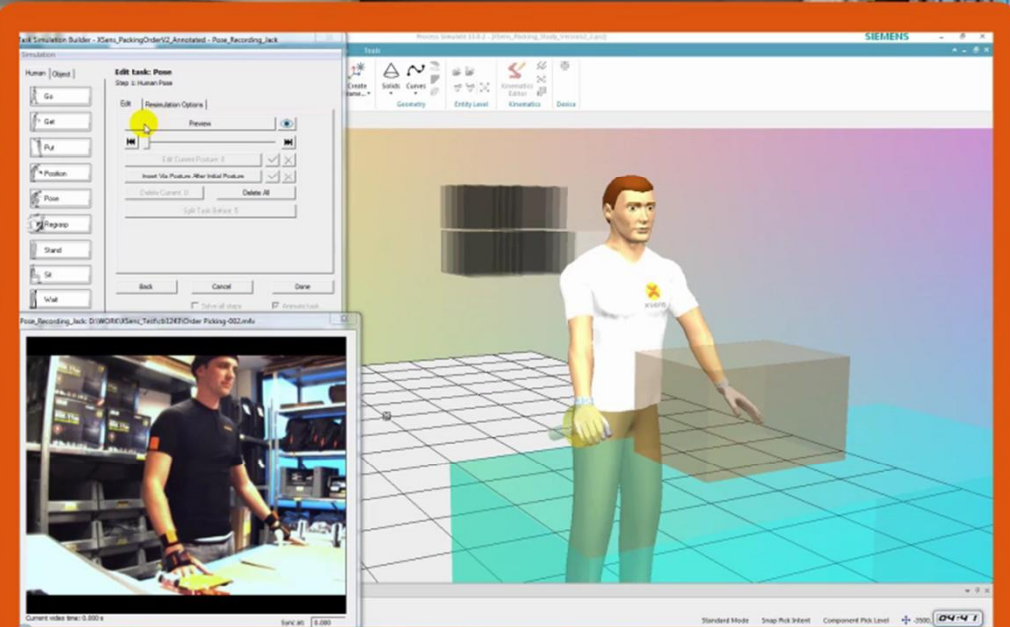
n

m





XSENS - MVN Studio BIOMECH Software

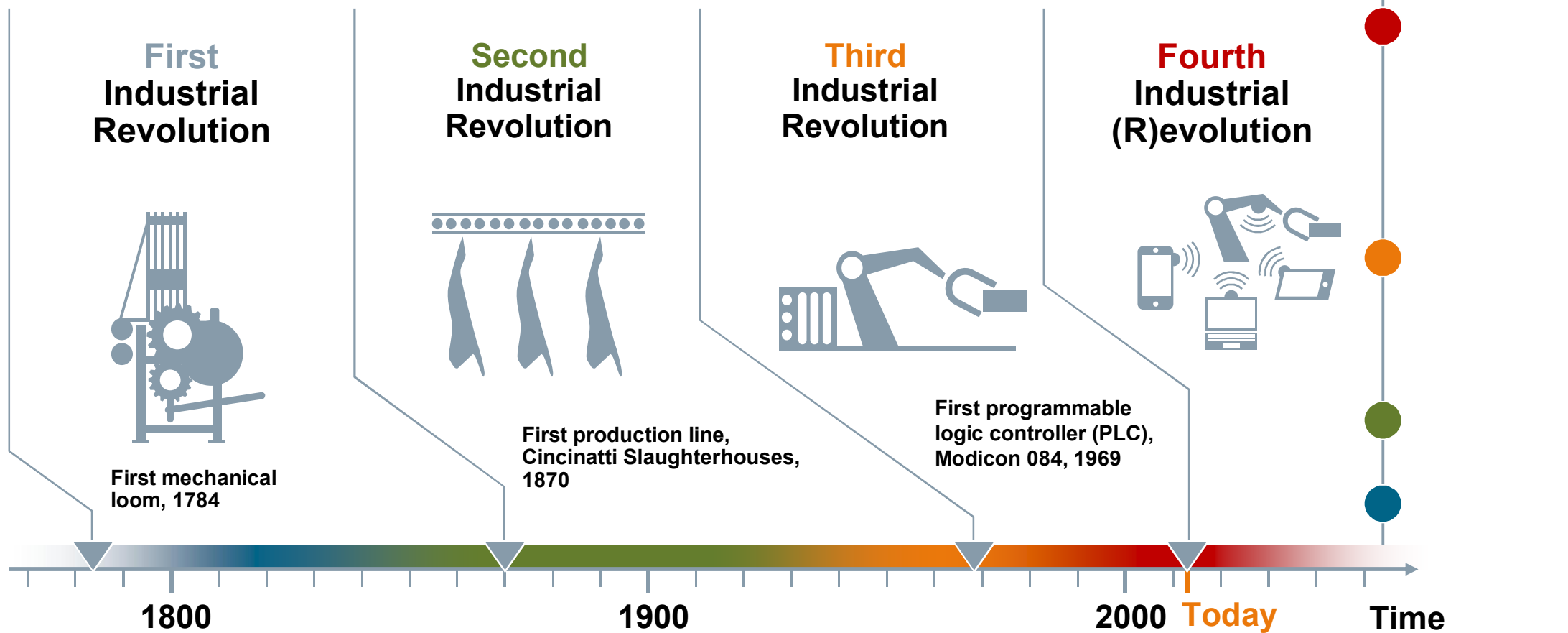


SIEMENS - Process Simulate Human Software



The evolution toward Industrie 4.0

From Industrie 1.0 to Industrie 4.0

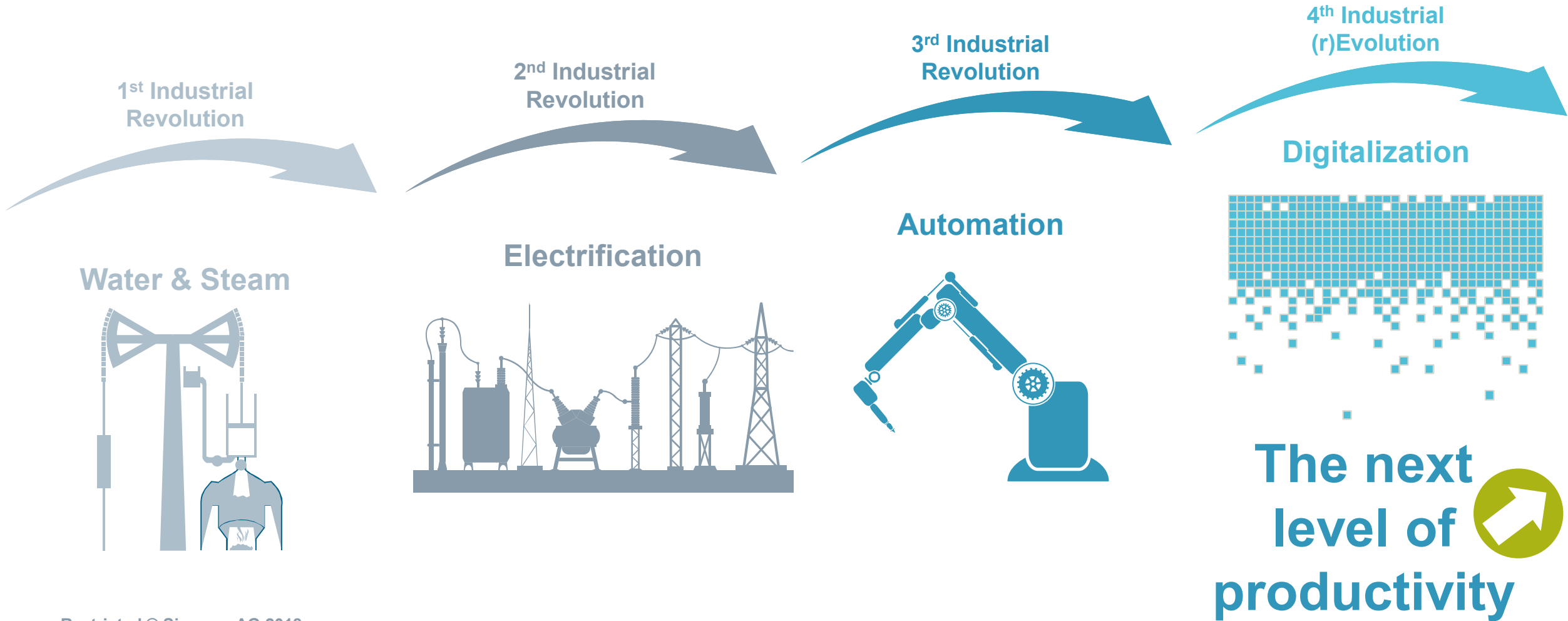


Why?



The Digital (r)Evolution - Siemens has been at the forefront since the beginning of the Industrial Revolution

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Ingenuity for Life



How to be 1% Better Every Day

The Kaizen Approach to Self-improvement



A photograph of four children of various ages, all dressed in formal business attire including suits, blouses, and ties. They are standing in a row against a bright, blurred background. The children are smiling and looking towards the camera. A large teal semi-transparent box is overlaid on the bottom half of the image, containing white text.

There is no one-size-fits-all solution in Digitalization

Every industry, every company is different and requires solutions it can integrate into existing processes and the production structure step by step while not restricting operations due to downtime.

Klaus Helmrich, member managing board Siemens AG

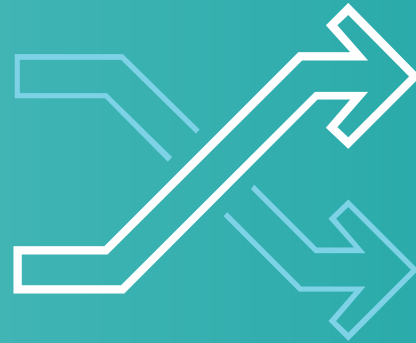
Our customers have essential requirements –
throughout the manufacturing industry

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Speed



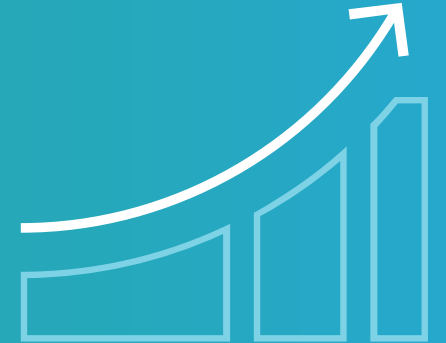
Flexibility



Quality



Efficiency



Security



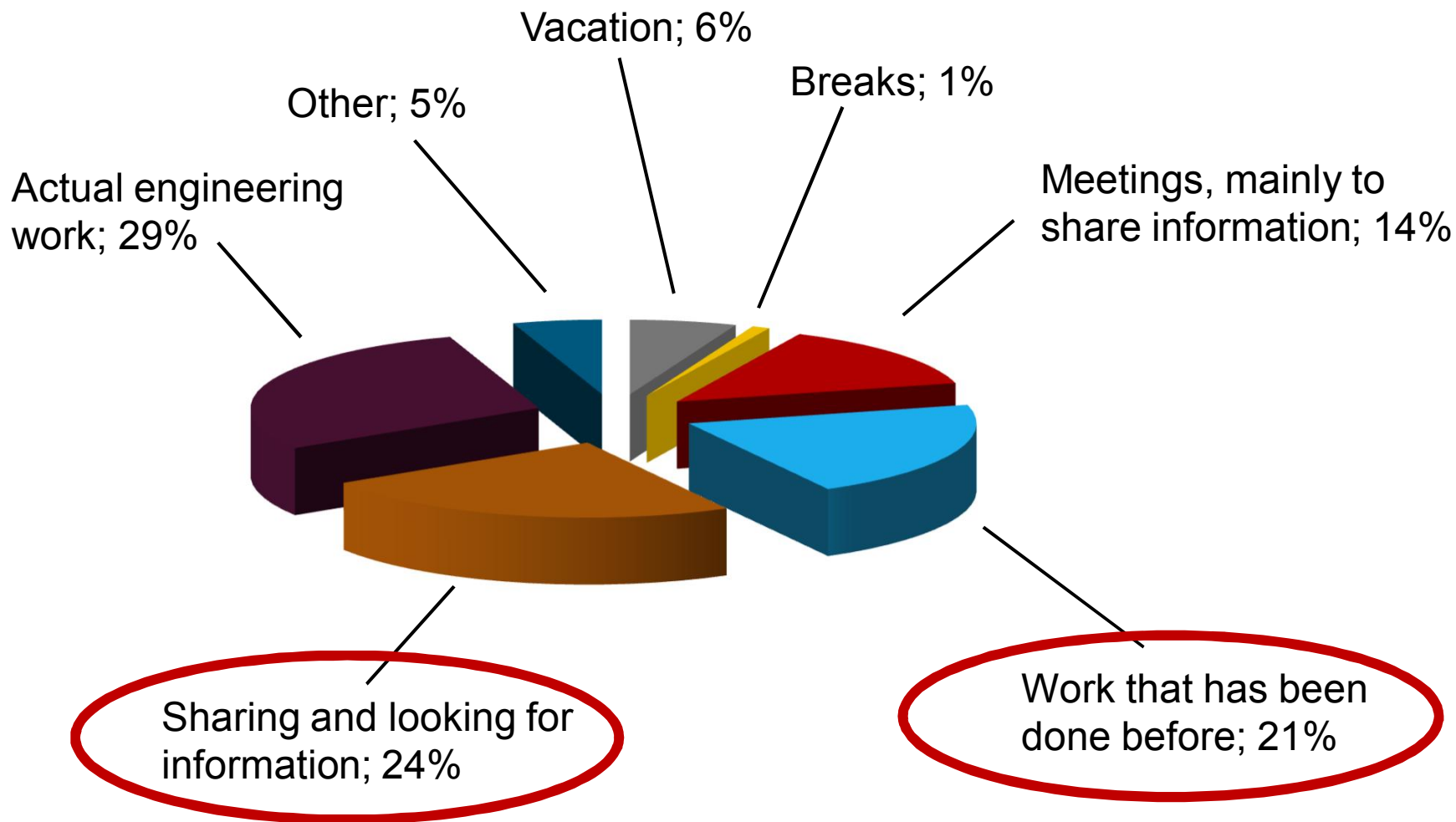
Poll n° 1:

Where lies the (main) bottleneck of Digitalization?

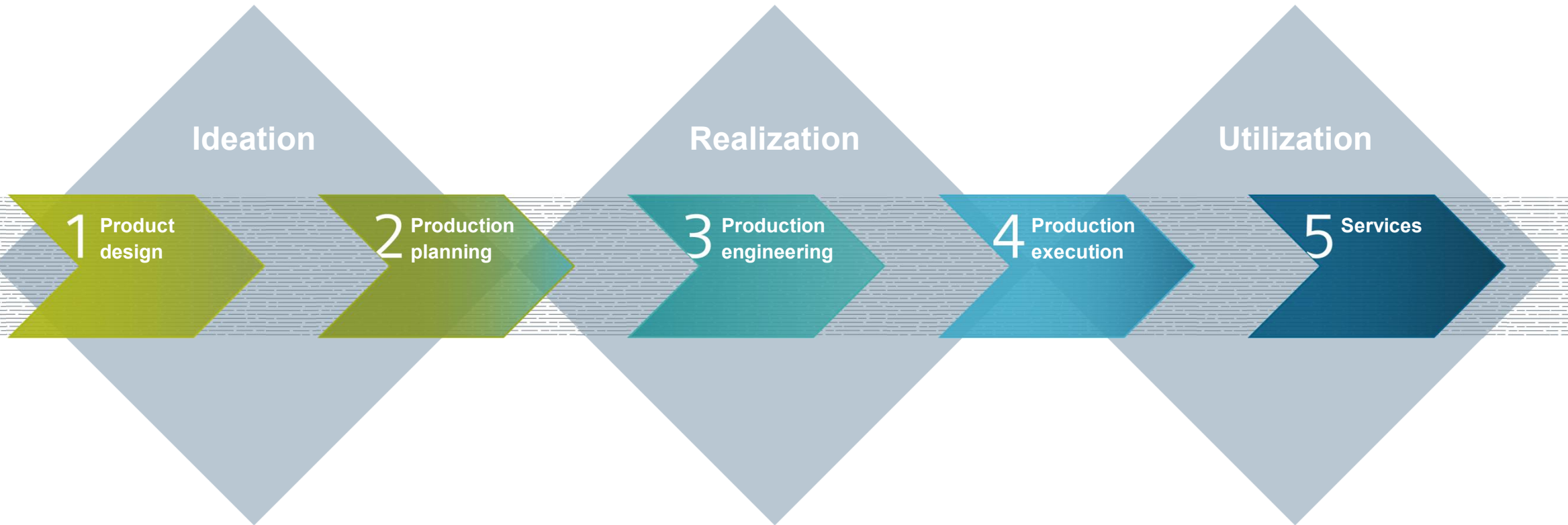
- Cost of the technology, solution
- Uncertainty of success
- Skills of current workforce
- Organizational structure

Engineering

The engineer's usage of time

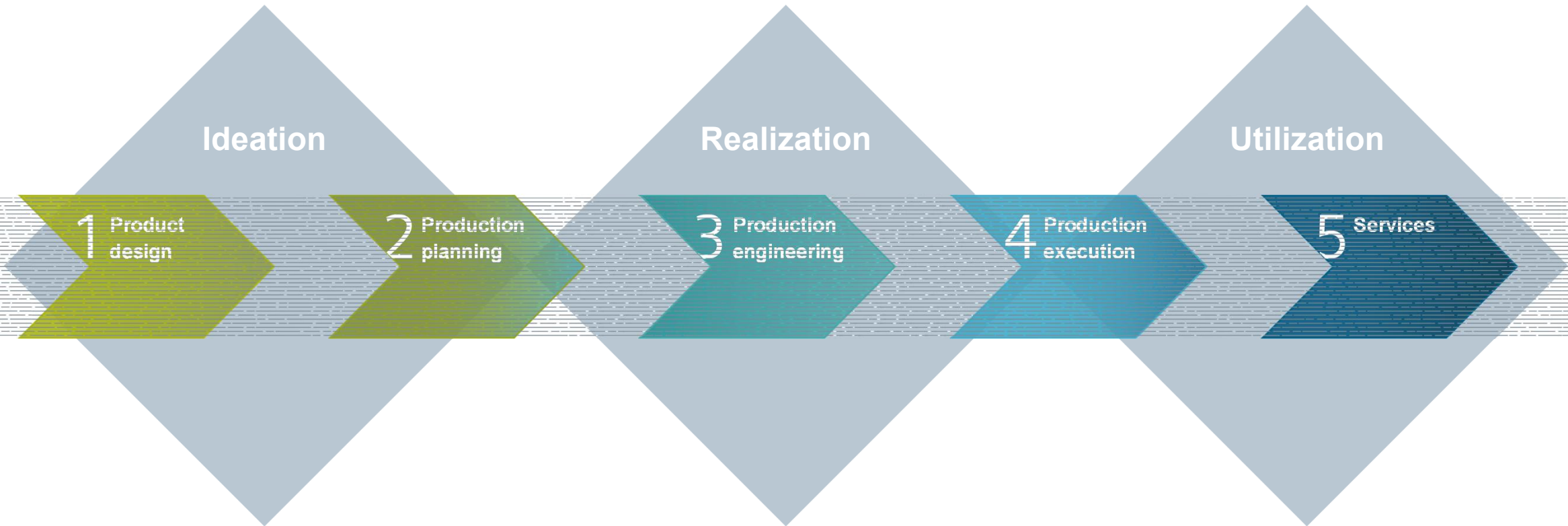


A common digital thread ...



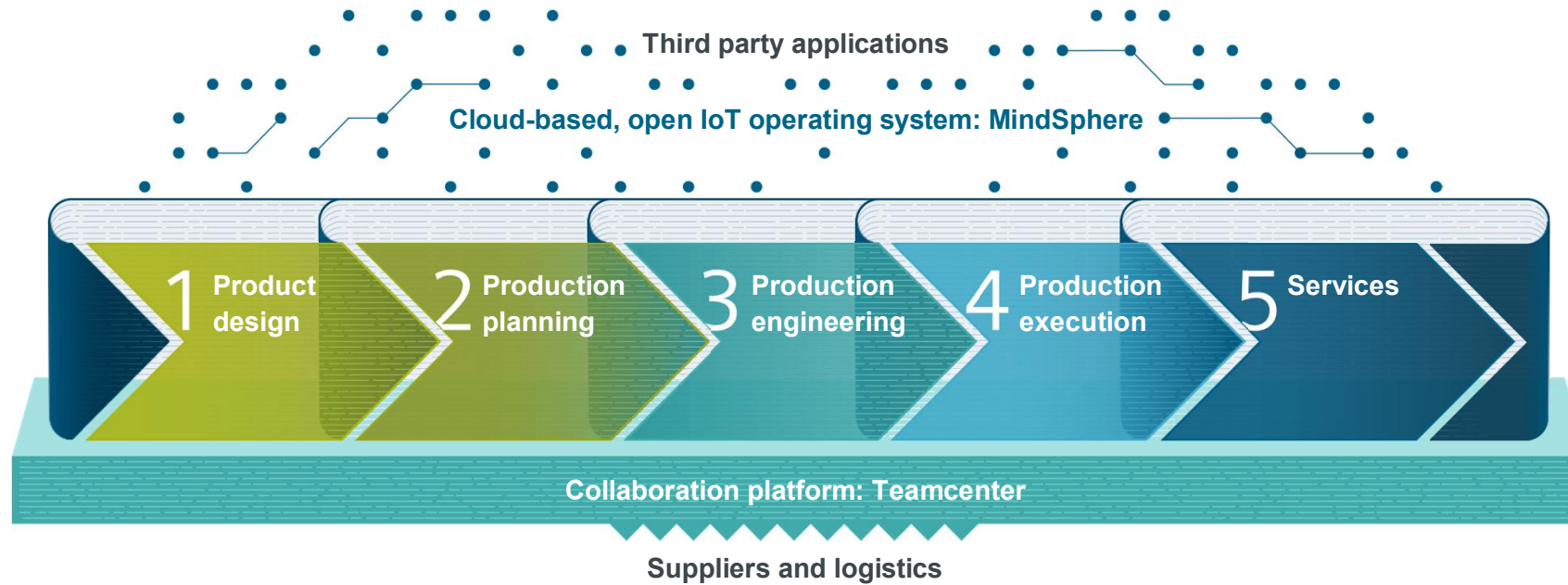
... compresses the innovation lifecycle ...

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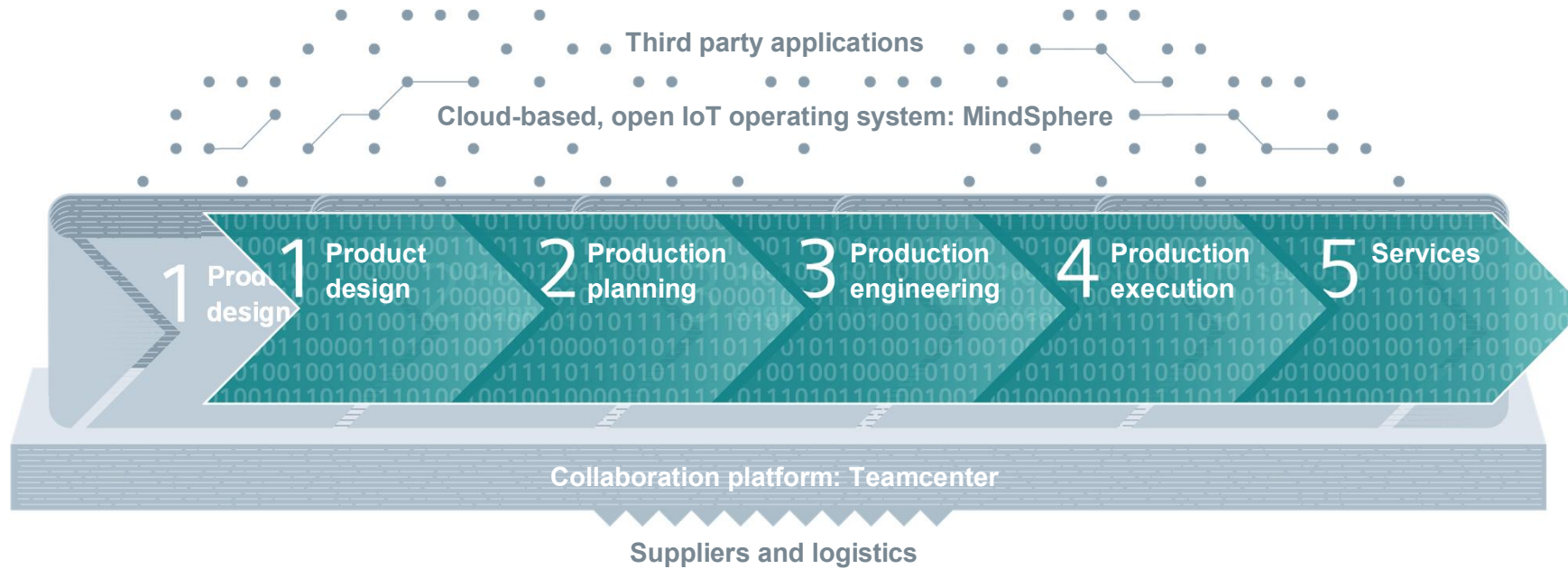
Integrating and digitalizing the entire value chain is key to staying competitive in the future

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Integrating and digitalizing the entire value chain is key to staying competitive in the future

SIEMENS
Ingenuity for life





SPEEDFACTORY

SIEMENS Digital Enterprise Suite

adidas and Siemens set to collaborate in the digital production of sporting goods

Hanover, 2017-Apr-24

adidas and Siemens today announced their intention to collaborate in the digital production of sporting goods. As part of a joint research and development program, the partners will be working to drive forward the digitalization of the adidas SPEEDFACTORY to ultimately develop capabilities for fast, transparent and individualized production.

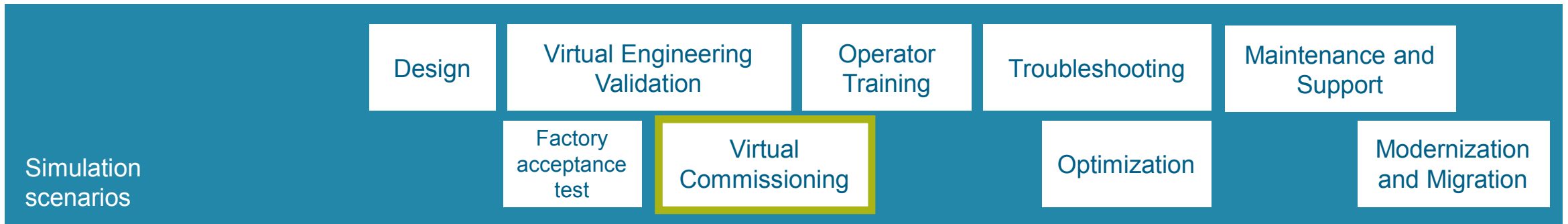
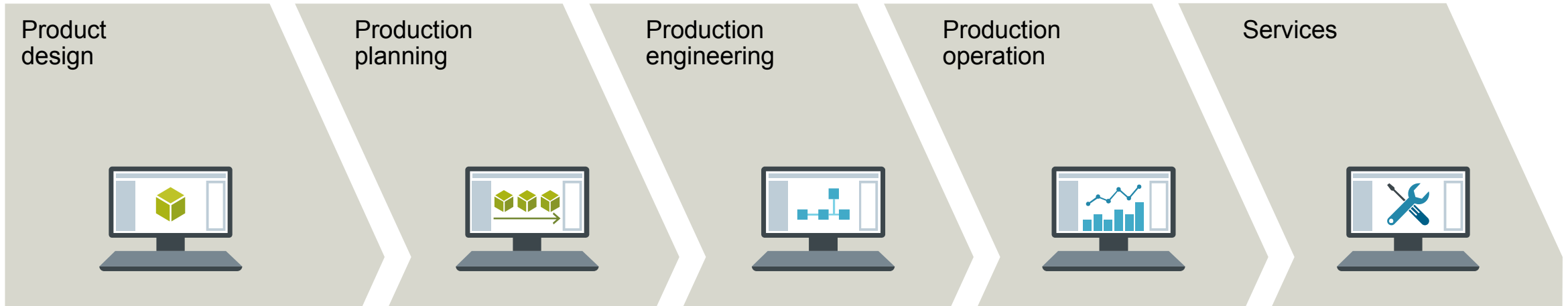




**Who takes part
in the simulation race?**

Simulation Scenarios

MiL – SiL - HiL

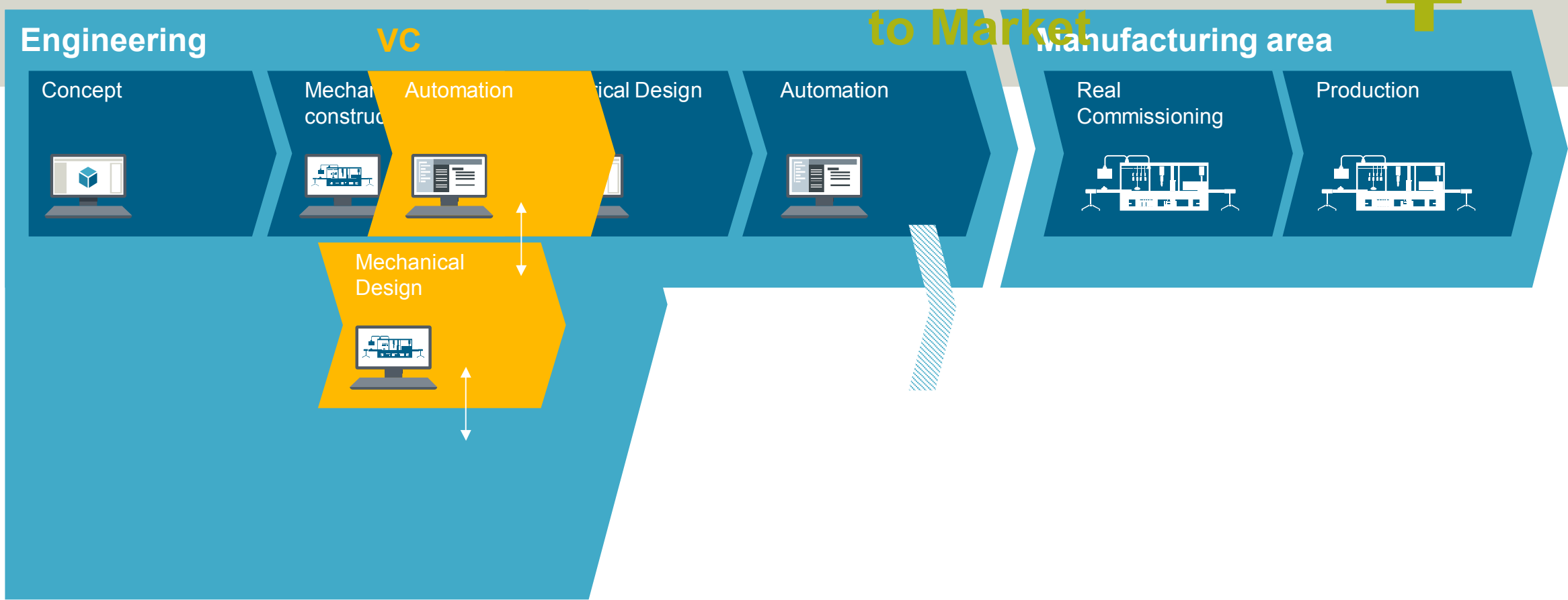


Virtual Commissioning = Importing, testing and modifying planning data in a virtual environment

Virtual Commissioning enables parallel work and thus a shorter time to market

Time to Market

Shorter Time
to Market



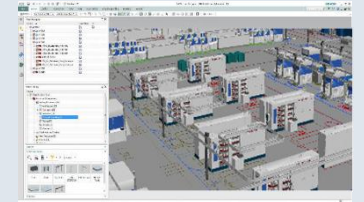
System Engineering Approach

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**Production
Plants**



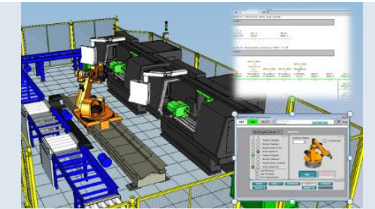
Plant Simulation



**Production
Cells**



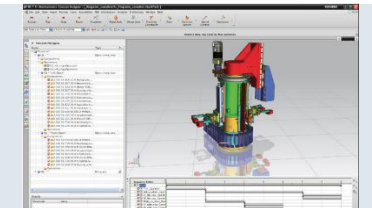
Process Simulate



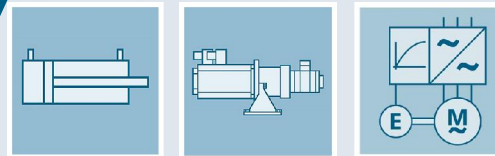
Machines



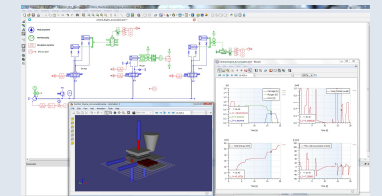
**Mechatronic
Concept Designer**



**Machines
components**



Amesim



System Engineering Approach



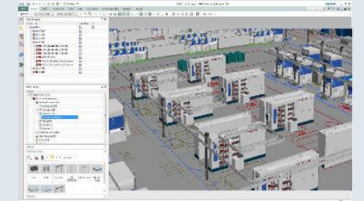
Production Plants

Layout validation

Logistic verification

Throughput verification

Time validation



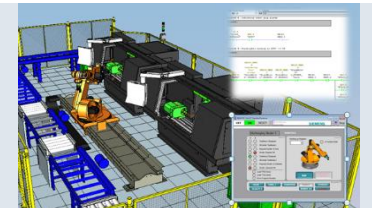
Production Cells

Geometry validation

Kinematic validation

Time validation

Cell Automation



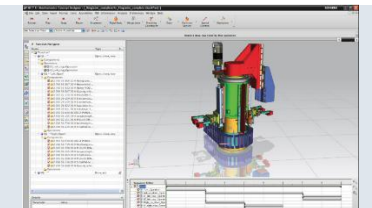
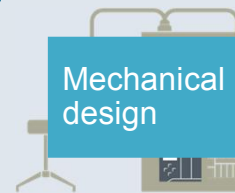
Machines

Mechanical design

Electrical design

Machine Automation

Mechatronic Validation



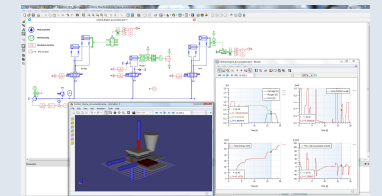
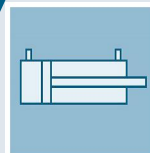
Machines components

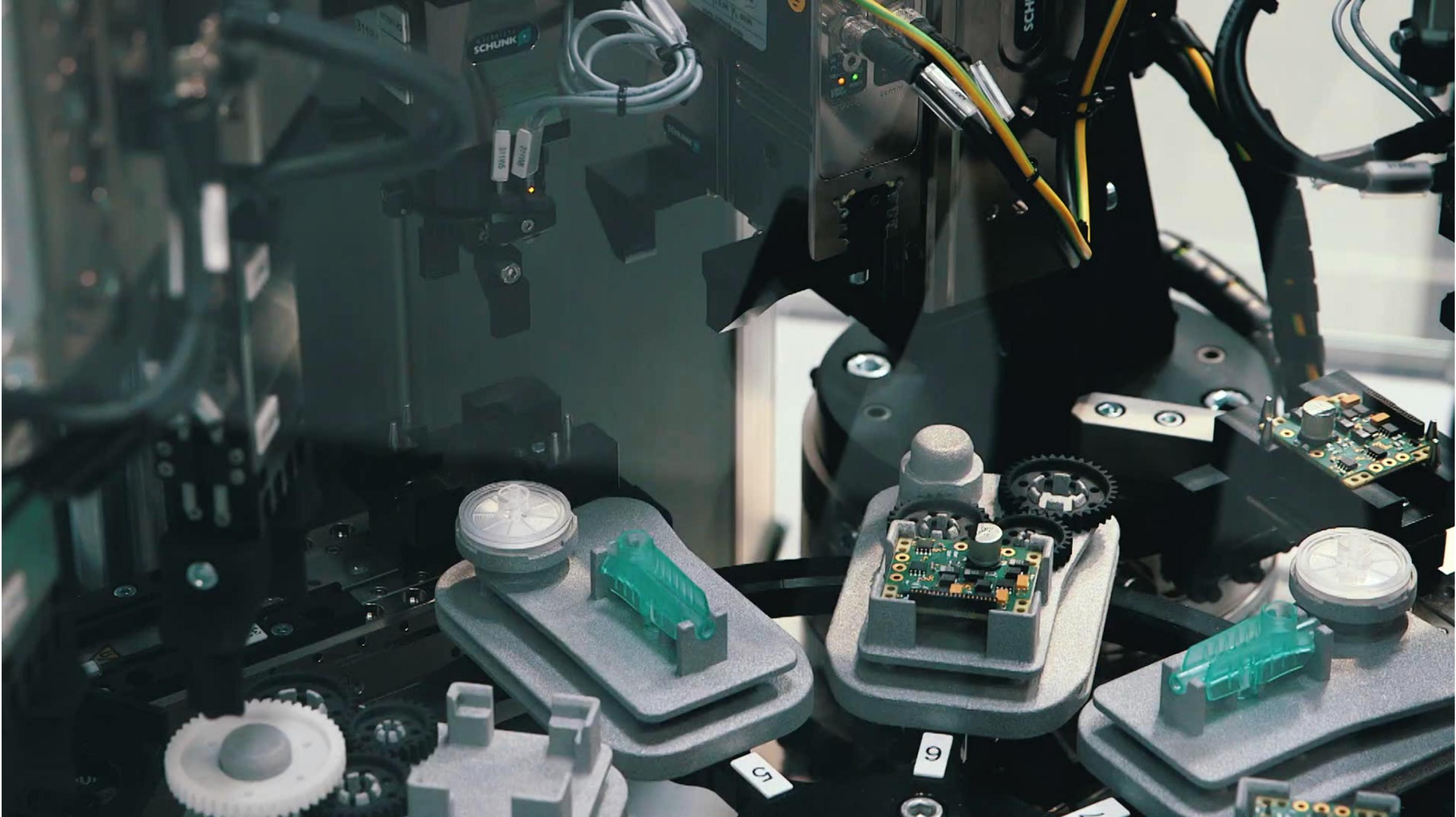
Multiphysics validation

Component sizing

Design optimization

Energy loss tracking





SCHUNK

SWITCH

SWITCH

SCHUNK

5

6

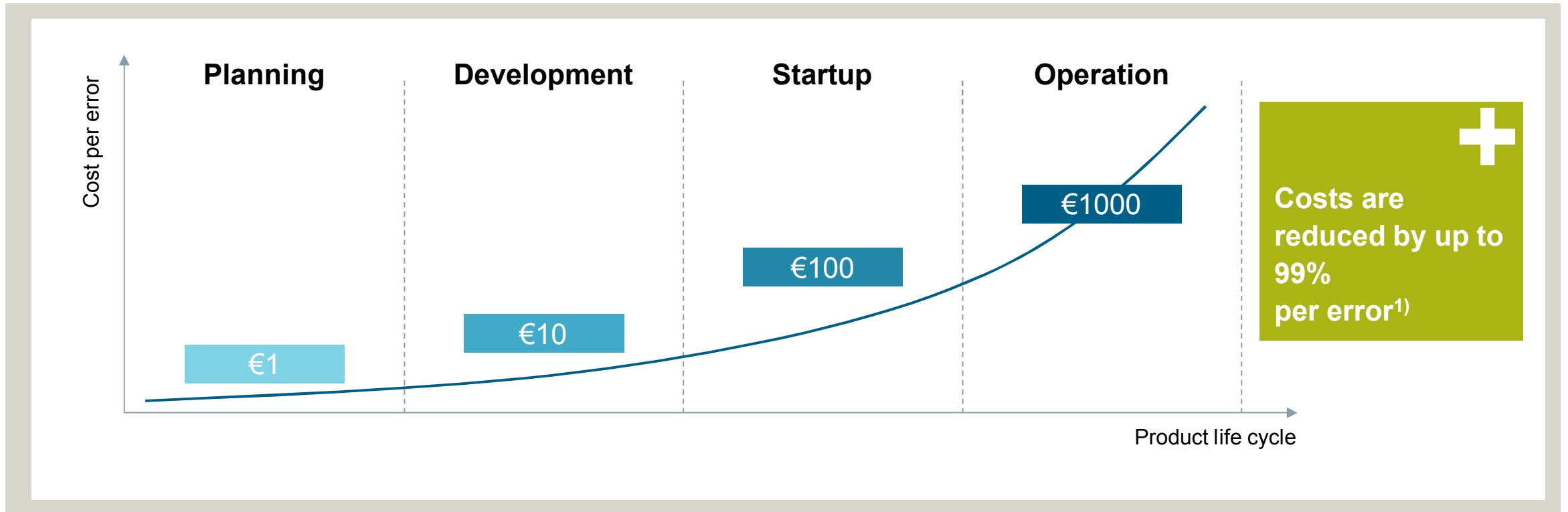
7

8



Find your Bottleneck

Six Sigma - Quality Rule - Rule of tens



Conclusion

The quality of the engineering project must be increased as early as possible in the product life cycle!

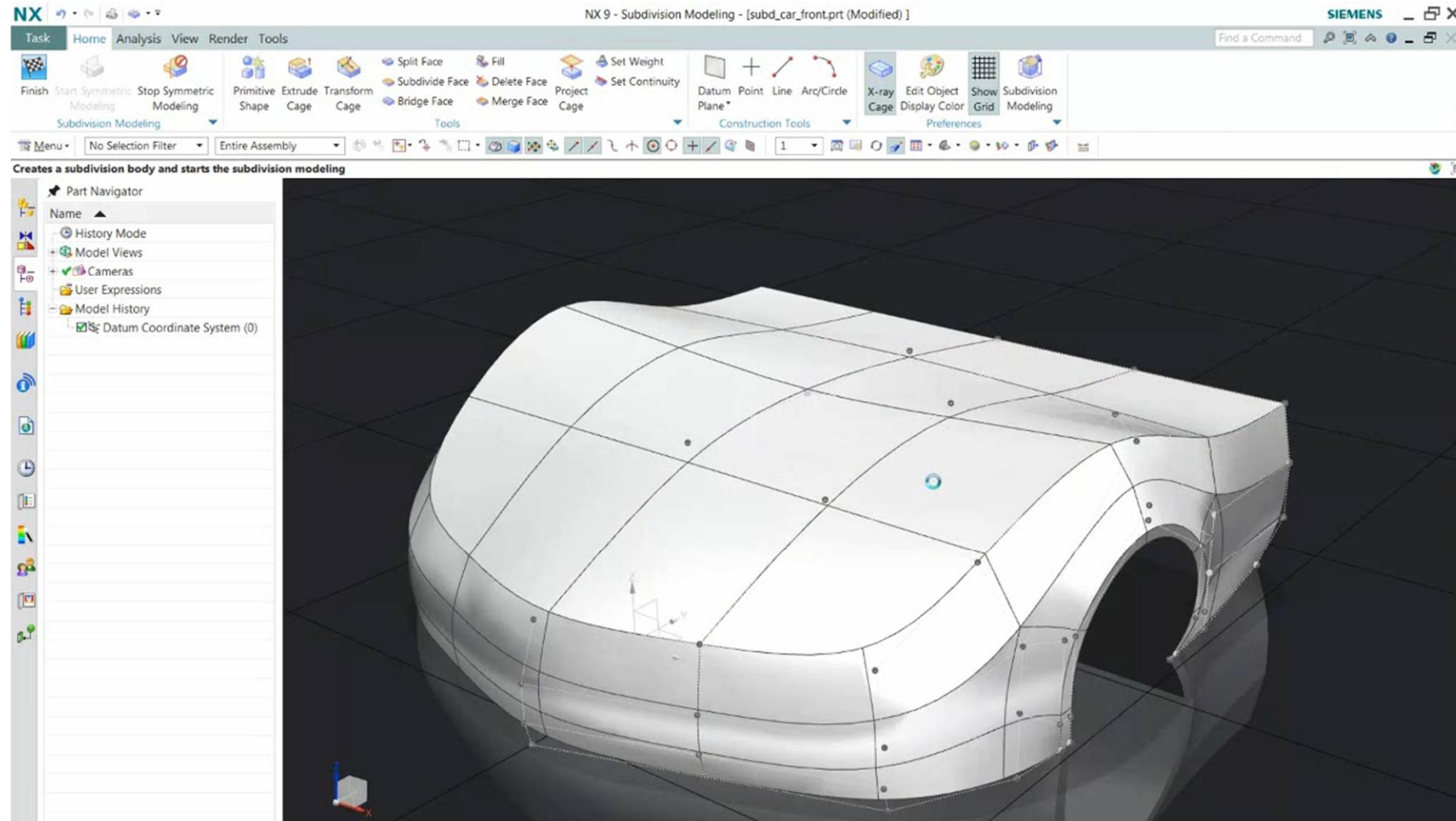
1) This assumes that the error would otherwise not be detected until operation

Product design : CAD



Design
the product

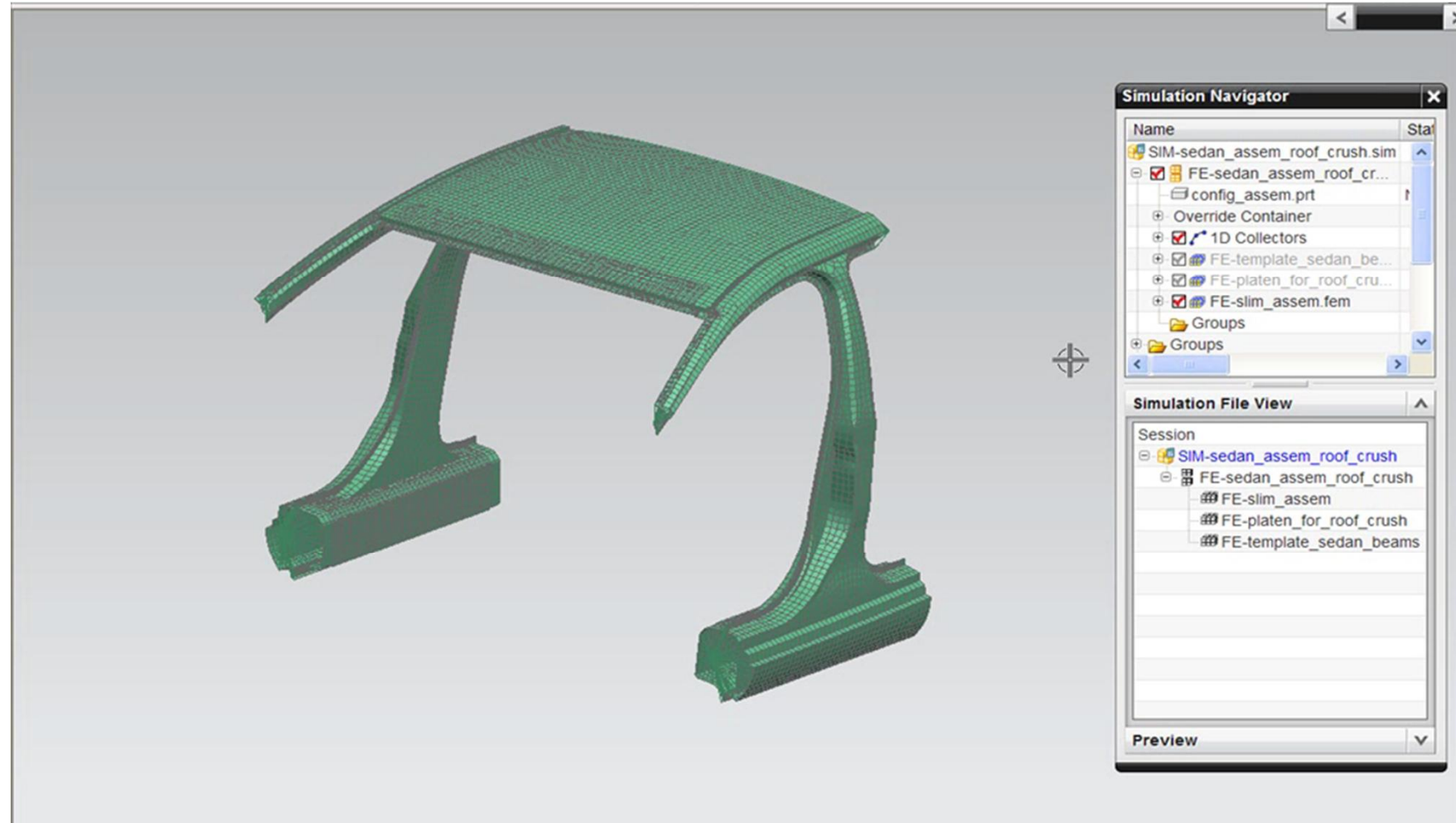
NX CAD



Product design : CAE

Simulate
the physical
behavior

Simcenter

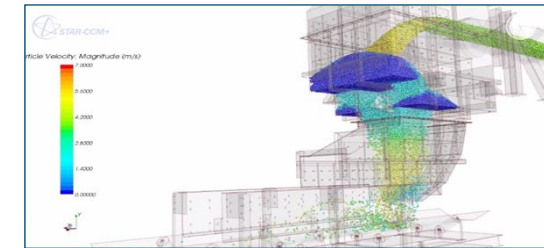
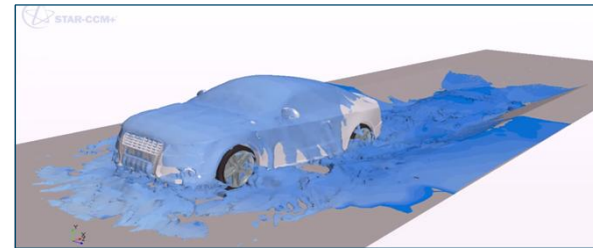
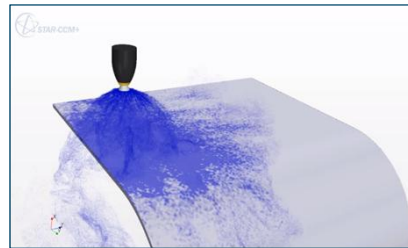
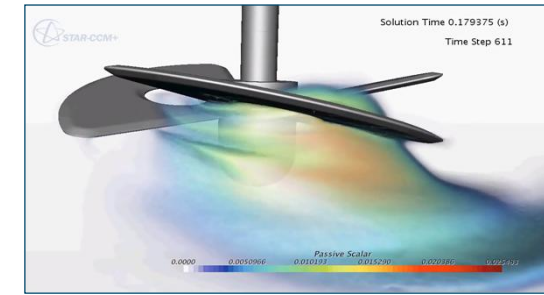
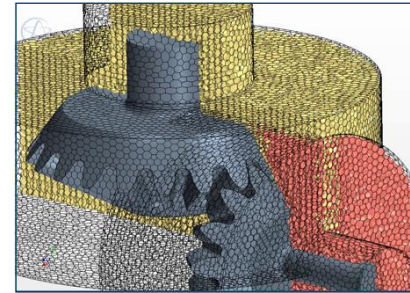
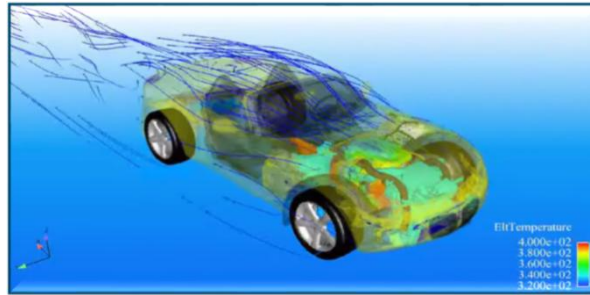


Predictive Engineering Analytics

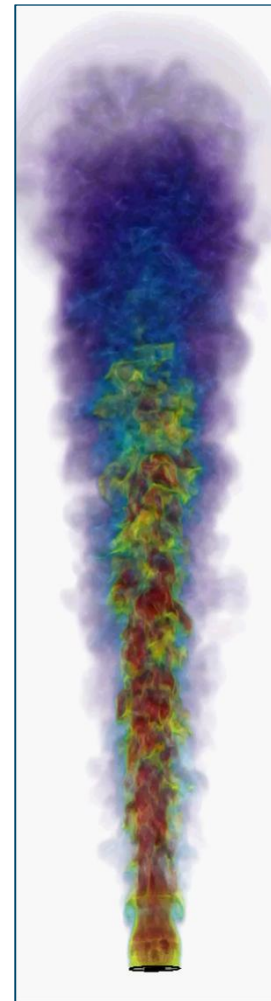
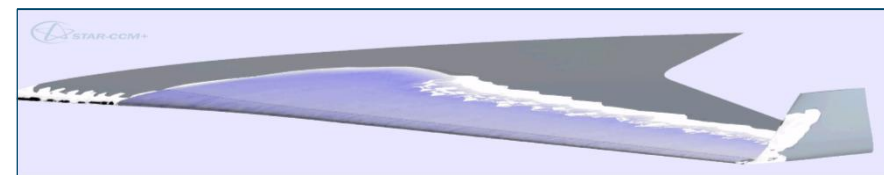
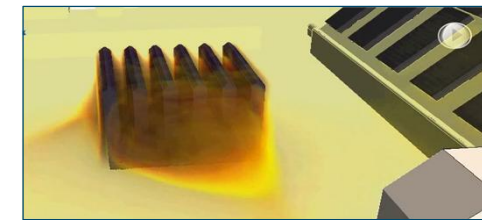
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Simulate
the product

Simcenter

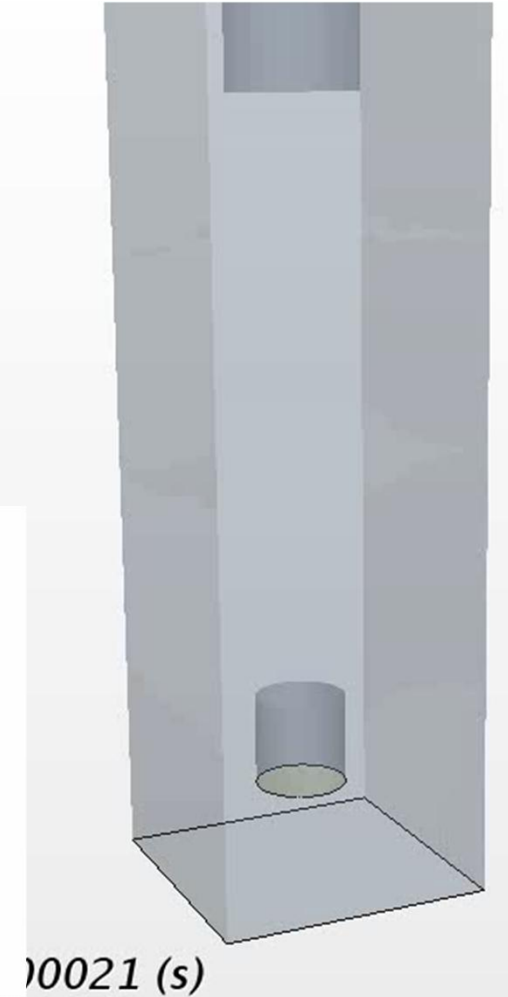
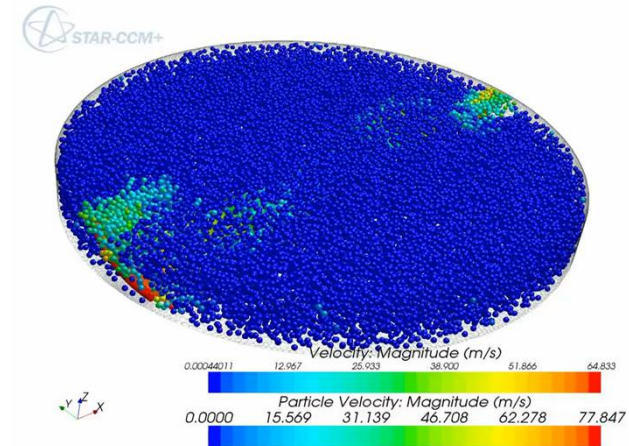
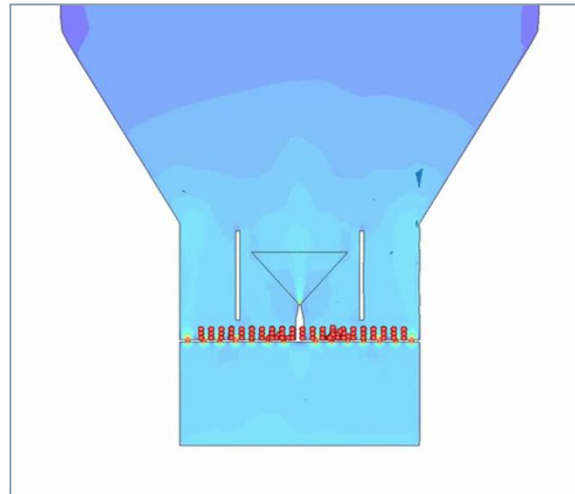
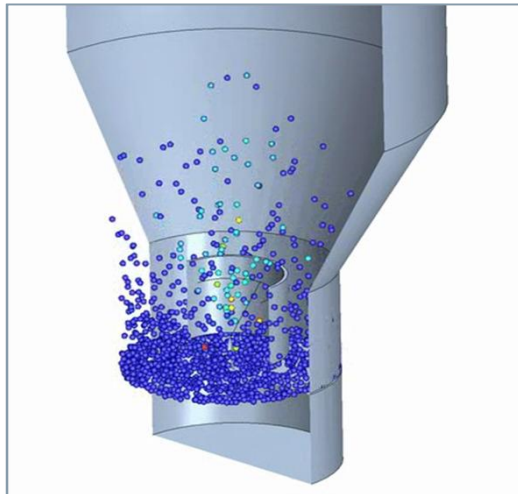
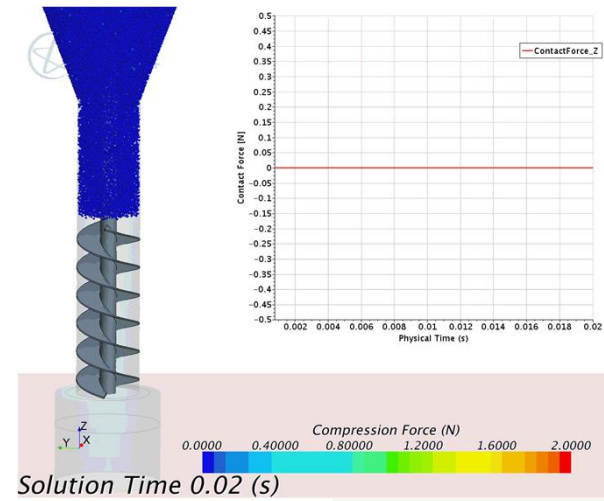
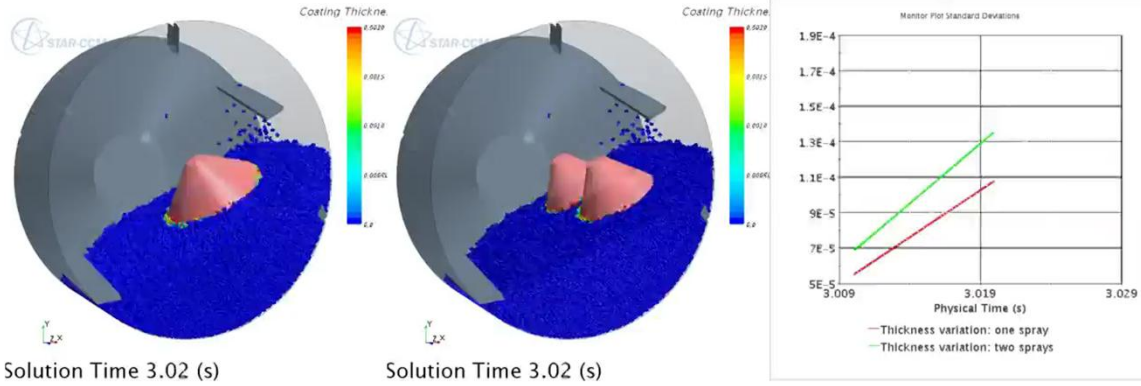


Multiphysics



- 1
- 2
- 3
- 4
- 5

Coating & Drying & Screw Press & Expellers

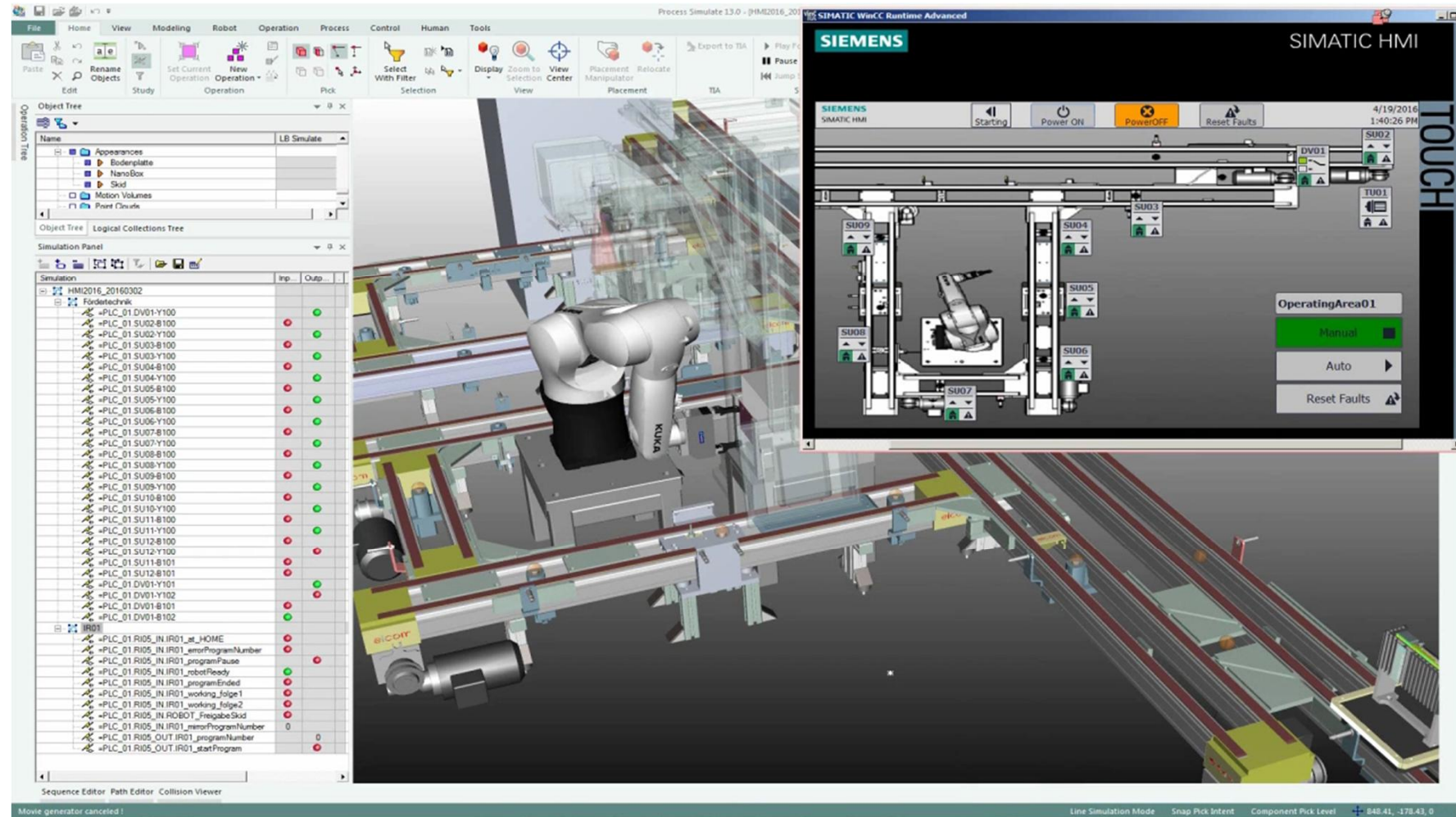


Extending the Digital Twin to cover plant and process



Code validation
by Virtual
Commissioning

TIA Portal

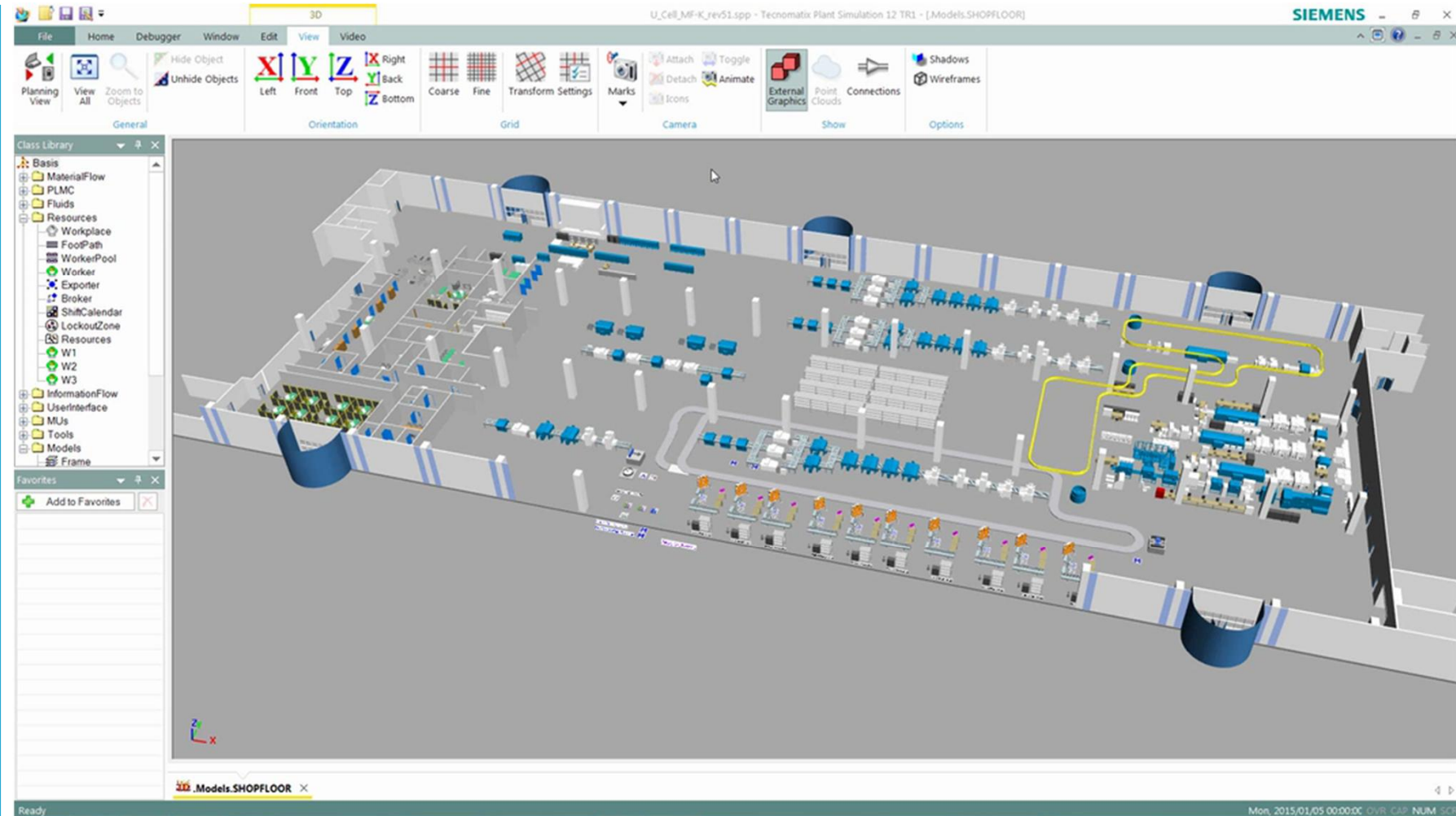


Extending the Digital Twin to cover plant and process



Simulate
Material &
Logistic Flow

Plant Simulate

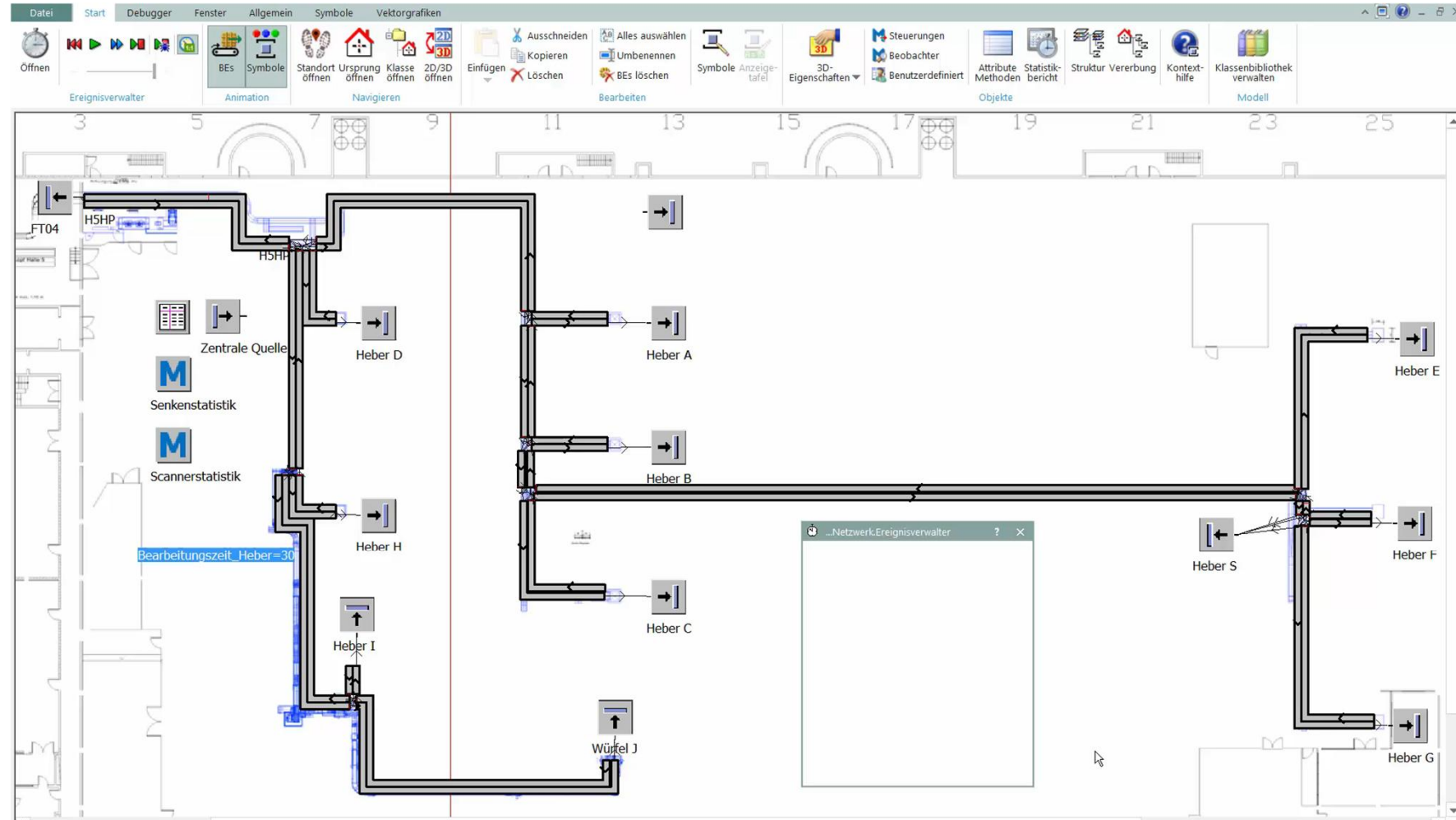


Extending the Digital Twin to cover plant and process



Simulate
Material &
Logistic Flow

Plant Simulate

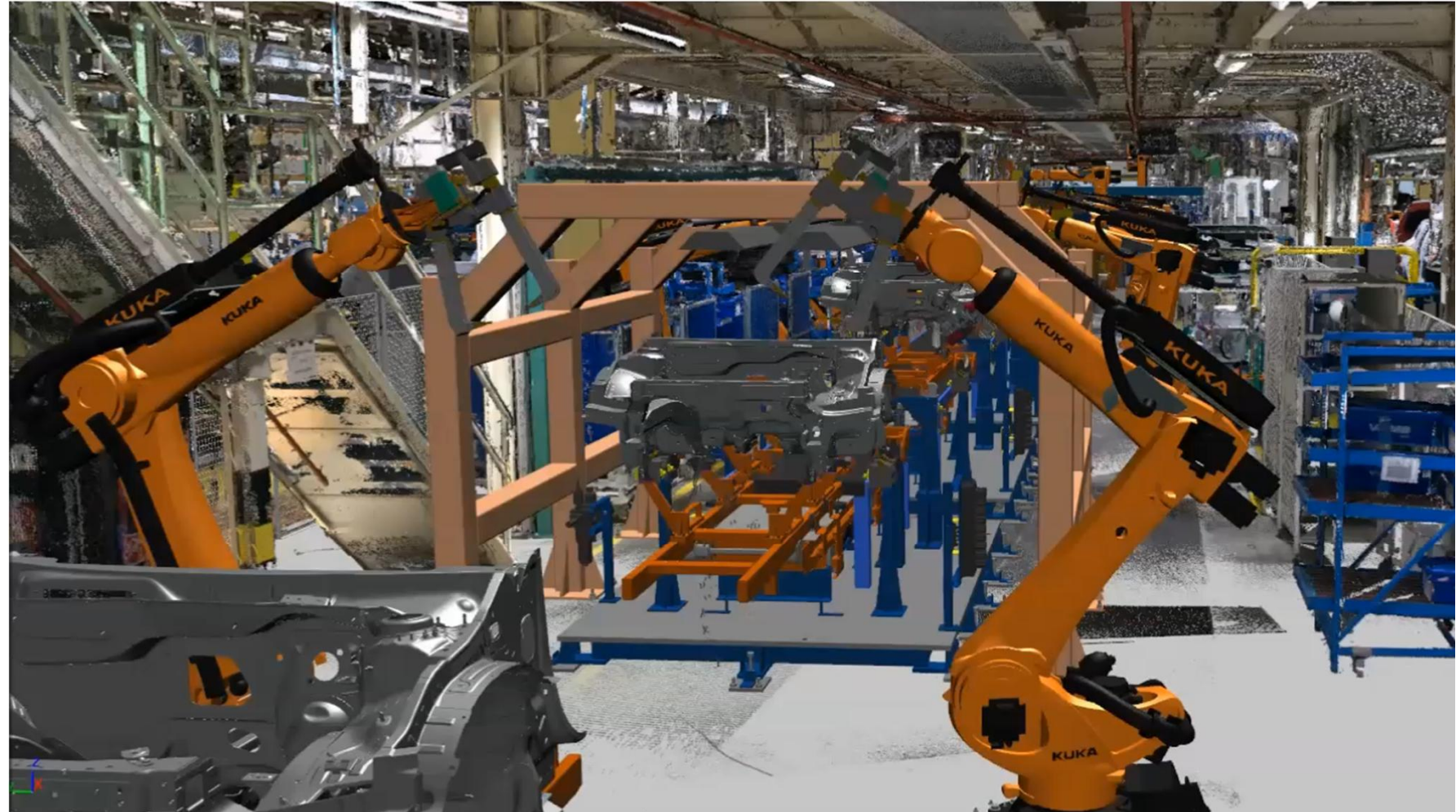


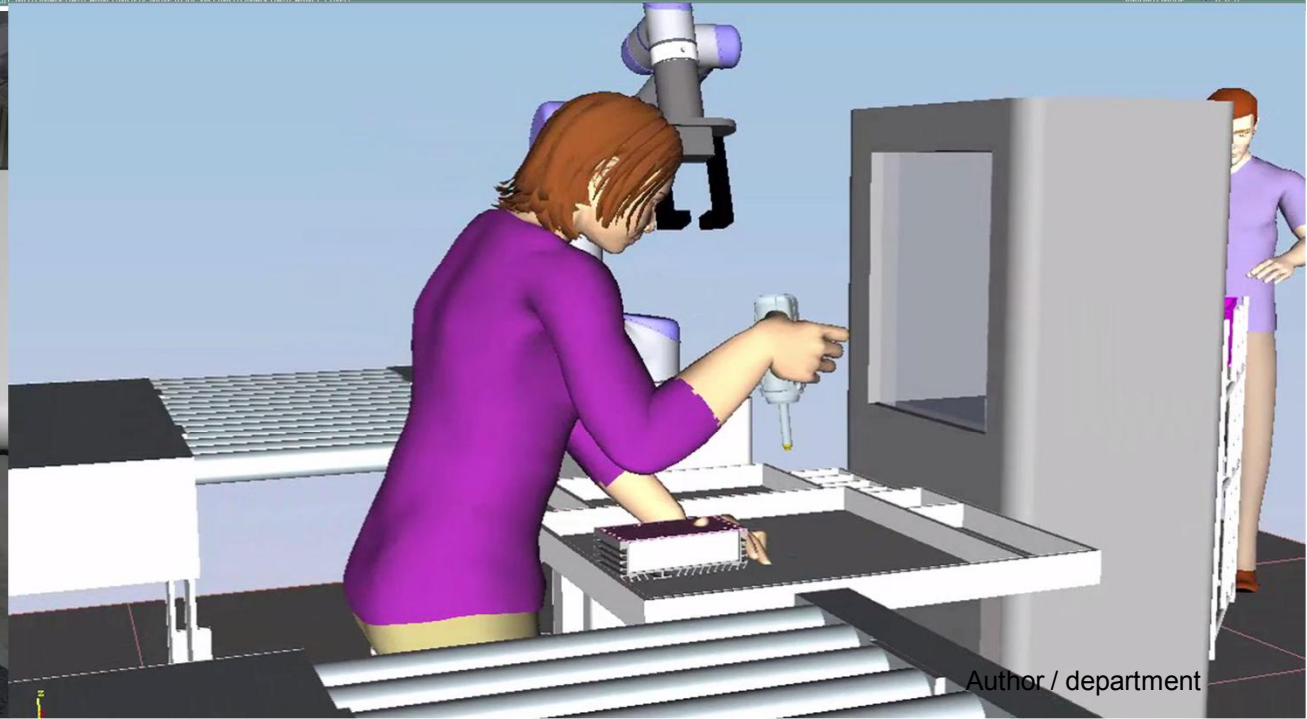
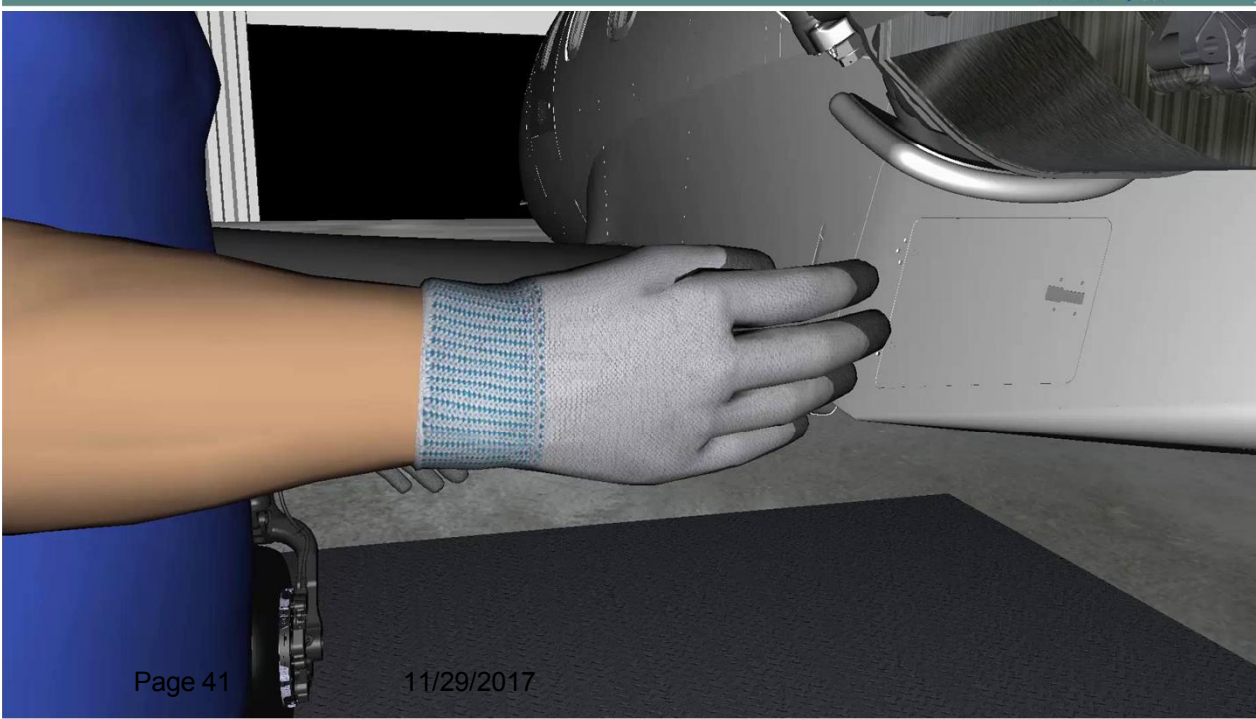
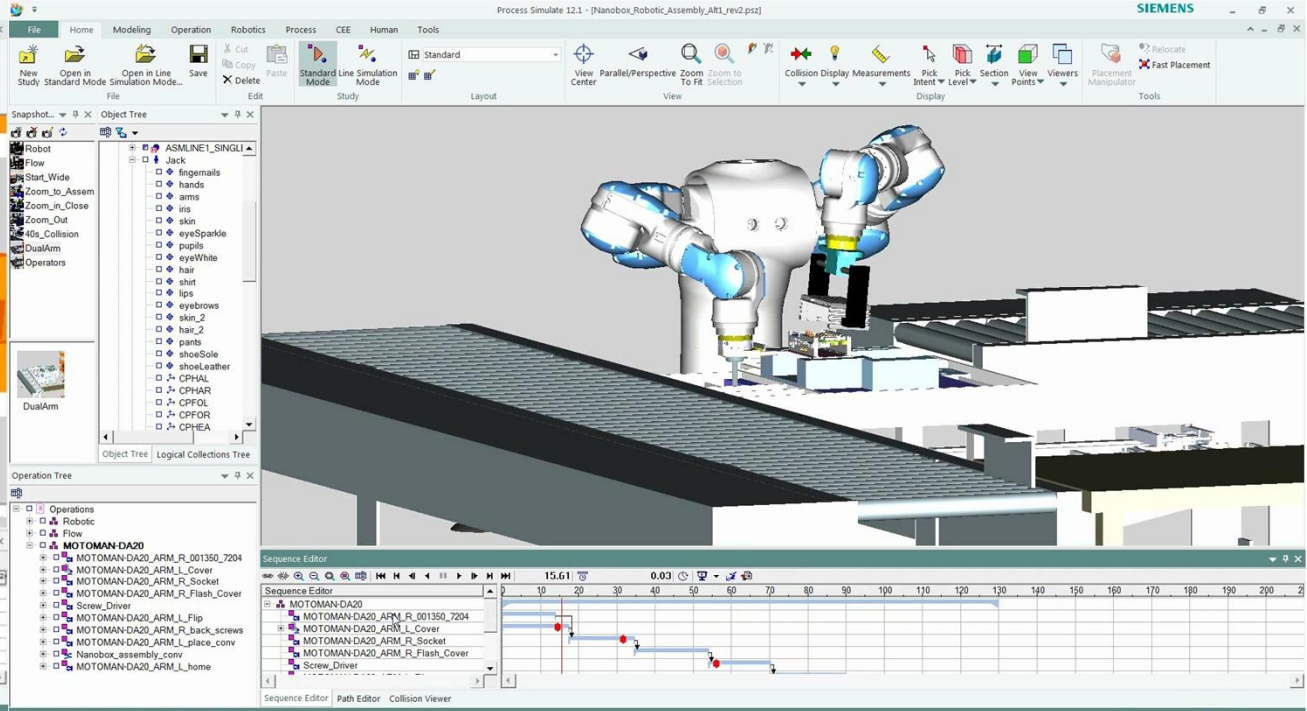
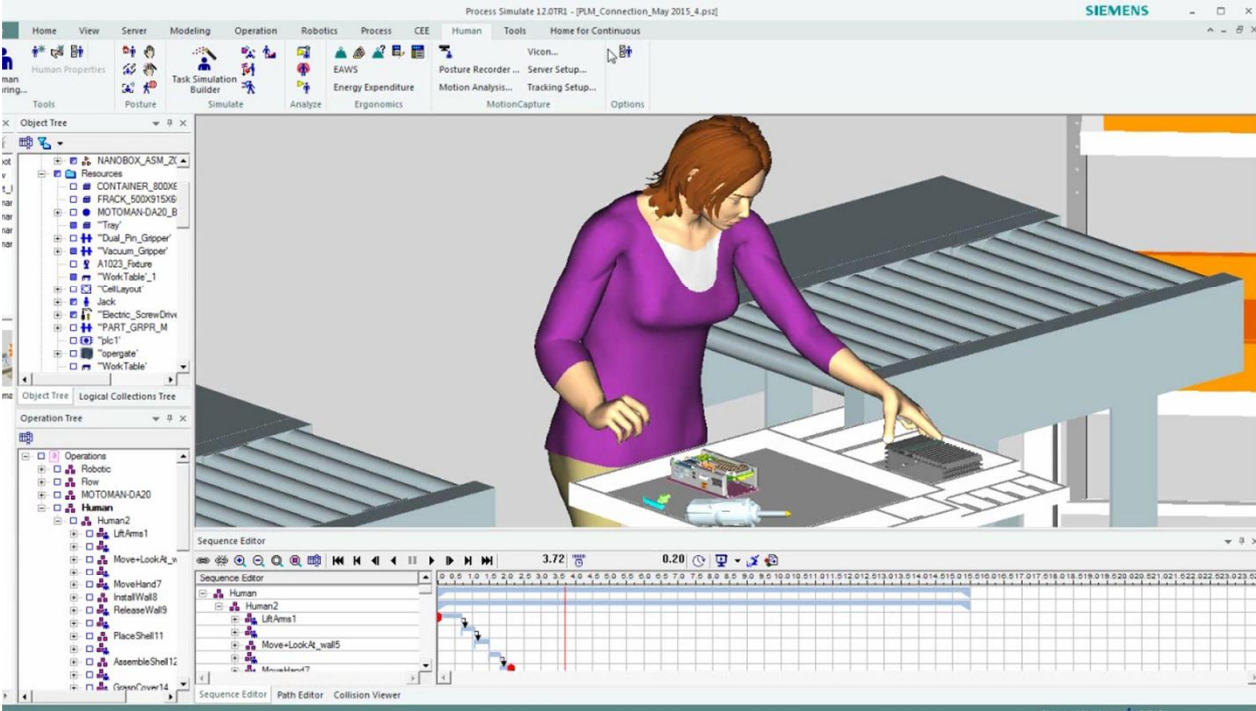
Robotics & Collaboration


Extending the Digital Twin to cover plant and process

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Simulate &
Program
Robotics
Process Simulate







Teleport supports elevation change, jumping to the roof or going down below zero level

Performance Engineering

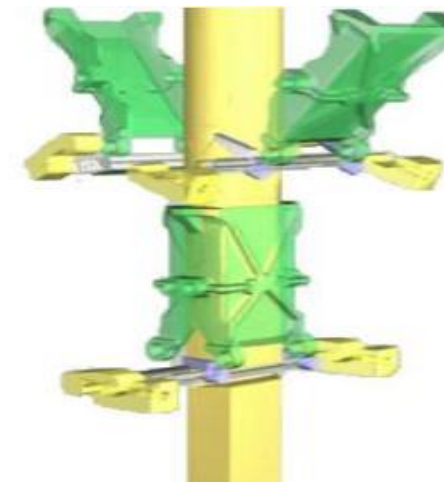
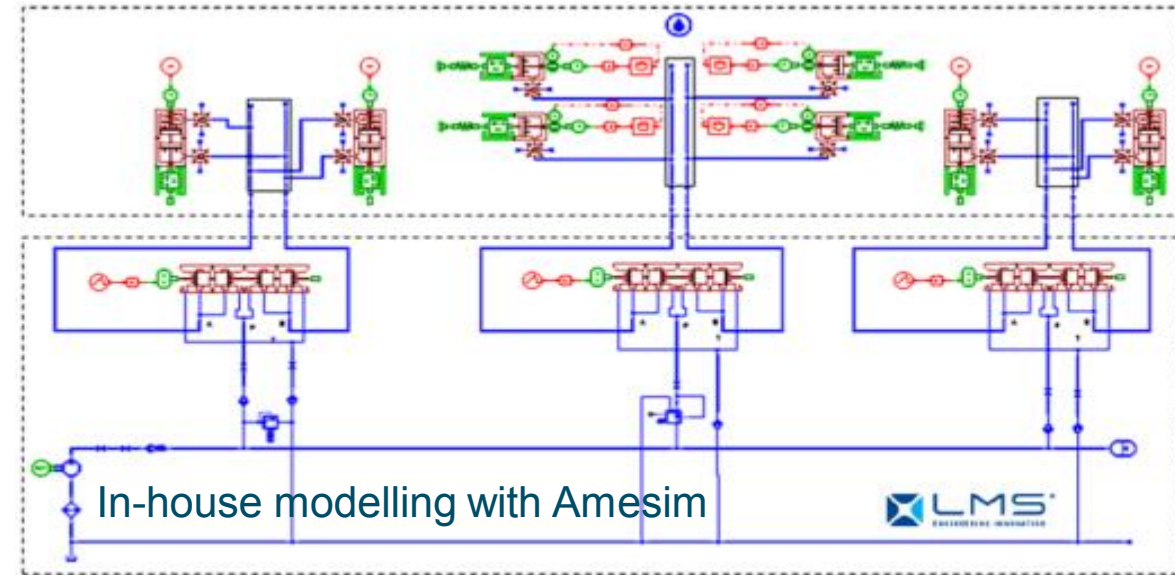
Digital Performance Twin – 1D Simulation @ Tetra Pak



Small change in valve-actuation layout
→ higher production rate
from 6000 towards 10000 p/h

Different pump characteristics
→ lower energy consumption

+66%
increase in
productivity



Jaw system
(shaping, sealing
and cutting
phase)

Operator Guidance



SIEMENS SIMATIC IT Discrete Industry

Equipment: STM

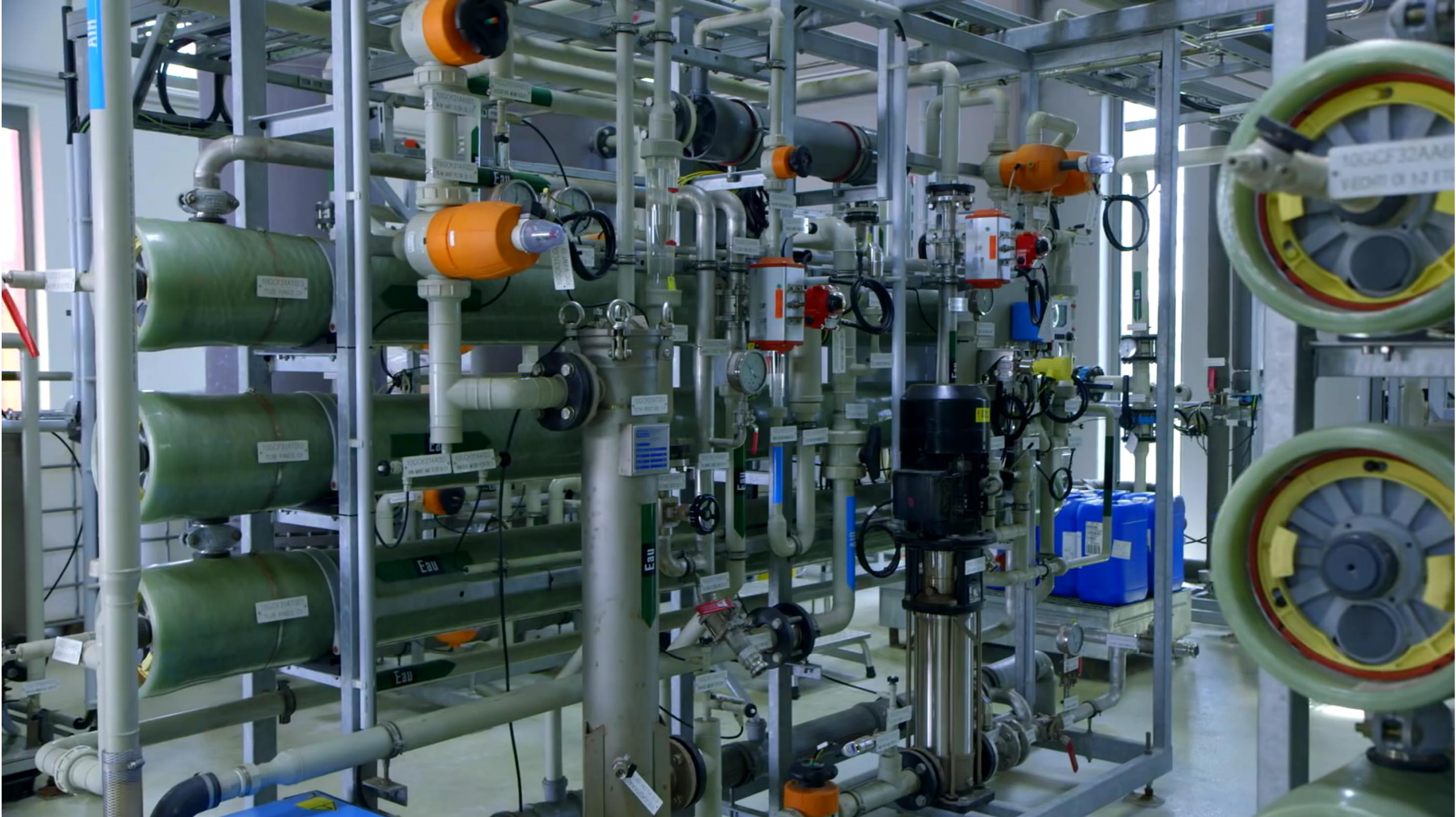
Work Order: 2019102201

Equipment	Tool Name	Material	Quantity	Unit
01	010010	010010	1	PC
02	020010	020010	1	PC
03	030010	030010	1	PC
04	040010	040010	1	PC
05	050010	050010	1	PC
06	060010	060010	1	PC
07	070010	070010	1	PC
08	080010	080010	1	PC
09	090010	090010	1	PC
10	100010	100010	1	PC

Check all are pr

Data essential





Additive Manufacturing

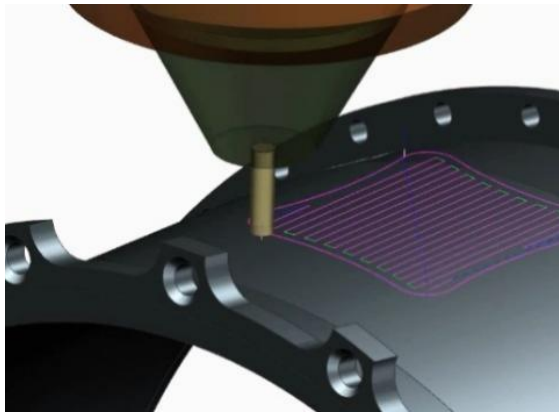
Poll n° 2:

What is the age of 3D printing?

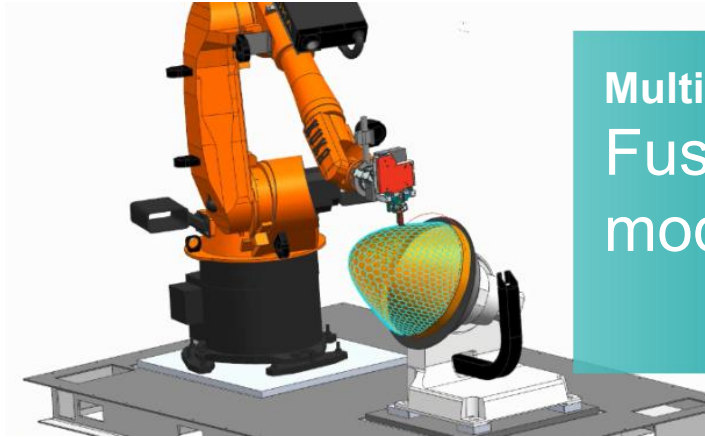
- Between 2 and 8 years
- Between 8 and 15 years
- Between 15 and 30 years
- Older than 30 years

Software defines the applications

Major 3D printing technologies supported in one system



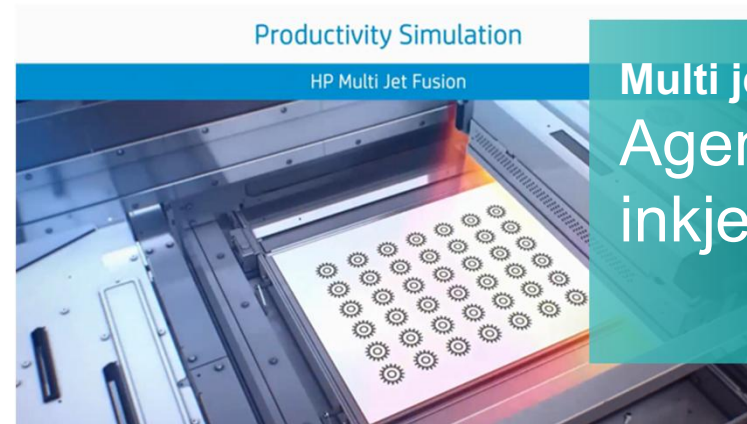
Hybrid additive
Directed energy
deposition



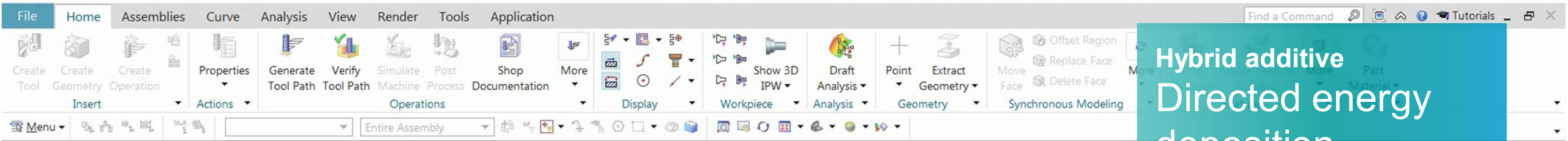
Multi-axis
Fused deposition
modeling



Powder bed fusion
Laser material
fusion



Multi jet fusion
Agent jetting/
inkjet technology



Hybrid additive
Directed energy
deposition

Planar Additive Spiral - [SPIRAL_AM_FEA...]

Path Settings

Method: METHOD

Slicing and Pattern

Layer Thickness: 1.0000 mm

Path Overhang: 0.0000 %Tool

Maximum Stepover: 50.0000 %Tool

Level to Level: Revolve Angle

Revolve Angle: 360.0000

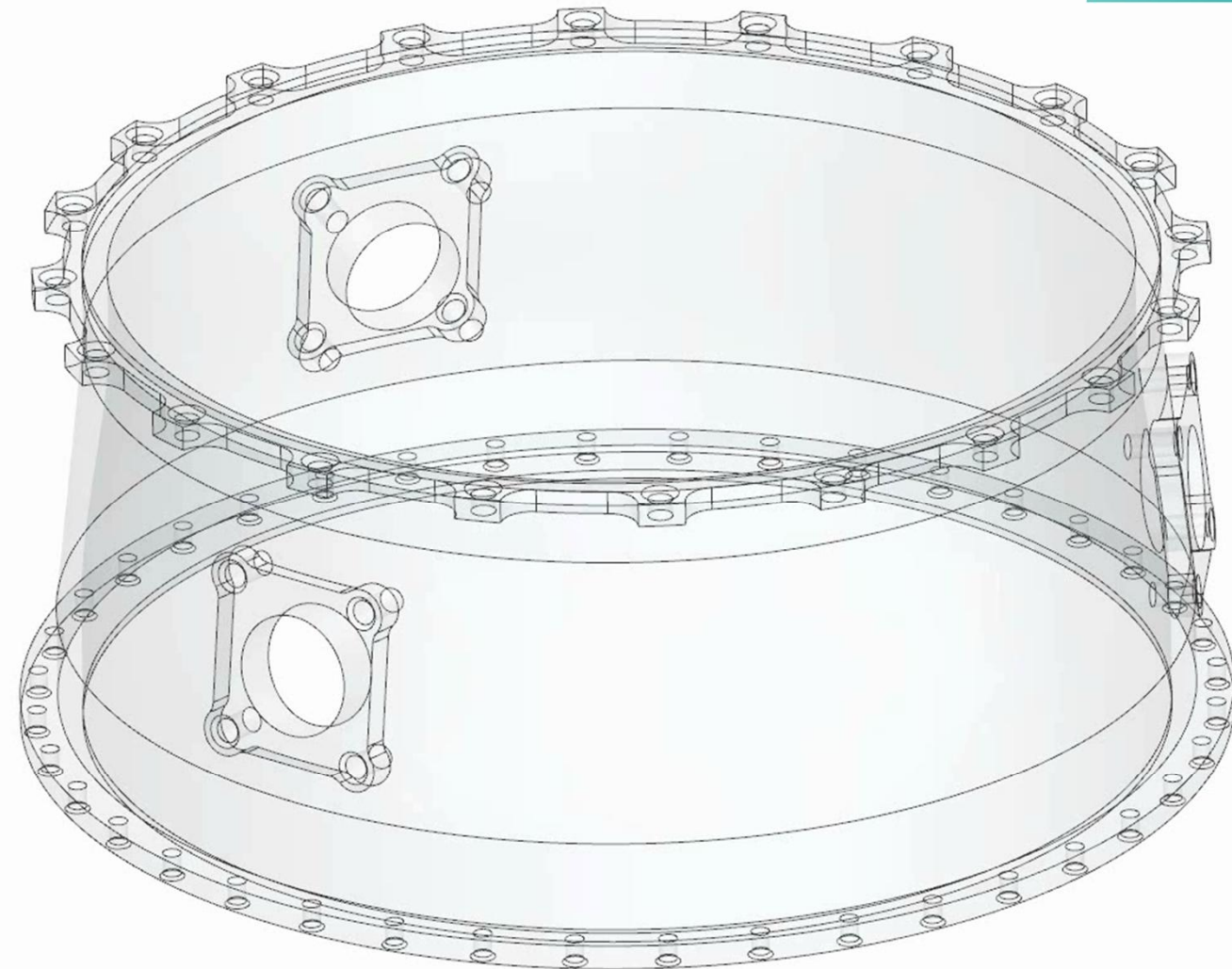
Finish Passes on Region: All

Non Cutting Moves

Feeds and Speeds

Actions

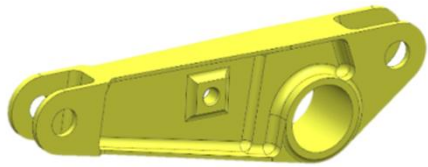
OK Cancel



DMG MORI

Reimagining design, production and service for greater business value

Original design



Final part



Generative design

Topology optimization

Light weighting*

Adapt design
Convergent Modeling™

Connecting a digital thread across the complete product lifecycle

15% reduction in weight (up to 30%)

Equal or greater strength

Less material waste

On-demand availability

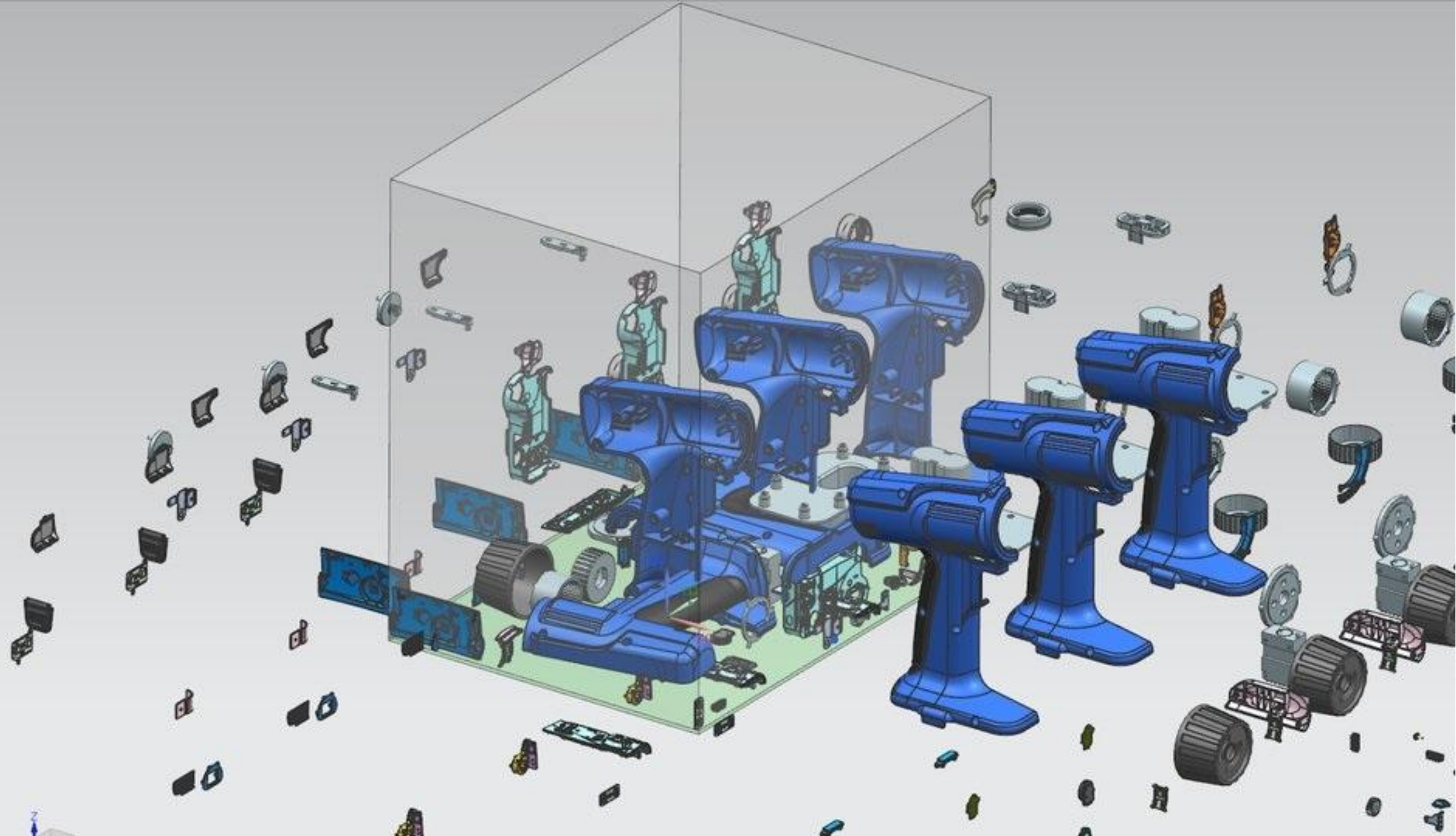
Validate
Inc. process simulation

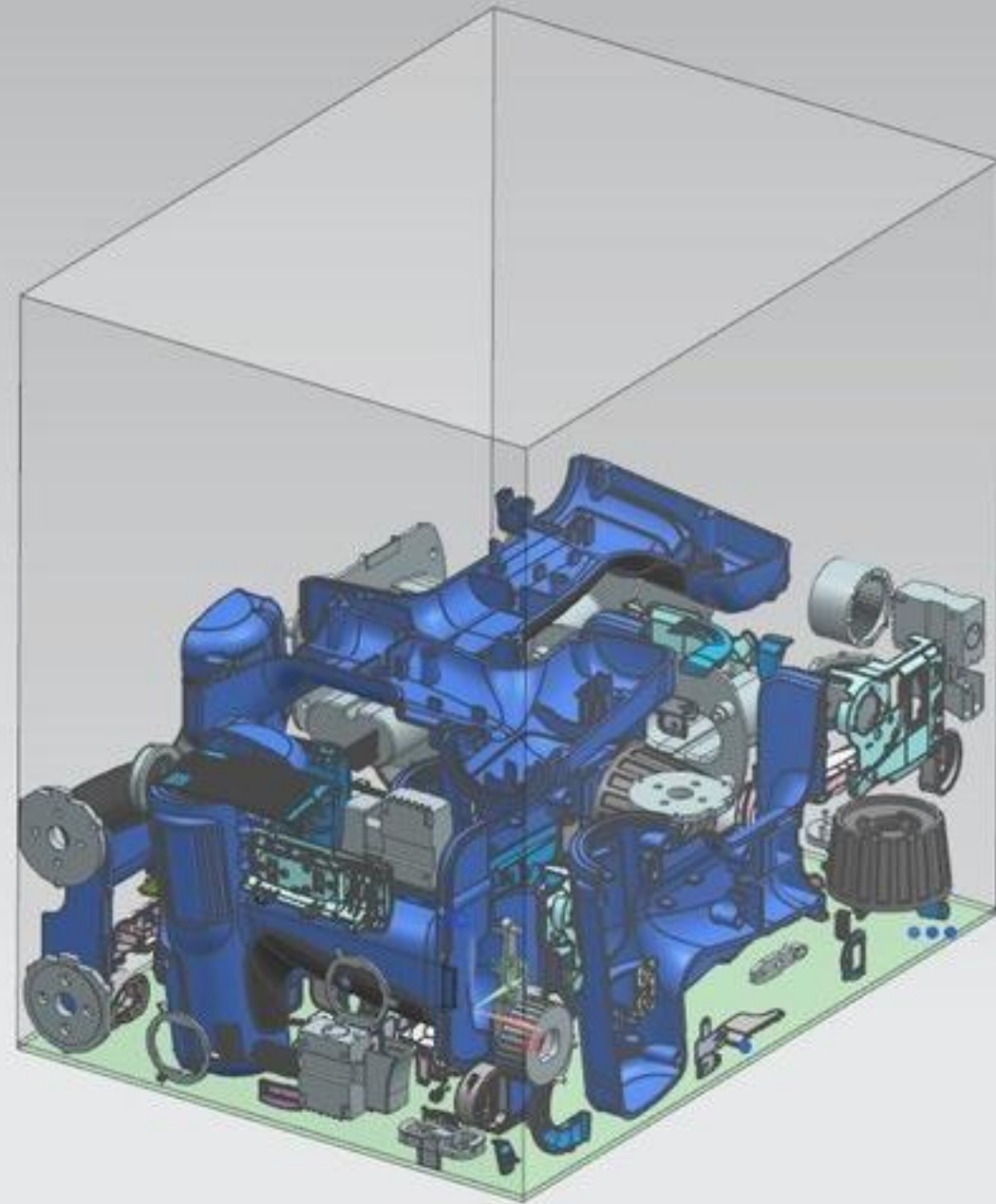
Post processing
and inspection

Slicing, hatching
printing*

Prepare for
printing*

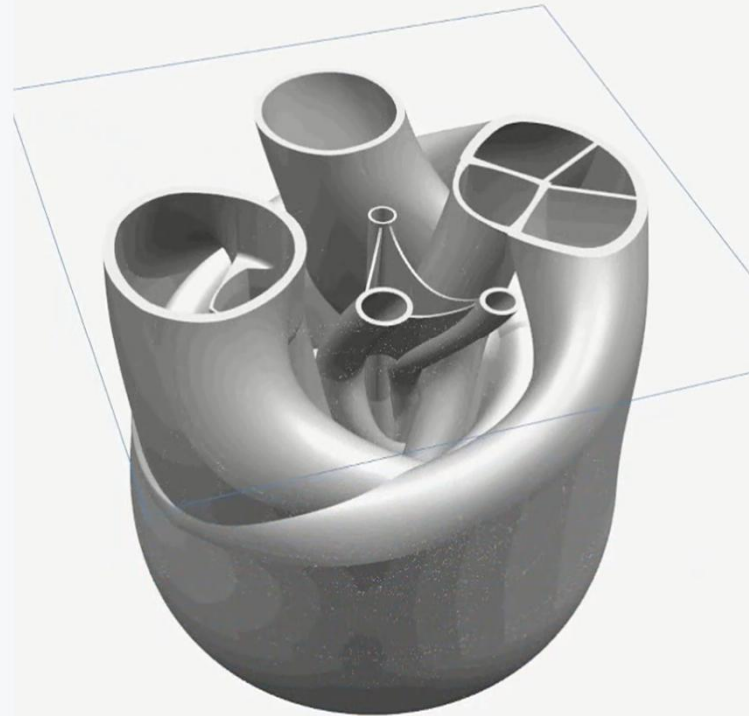
* Powered by Materialise





Generative design

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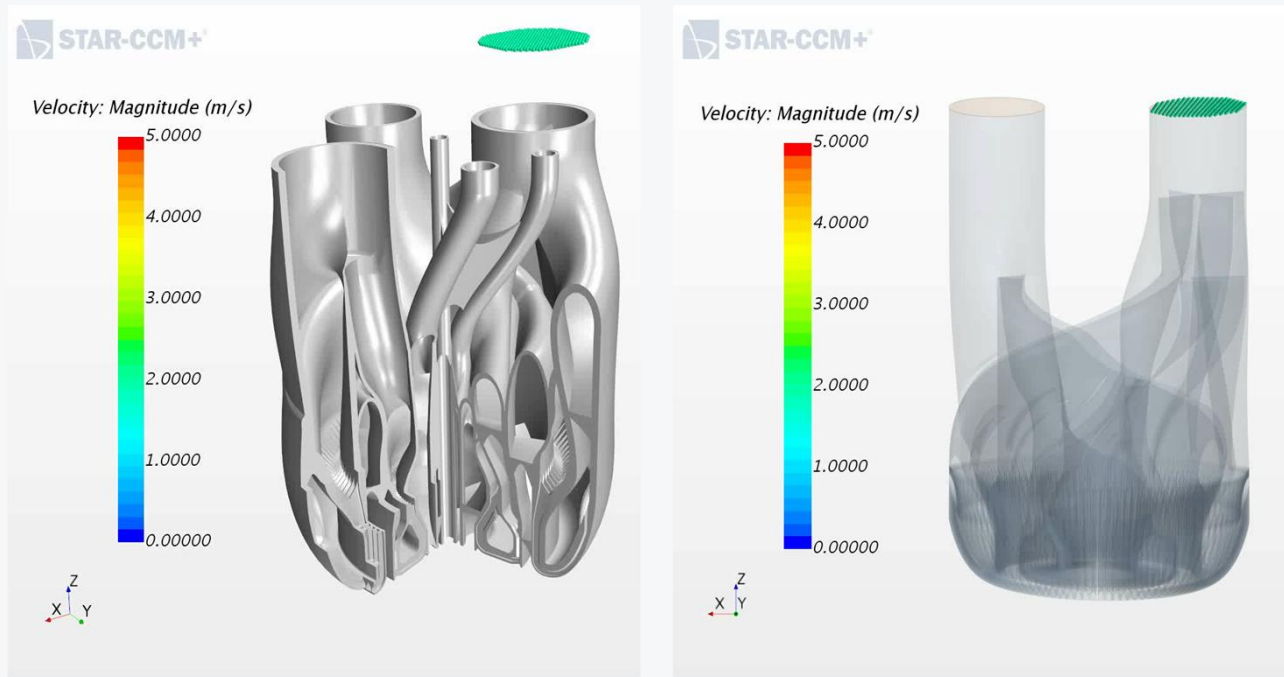


- Set the conditions
- Run the simulation
- Iterate, iterate and iterate again
- Get your optimized design

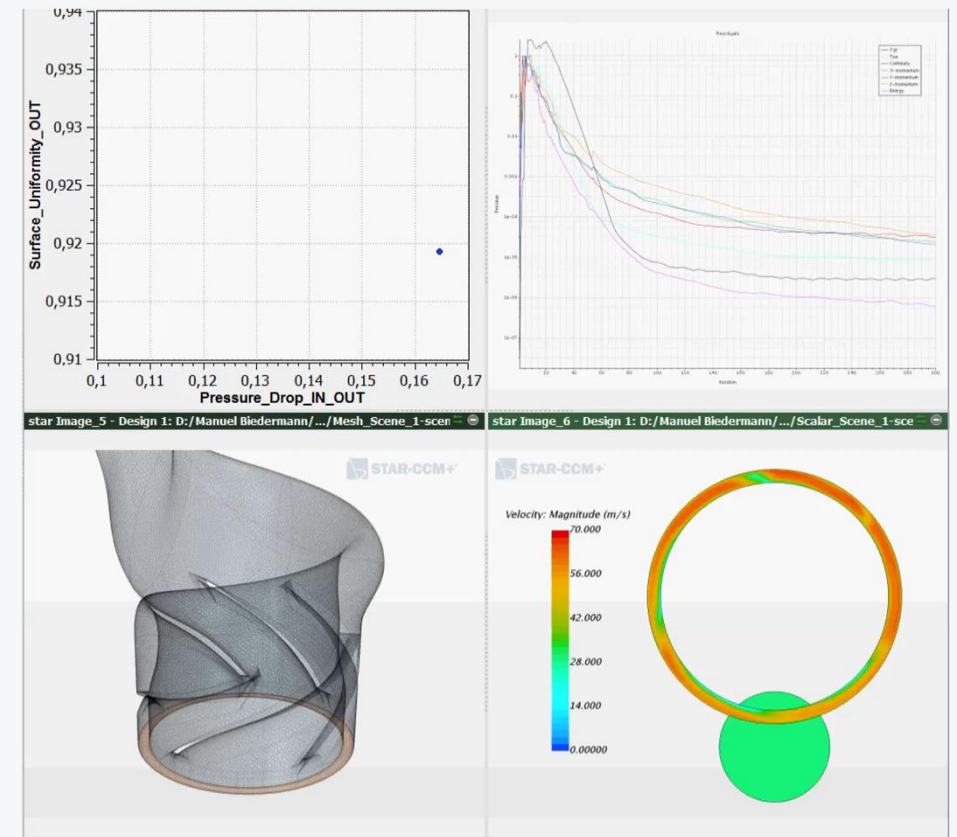
Discover Better
Designs, Faster!

Simulation-driven generative design

Computational fluid dynamics



Design space exploration



Additive Manufacturing in Power & Gas

SIEMENS
Ingenuity for life



SIEMENS Energy

- Higher performance designs possible with internal cooling channels
- Repairs carried out onsite rather than in Siemens HQ [\(more\)](#)



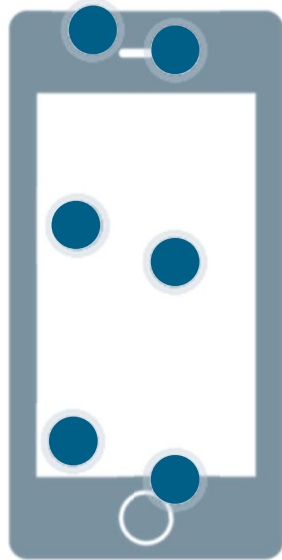
44 weeks → 2 weeks!!

More than **50%** of the world's data
was created last year ...

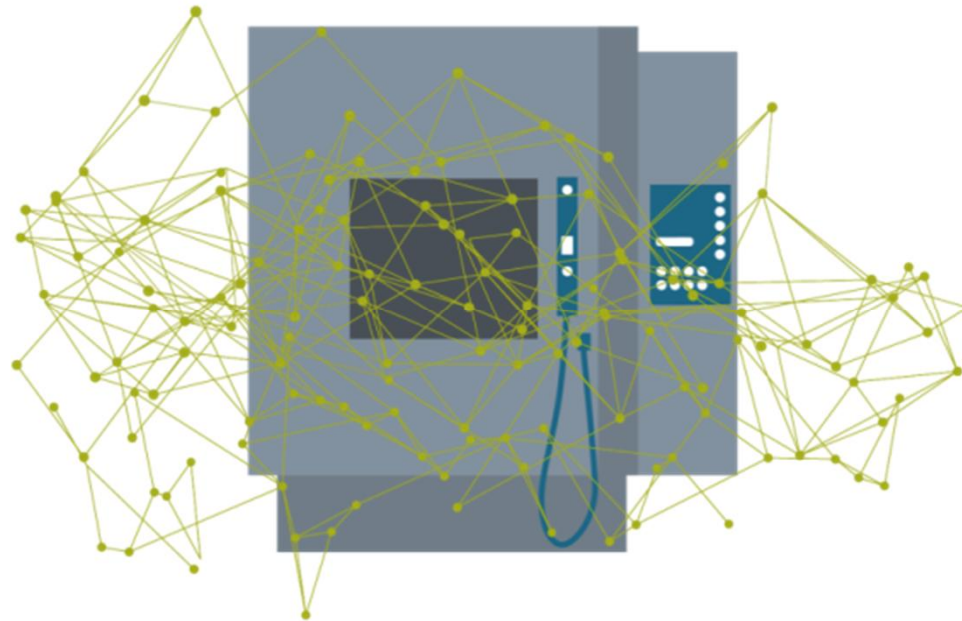
but **less than 0.5%**
was analyzed or used

A lot can happen in one year

Simple consumer applications vs. complex industrial applications



6 sensors

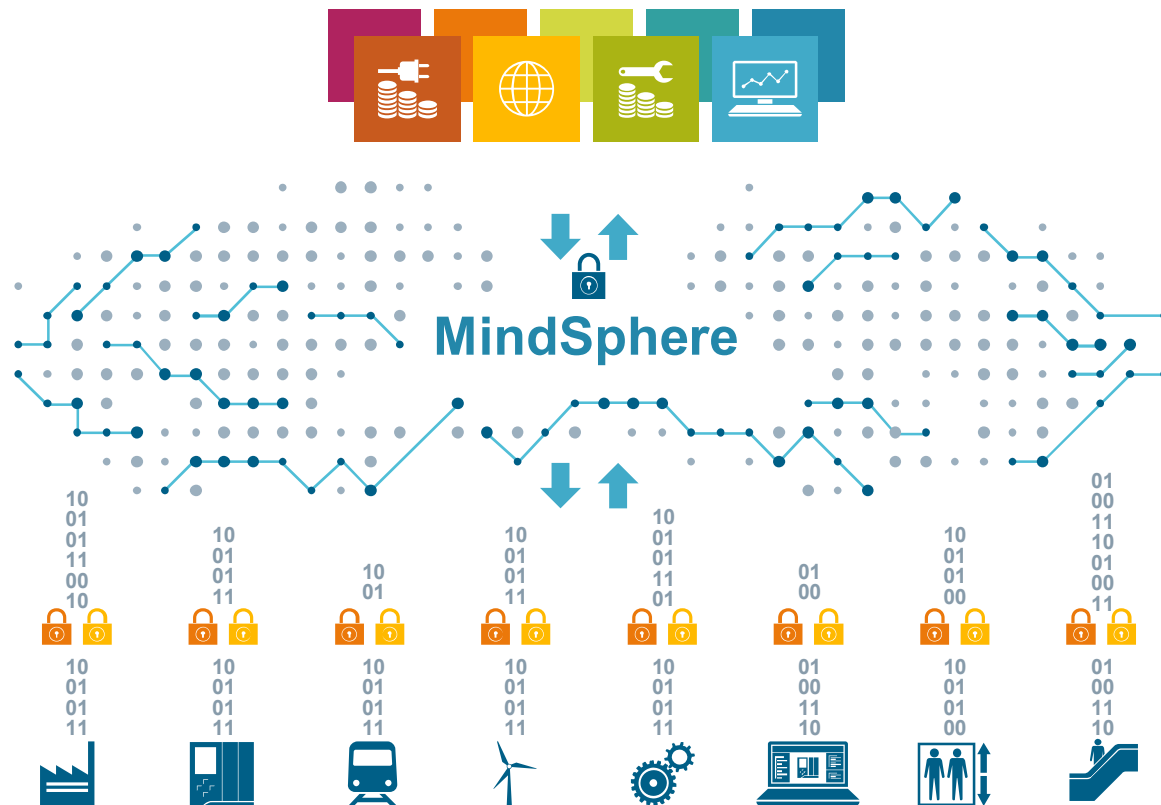


2000 data points



**Industry
expertise
is key to
success**

MindSphere – The cloud-based, open IoT operating system from Siemens



MindApps & other Apps

- Use apps from Siemens, partners or develop own apps
- Gain asset transparency & analytical insights
- Subscription based pricing model

MindSphere

- Open interface for development of customer specific apps
- Various cloud infrastructures: SAP, AtoS, Microsoft Azure offered as public, private or on-premise (planned)

MindConnect & other Connecting devices

- Open standards for connectivity, e.g., OPC UA
- Plug and play connection of Siemens and 3rd party products
- Secure and encrypted data communication



Apps for Process Industries

[Reference+](#) [More Information](#)

- Design & Engineering
- Automation & Operation
- Maintenance & Service
- Supply Chain & Logistics
- Industry (Verticals)

Smart Water

Valve Predictive Maintenance

Control Performance Analytics

Drive Train Analytics

Smart Pumping

SIPAPER Drive Performance Analytics

Oil Production Monitoring

Digital Lifecycle Services

DCS Health

Anomaly Detection For ESP

Bentley

COMOS in the cloud

SISHIP EcoMAIN

Axit - AX4 mobile

XHQ Launch (Mobile)

Control in the Cloud (Workbench)

Data & Security Gateway

MindConnect

The three main advantages of digitalization

Software enables the full potential of Hardware



Data integration
Reusability



Validate through
Simulation



Transform data
into value

Poll n° 3:

Where lies the (main) added value of Digitalization within an industrial context?

- Design Optimization
- Virtual Commissioning
- Virtual Training
- Asset Performance Optimization

Embrace Change

Talk to people

Trust People

Be open

Go 4 user's value

Listen

Never stop learning

AGILE MINDSET !

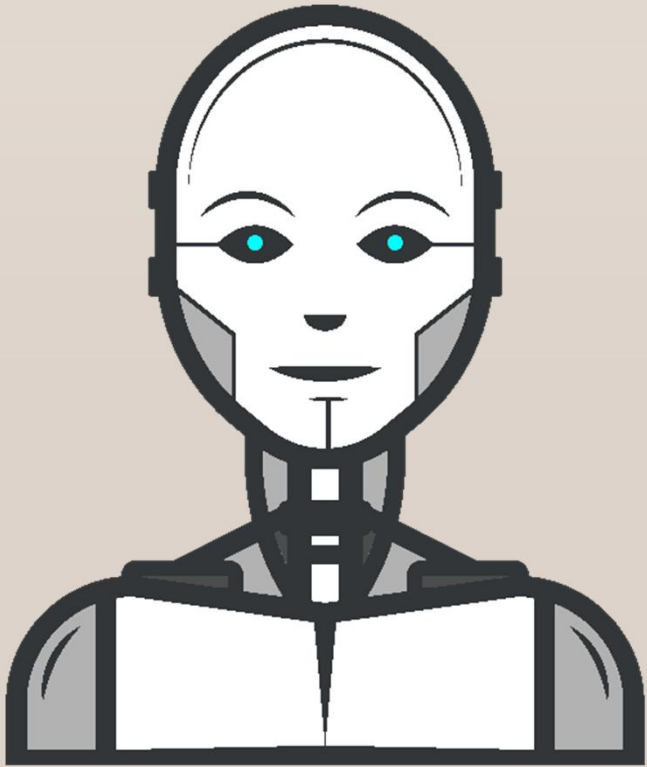
Keep things simple

Deliver small successes

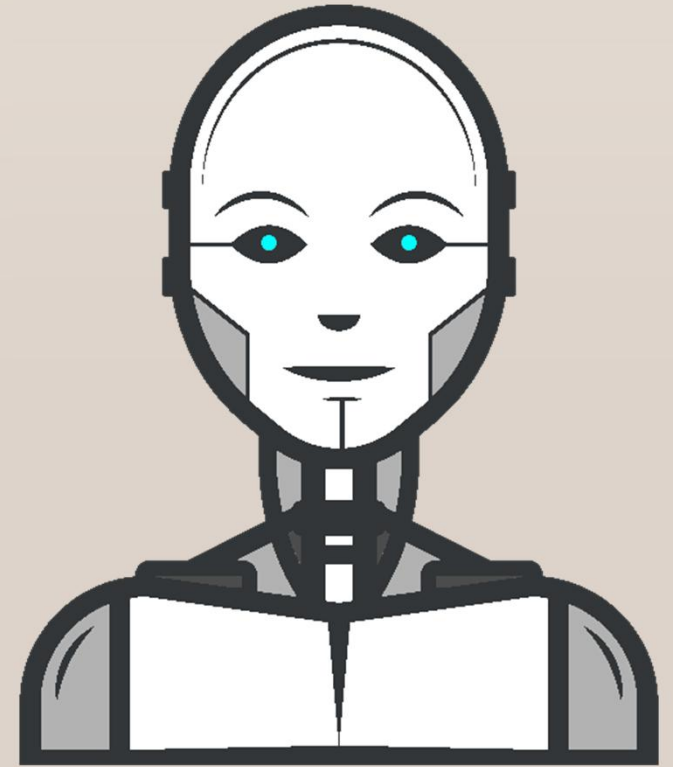
Unlearn & Relearn

Think we instead of me

Expect Imperfection



**THINK
OUTSIDE
THE BOX**



Contact Page



[siemens.com/digitalization](https://www.siemens.com/digitalization)

Bart Demaegdt

Digital Enterprise Team Coordinator



SIEMENS Belgium

Mobile: +32 476 46 83 55

E-mail: bart.demaegdt@siemens.com



<https://be.linkedin.com/in/bartdemaegdt>



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