

# Continuously optimizing with the Digital Enterprise

Magnus Edholm

# How?



# With a holistic digitalization approach

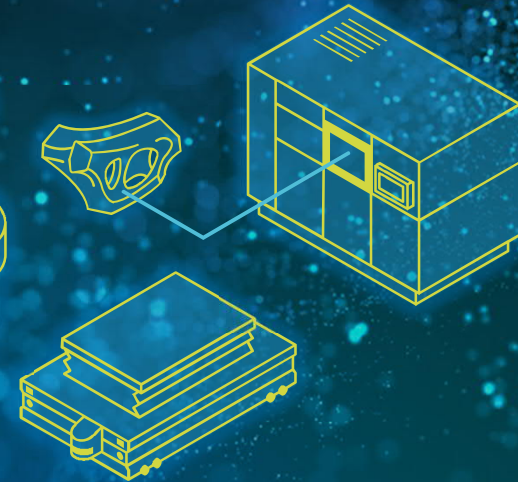
Variety of drive concepts



Future mobility requirements



Additive Manufacturing

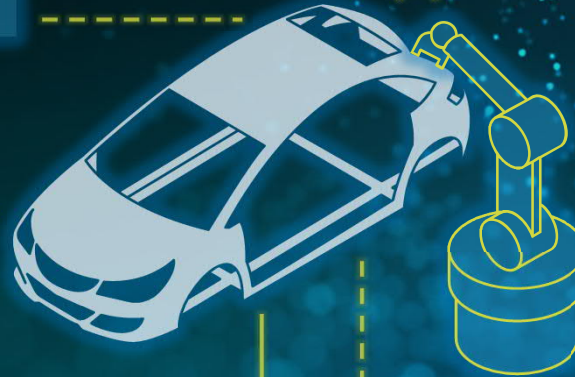


Automated Guided Vehicles

Innovative product development



Integration of new value chains

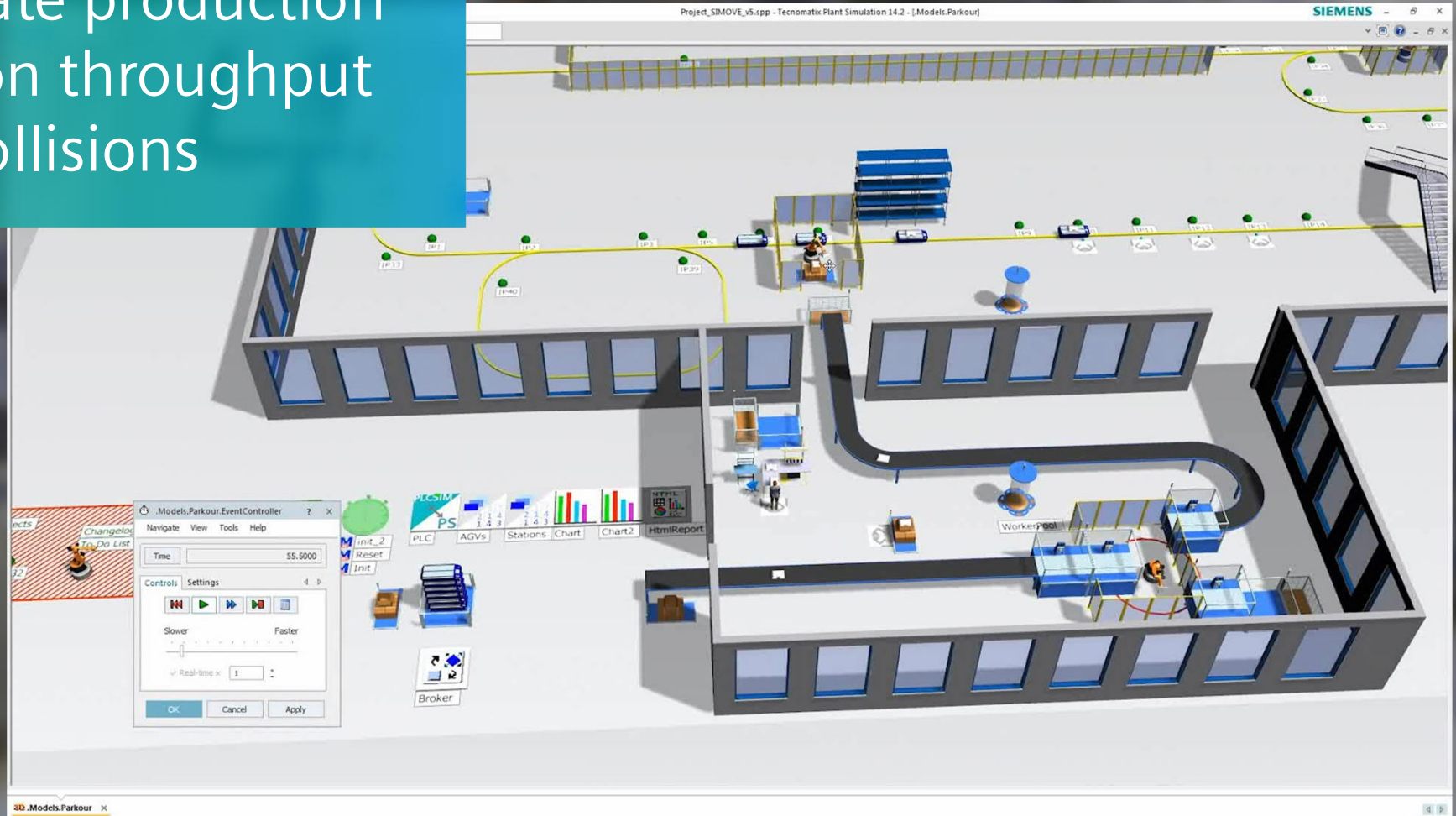




Addressing production complexity  
Flexible production  
concepts with  
Automated Guided  
Vehicles (AGVs)



Simulate production lines on throughput and collisions





Standardized and open system package  
Complete automation,  
communication, and  
functional safety



## Simulation and flexible production concepts

**Faster  
validation and  
verification**

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**Economic  
manufacturing  
of different car  
models**

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**Easy scalability  
of production  
capacity**

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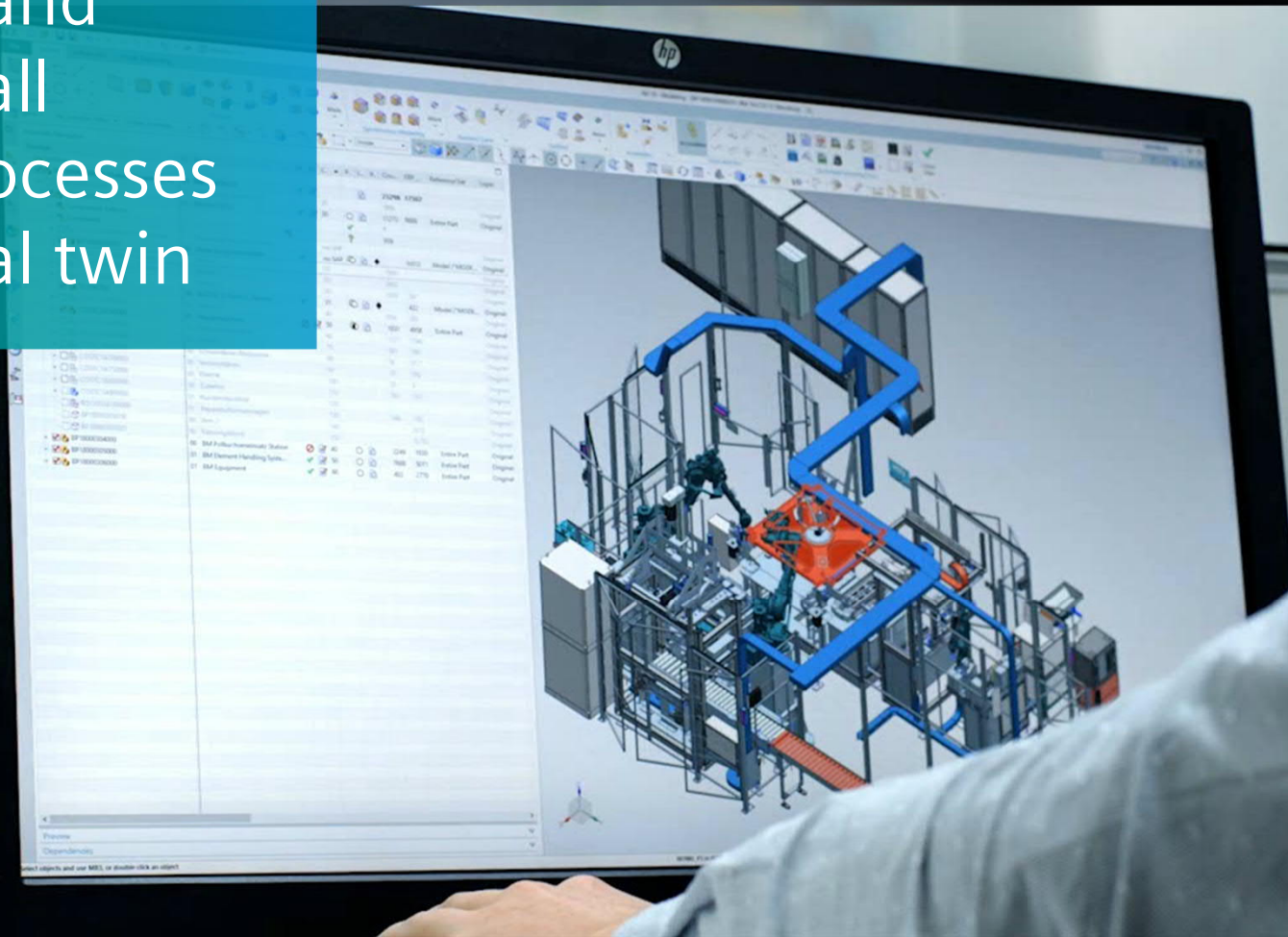




*For some 30 years, industry believed it had reached the physical limits when casting lead poles for classic lead-acid batteries.*

**Siegfried Altmann**  
CEO Rosendahl Nextrom GmbH

Simulating and  
optimizing all  
machine processes  
with a digital twin





//

*We achieve a totally new level of output, quality, and performance. None of this would be possible without a digitalized and digitally controlled workflow in the factory.*

**Siegfried Altmann**

CEO Rosendahl Nextrom GmbH



From up to 24 months  
of developing time

down to  
**12**





## The digitalization effect

**50% shorter  
development  
time**

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**95% machine  
efficiency rate**

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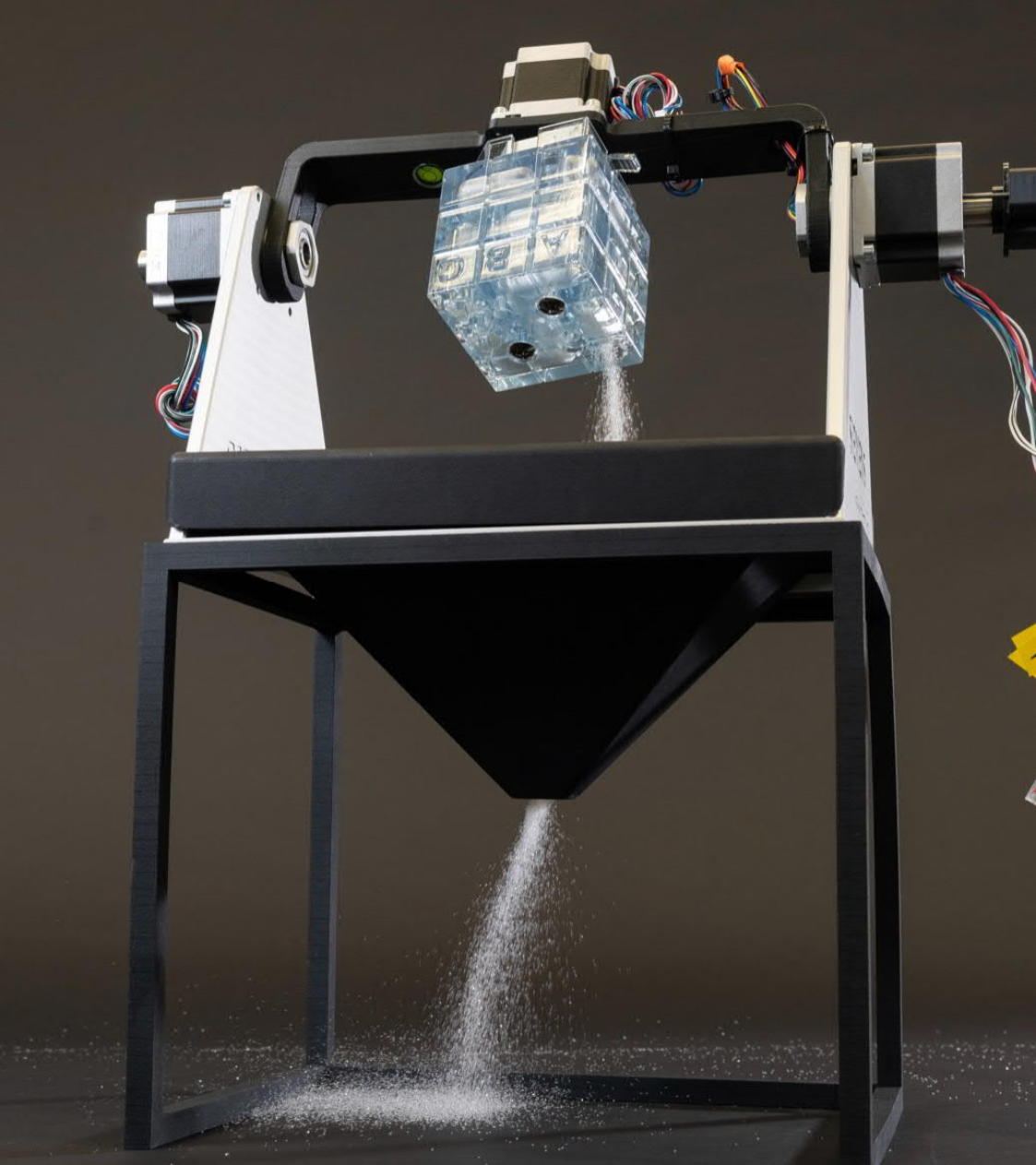
**25% higher  
production  
output**

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## Non-value-adding-time and waste of resources







Algorithm for  
a depowdering  
chamber



Fully automated  
removal of metal  
powder based on  
algorithms



Automated depowdering

No harm for  
human workers

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Reusing metal  
powder

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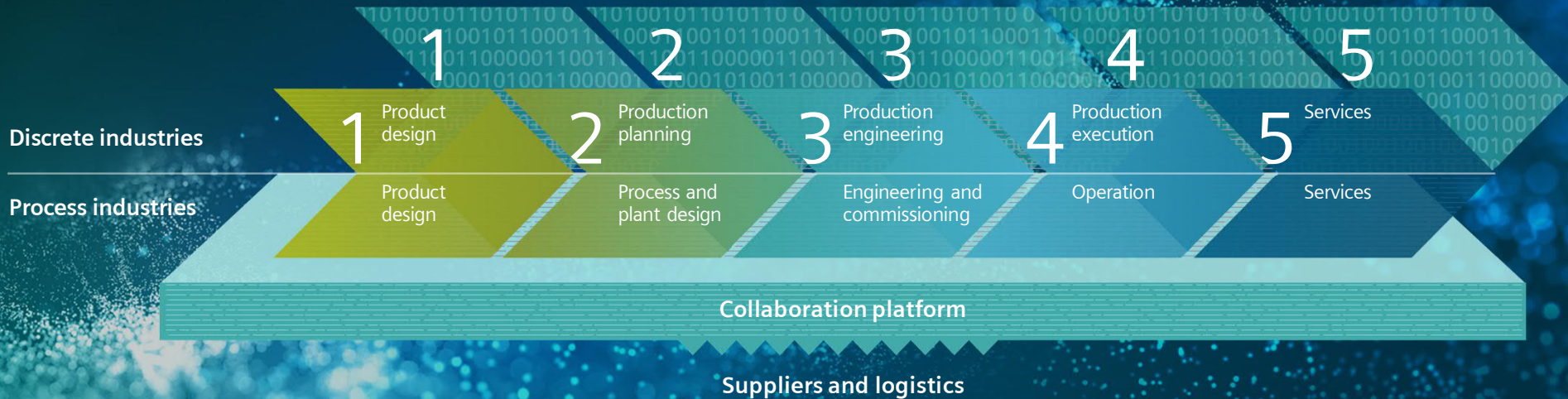
Less environ-  
mental impact

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# Continuous optimization



# Integrating and digitalizing the entire value chain



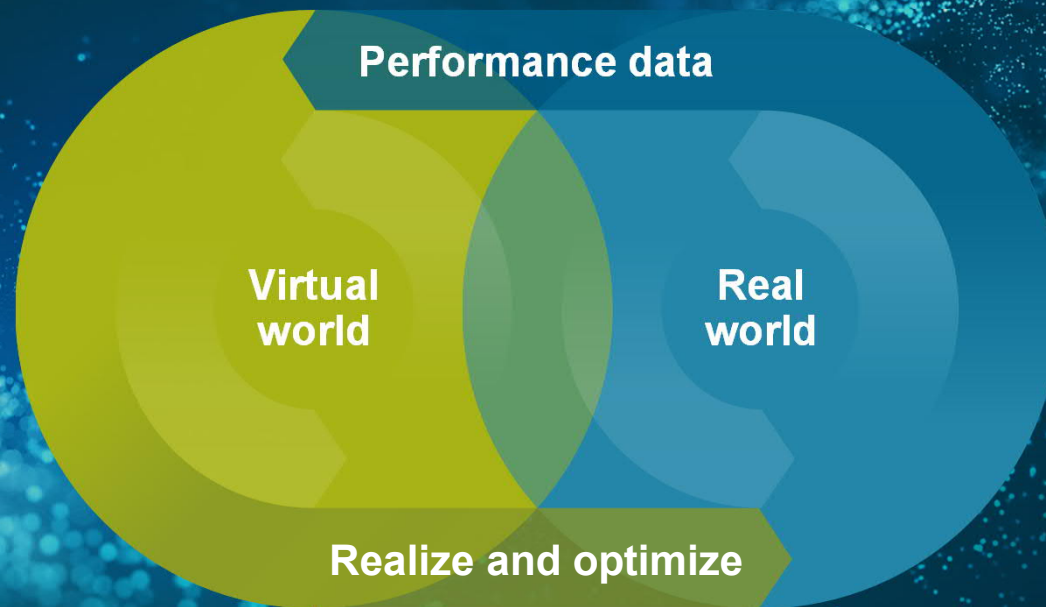
**End-to-end solutions  
for all industries**

**Numerous starting  
possibilities**

**Brownfield or  
greenfield**

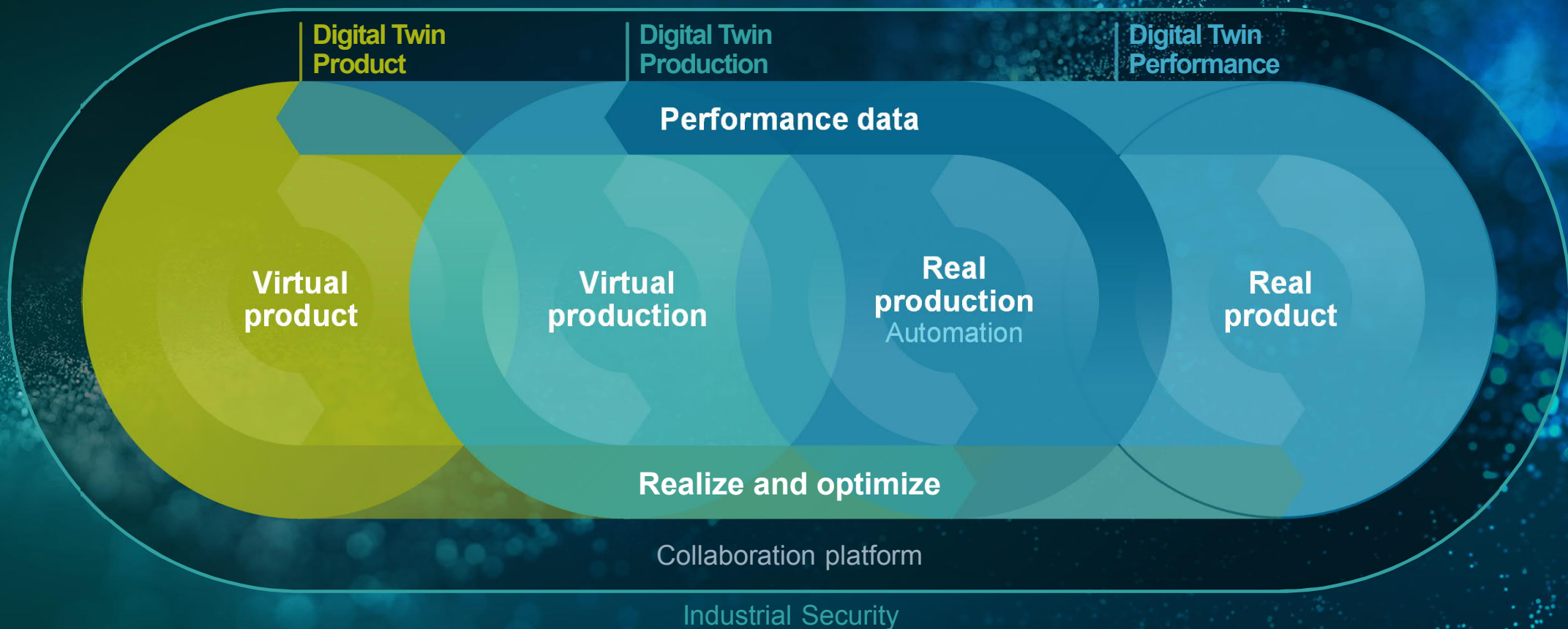
**Standardized and  
open interfaces**

# The basis for continuous optimization





# The basis for continuous optimization





The basis for continuous optimization

# Portfolio

Services for the Digital Enterprise

Consulting

Implementation

Optimization

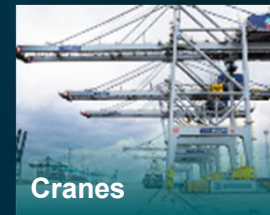
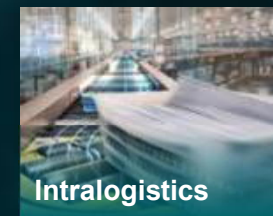
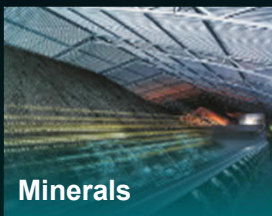
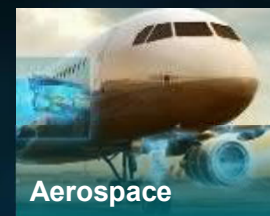
# Driving the digital transformation in focus industries



## Process Industries

## Hybrid Industries

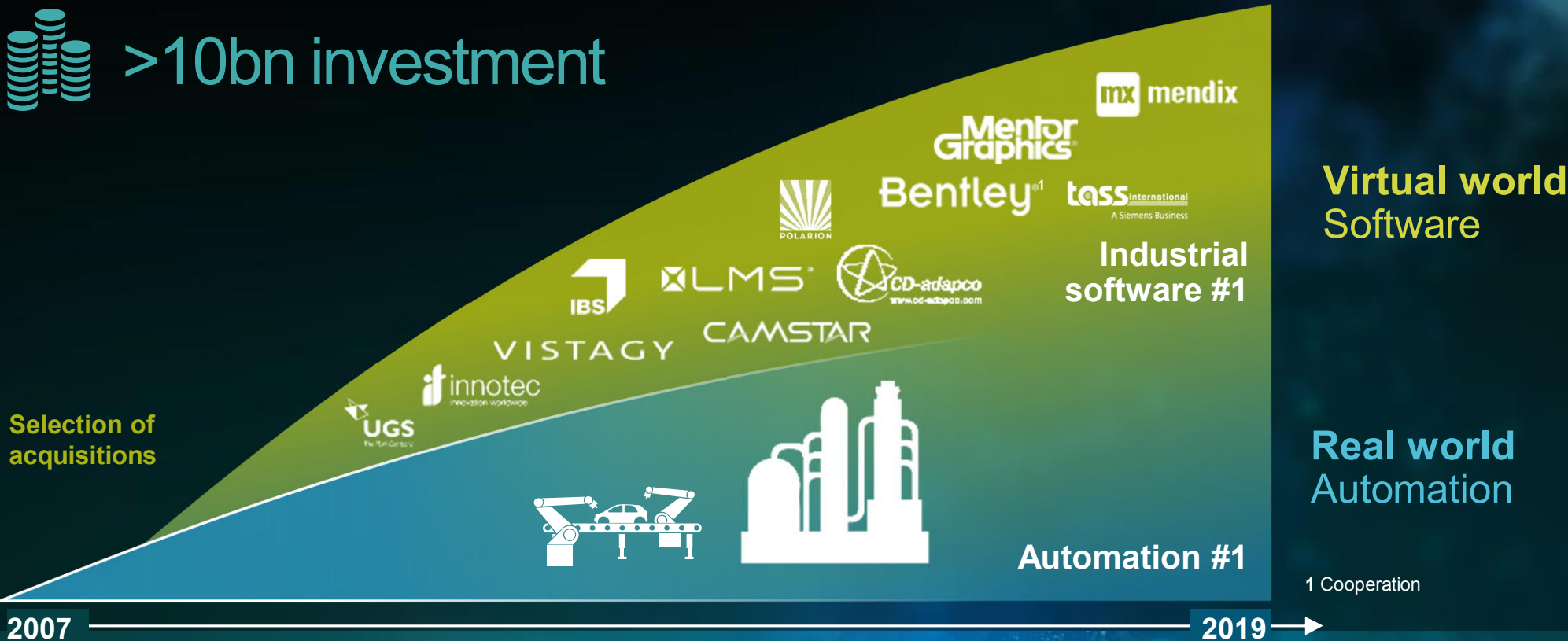
## Discrete Industries



# Digitalization is key to achieving next-level productivity



 >10bn investment





“With an integrated digital twin platform, we see major potential in speeding up the product development process, reducing prototypes, increasing traceability and thus improving quality and reduce development cost.”

Juha Pankakoski, Executive VP,  
Technology at Konecranes

**KONECRANES®**

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Digital Industries



“The most important is the competence of the people. We can ask technical questions and they are helping us to solve our challenges, and that makes their systems far more powerful.”

*Olav Tronrud, CEO at Tronrud Engineering*

- Shortened commissioning phase by 20-25%
- Reduced design phase by 10% through parallel working of electronic, mechanical and automation departments



“We have incredible manufacturing flexibility where we can produce specialty paint batches in 1/50th of the size.”

Kevin Worrell,  
Project Director at Dulux Australia

- >50% less time from testing to paint production
- 8x faster production process

**Dulux**<sup>®</sup>



This way they can meet the essential  
market and customer requirements

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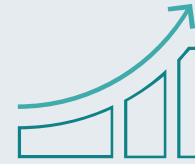
**Speed**



**Flexibility**



**Quality**



**Efficiency**

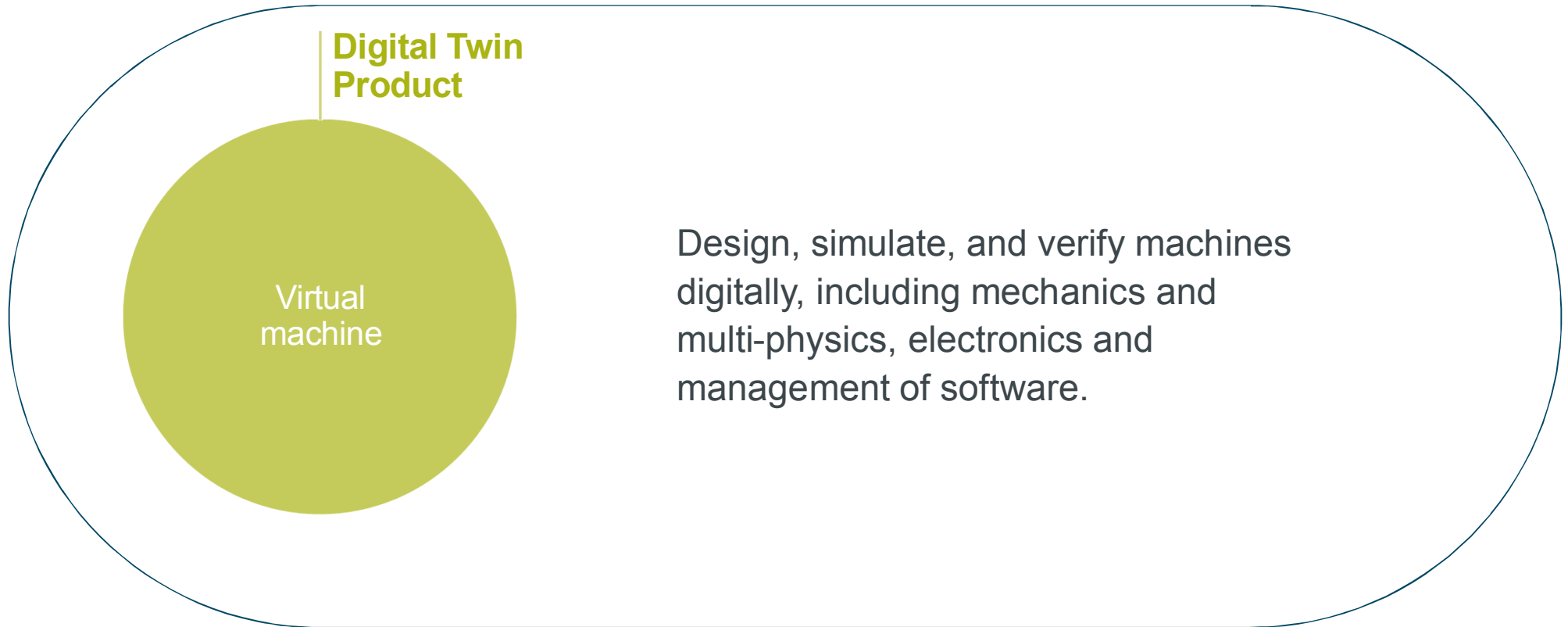


**New business models**



**Security**

# The most holistic Digital Twin

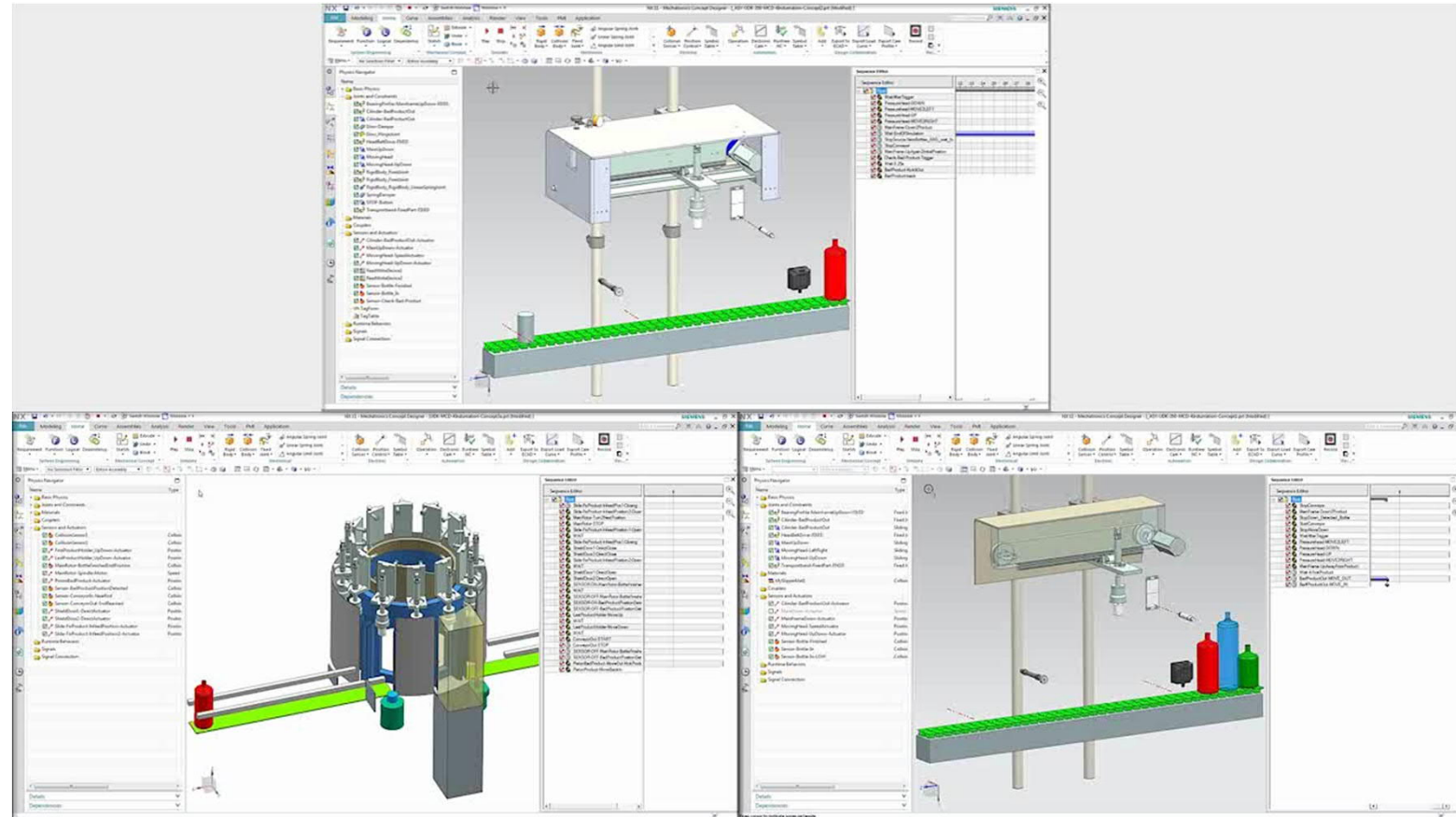


# Digital Twin Product – Virtual machine

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Easy evaluation  
of different  
machine  
concepts

NX Mechatronics Concept  
Designer



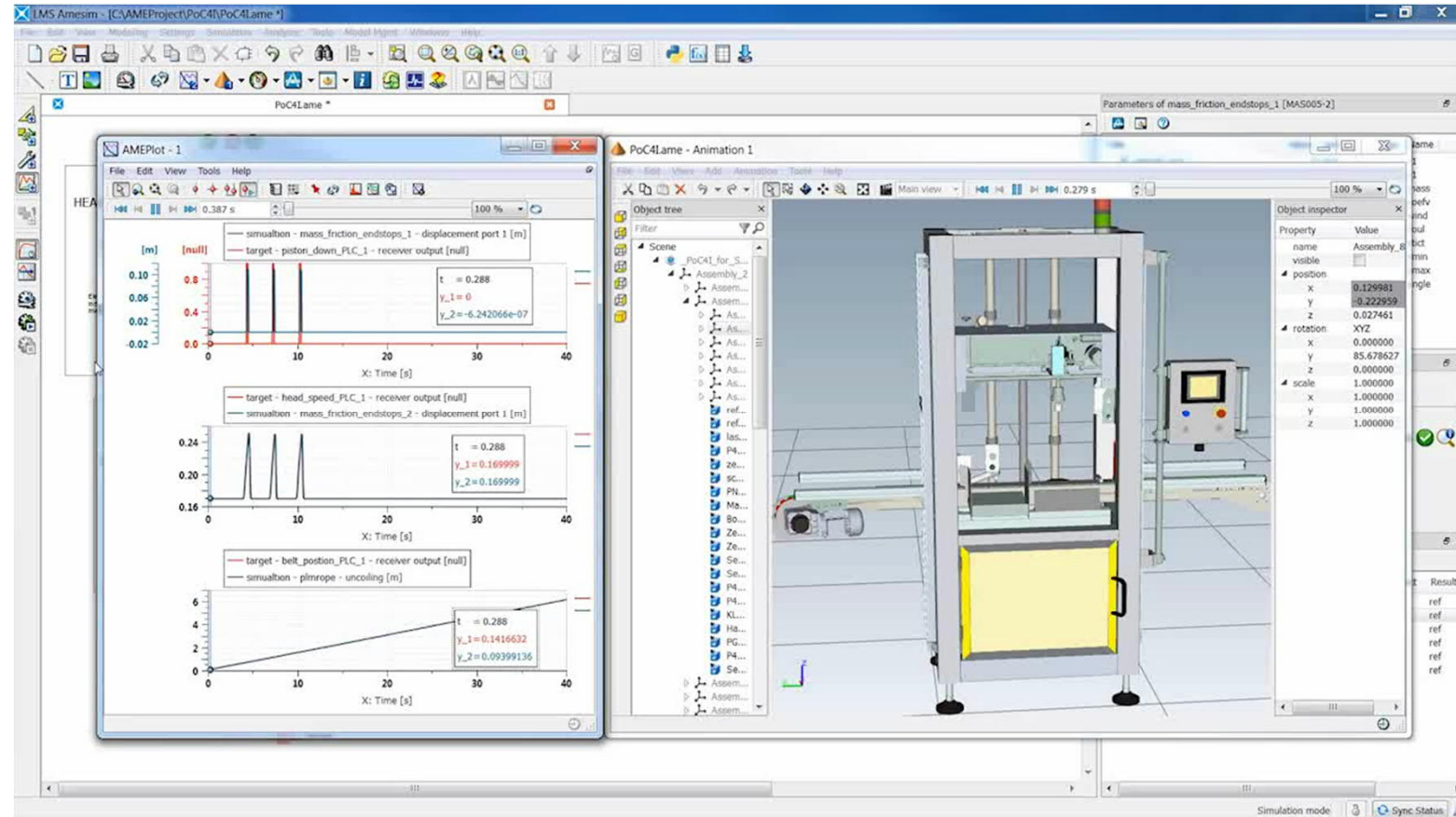


# Digital Twin Product – Virtual machine

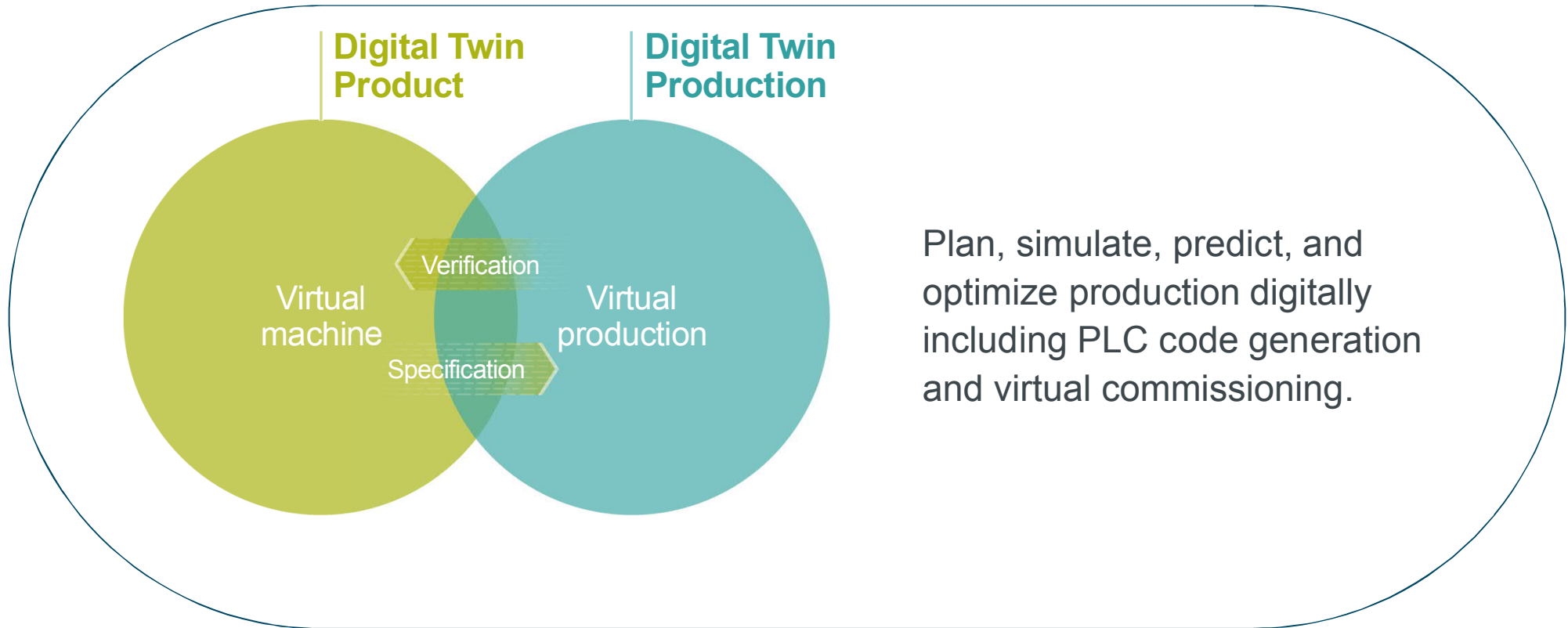
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Validate  
machine  
concepts with  
multi-physics  
simulation

NX Mechatronics Concept  
Designer, Simcenter



# The most holistic Digital Twin

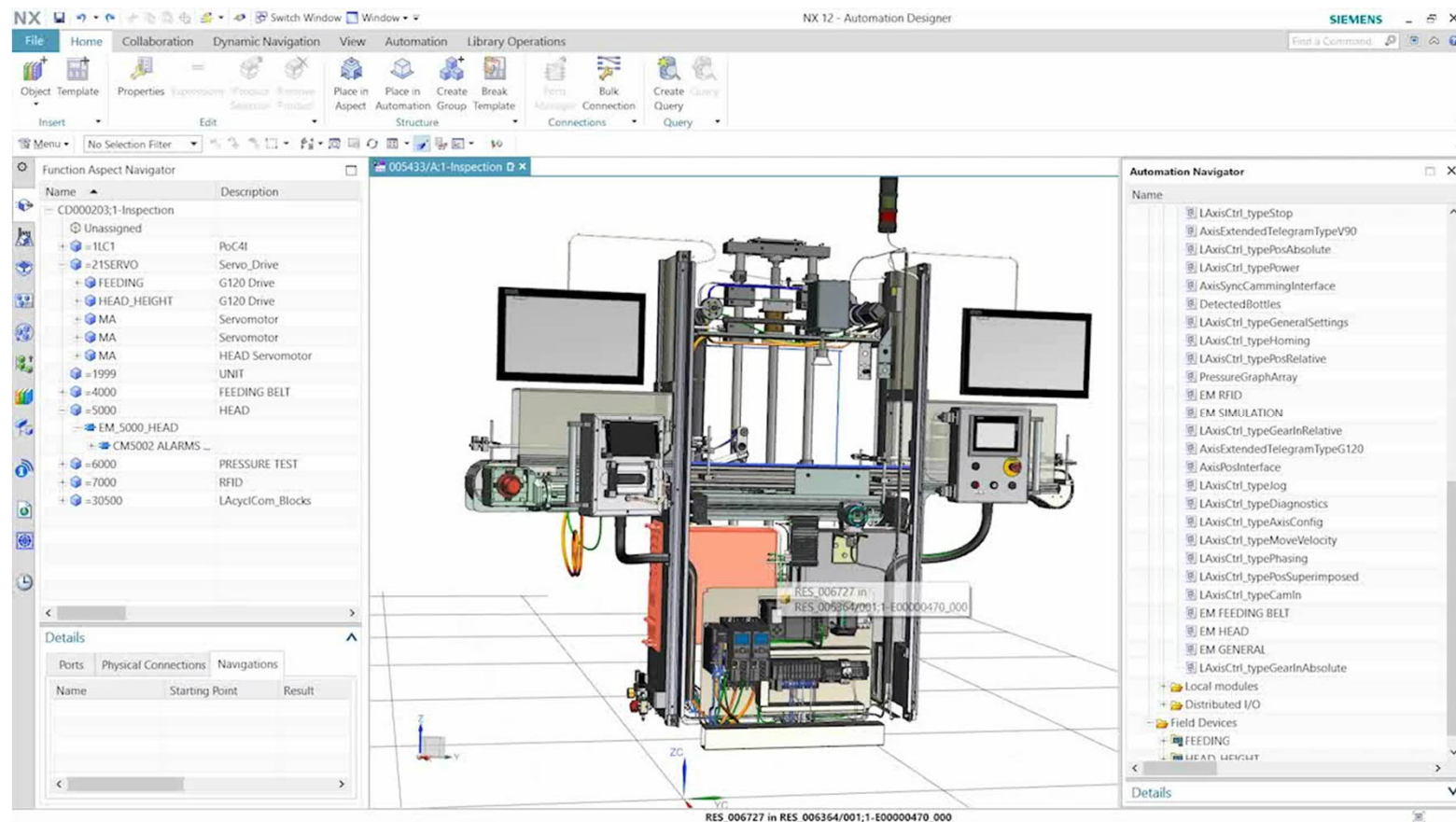


# Digital Twin Production – Virtual production



Generate the  
PLC code in  
collaborative  
automation  
design

Automation Designer





Fast and  
efficient  
engineering and  
commissioning

TIA Portal with  
PLCSim Advanced

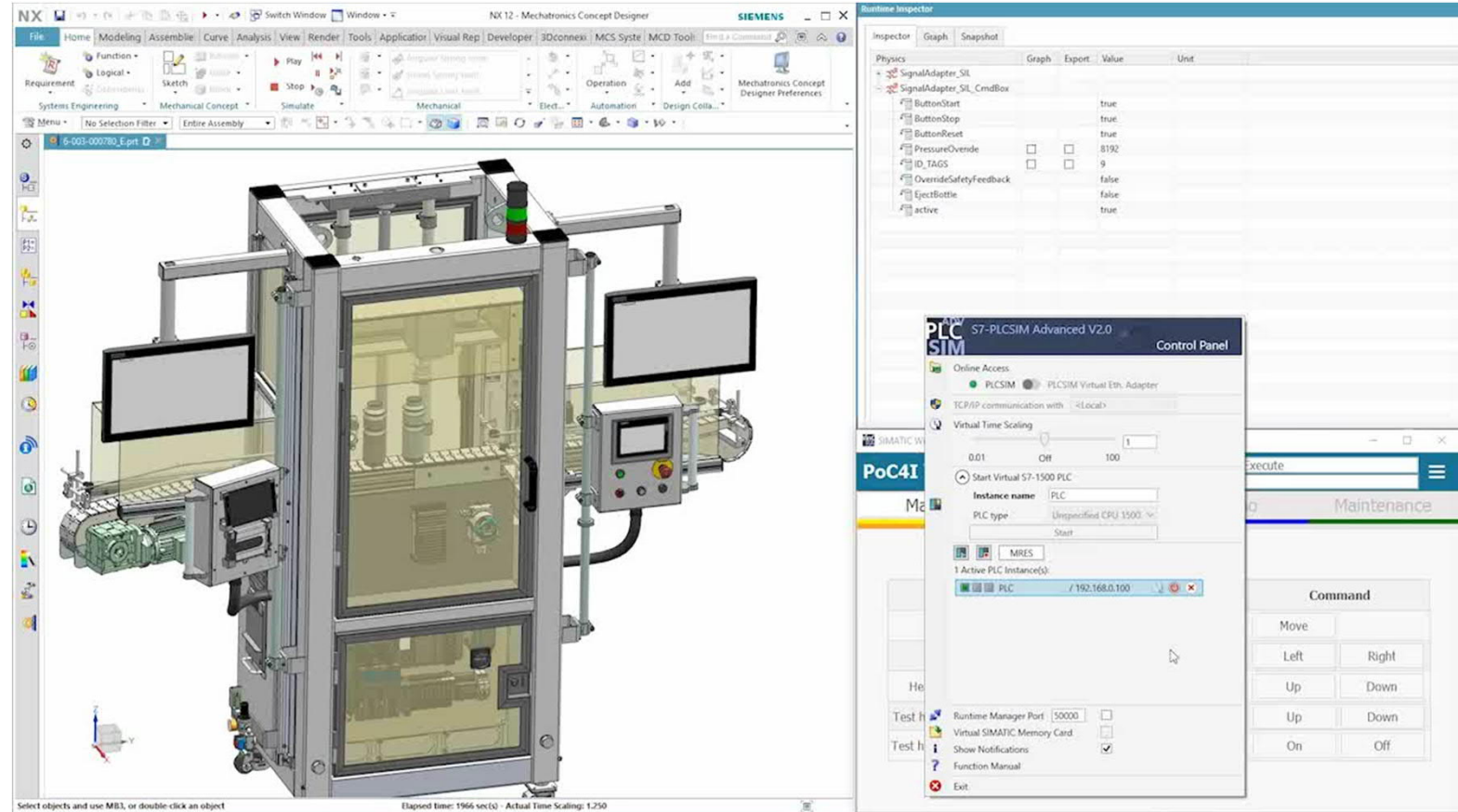


# Digital Twin Production – Virtual production

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Time-saving  
validation of  
automation code  
and machine in  
the virtual world

NX Mechatronics Concept  
Designer, PLCSim  
Advanced, TIA Portal, SIMIT

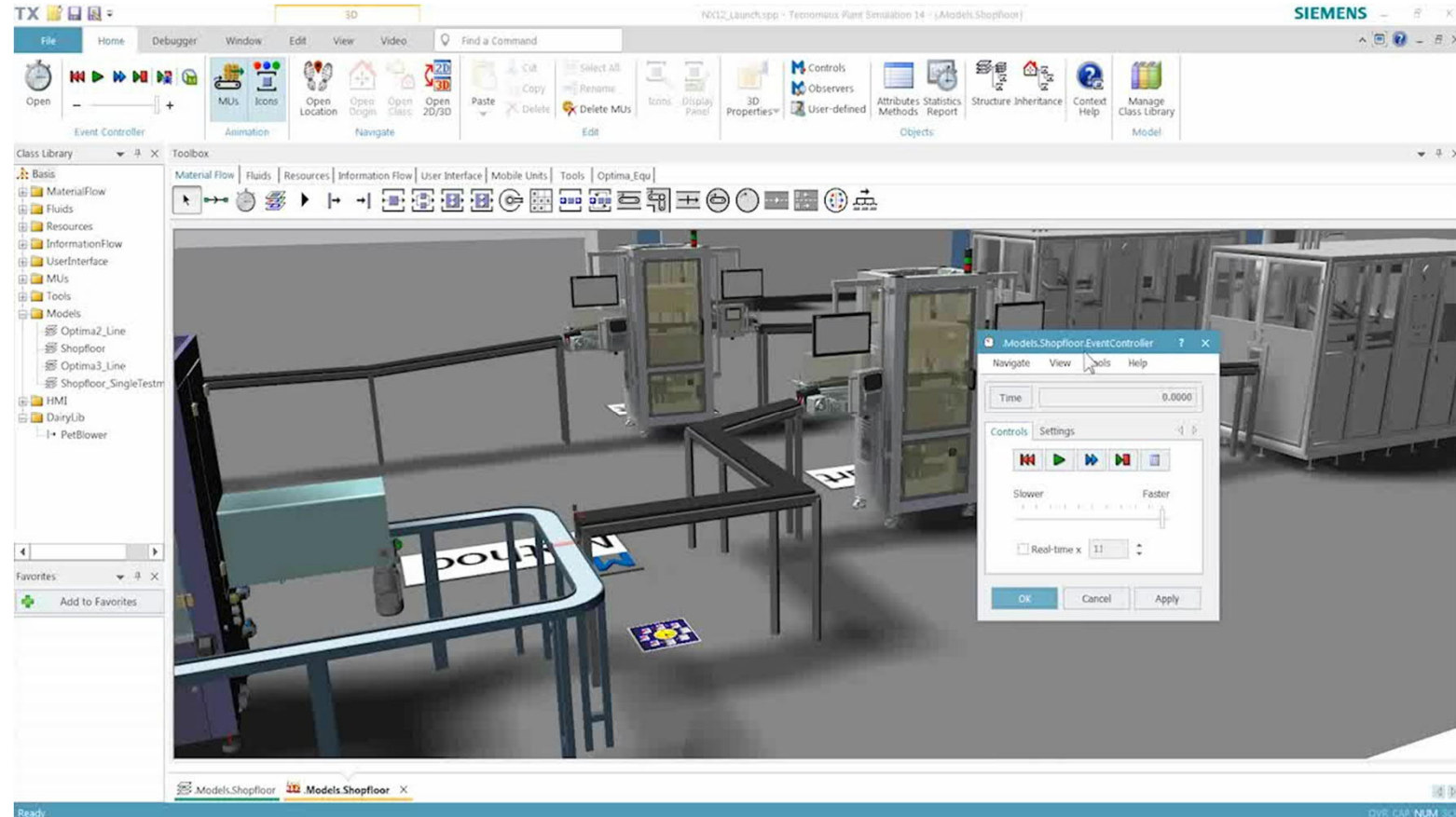


# Digital Twin Production – Virtual production

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Simulate  
production line  
concept to  
ensure  
throughput  
and avoid  
bottlenecks

Tecnomatix Plant Simulation



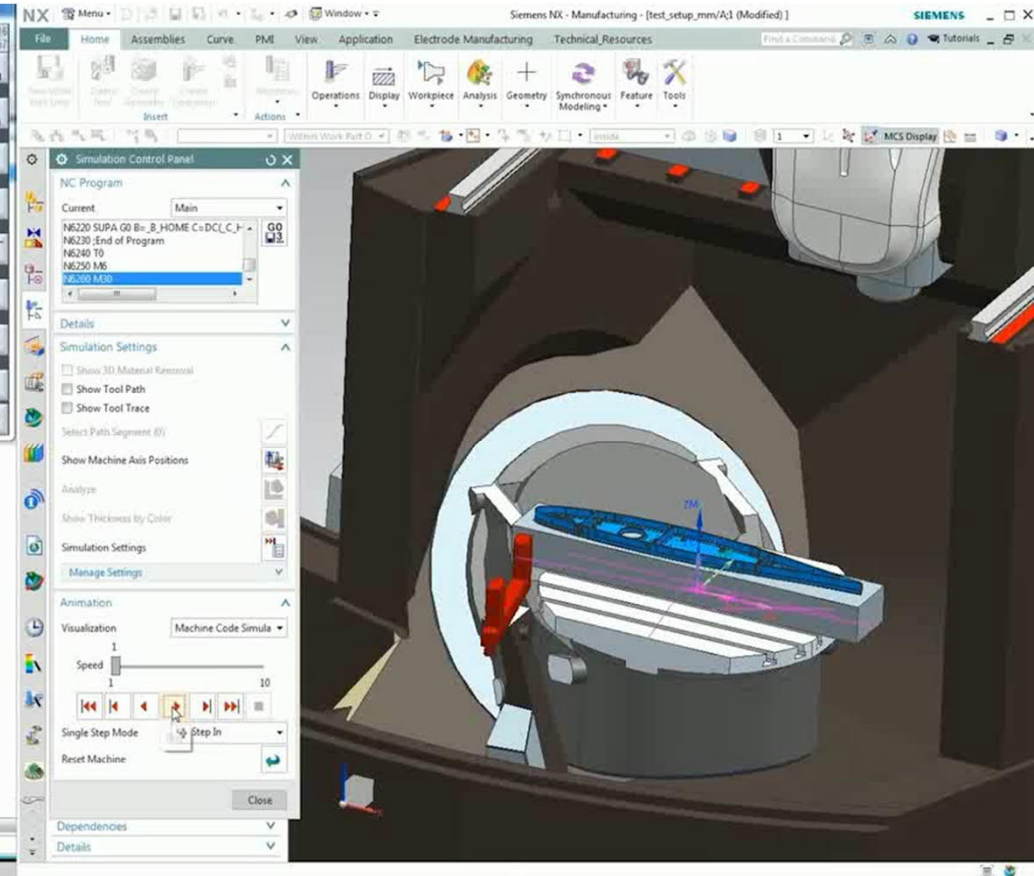
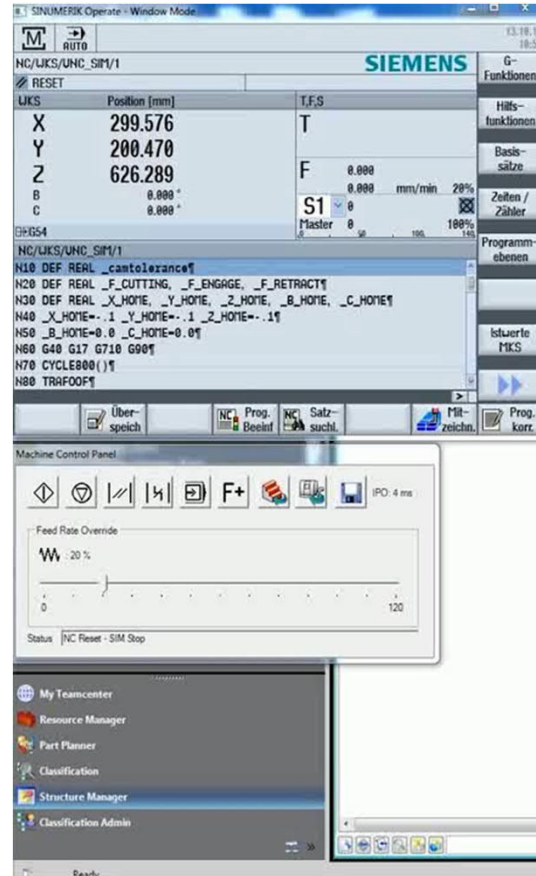
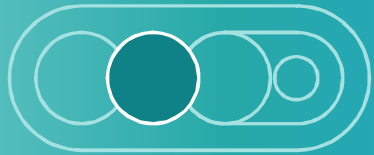


# Digital Twin Production – Virtual production

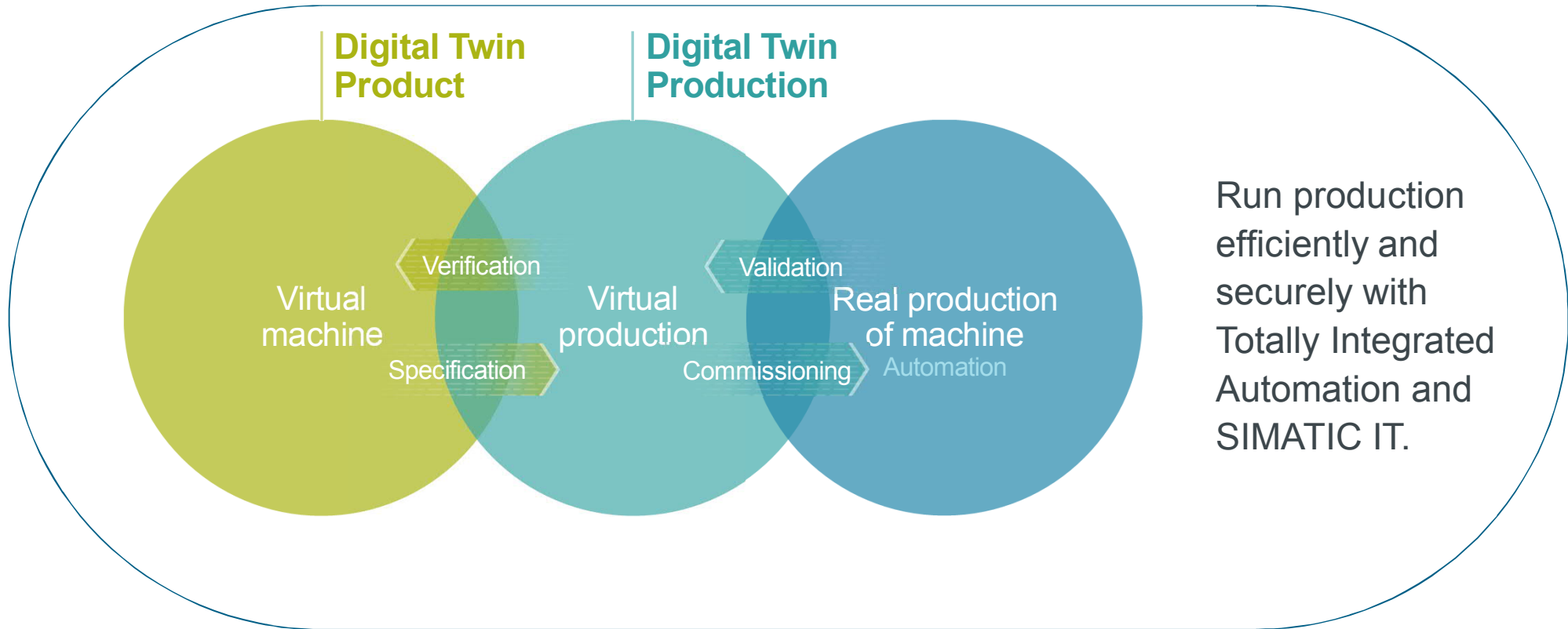
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## Validation of G-code in the virtual world

NX CAM, SINUMERIK VNCK



# The most holistic Digital Twin

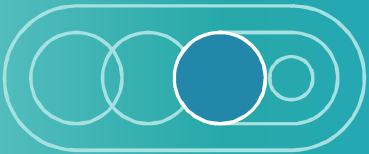


# Digital Twin Performance – Real production of machine (Automation)

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Schedule and execute work instructions and quality inspections

SIMATIC IT UA Discrete Manufacturing, QMS Professional, Preactor APS



Segregation Tags Operator

WO\_QTM\_006 Main Frame Assembly Status: Active Work Center: 1010 Main Frame Assembly Active Users/Teams: Operator  
Remaining Time: 33:49 S/N: SN\_QM\_20181030\_006 Sequence: 1010/1100 Material: Quality Test Machine.A

Quick Search

Main Frame Assembly Sequence: 1010

Mount Machine Foot 4x Sequence: 10

Get + Place Main Frame from palette Sequence: 20

Mount Cover cap 4x Sequence: 30

Mount Cover plate 3x Sequence: 40

Mount Rear fixed cover plate Sequence: 50

Mount L Strips 4x Sequence: 60

Mount Air filter 2x + Ventilator Sequence: 70

Mount rear cover plate Sequence: 80

**Mount Machine Foot 4x**

**Safety instructions**

Wear safety glasses Wear safety shoes Wear safety ear protection

**Work instructions**

- Identify SGR Main Frame
- Identify and mount standard foots (4x)
- Fill the forms in the tab **Tools**.

**Filling the Tool tab:** select the right tool and click the Use Tool button.

List of additional standard parts

Part-No.	Description	Qty
E-000046	Adjustment tube 90x90x700	4
E-000044	End plate 84x84x8	4
E-000045	Nut M30	4
E-000263	Hexagon bolt M24x130	4
E-000255	Ring 26x44x4	8
E-000256	M22 nut	4

Start

START PAUSE STOP COMPLETE STOP

SHOW DETAILS ADD DOCUMENT NOTES DETECTS CHANGE TRAVEL REQUEST LOGISTIC EXECUTION GROUP UNLINK AS BUILT

3D model of the machine frame assembly with labels: E-000256/001, 1-M22 nut; E-000255/001, 1-Ring 26x44x4; E-000263/A, 1-Search driver; E-000255/001, 1-Hexagon bolt M24x130

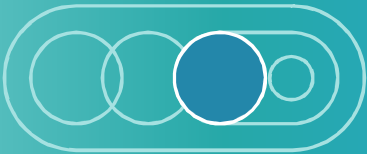


# Digital Twin Performance – Real production of machine (Automation)

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Efficient  
and secure  
production  
with Totally  
Integrated  
Automation

SIMATIC, SINUMERIK,  
SIMOTION, SIMOTICS,  
SINAMICS, SIRIUS, TIA Portal

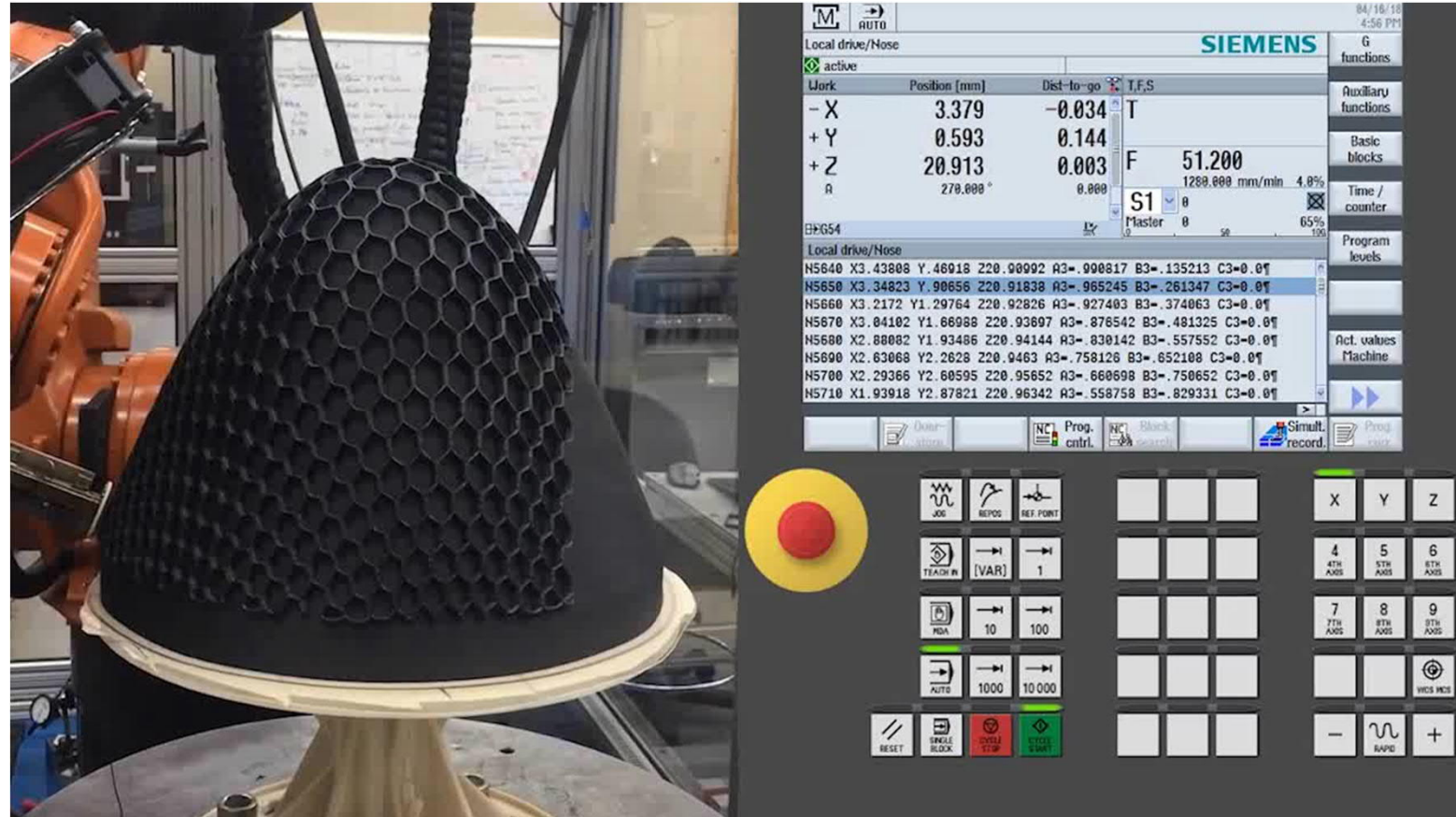
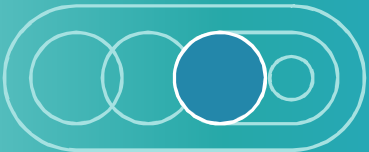


# Digital Twin Performance – Real production of machine (Automation)

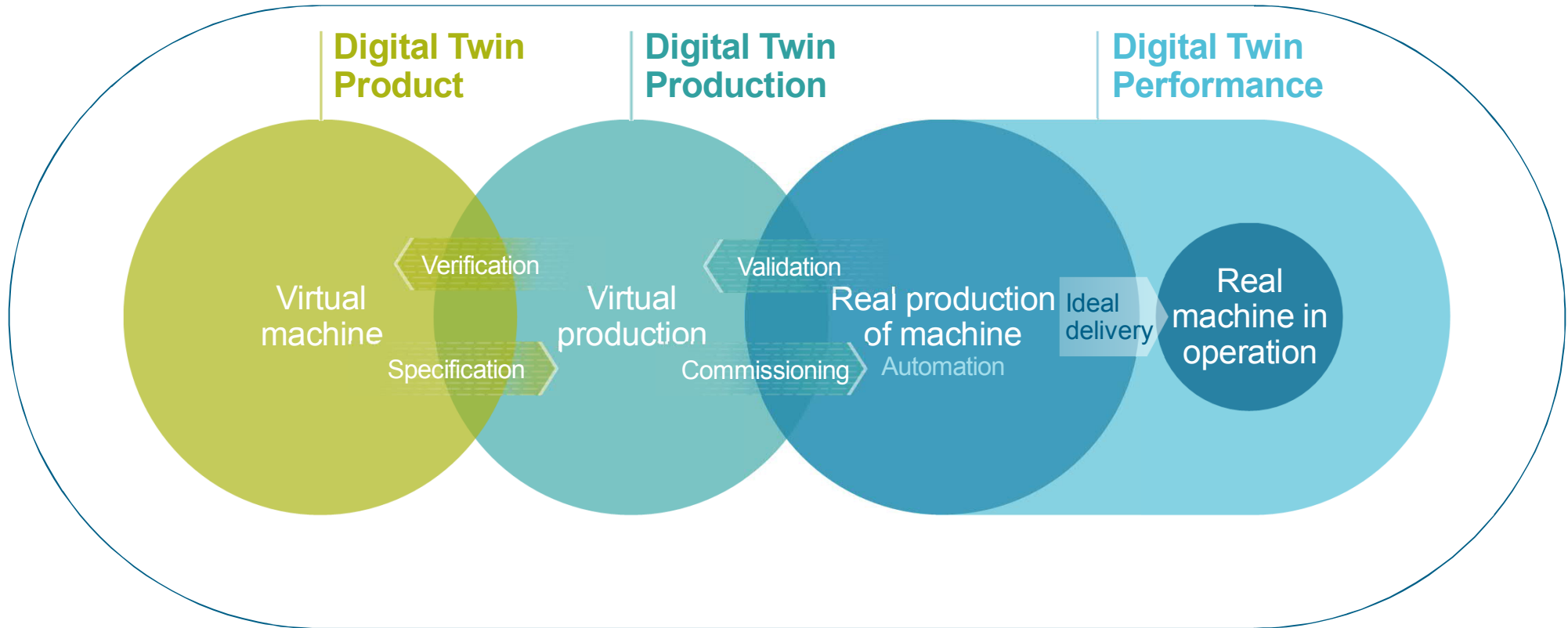
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Realize  
revolutionary  
designs with  
Additive  
Manufacturing

Robot control with  
SINUMERIK and SIMATIC



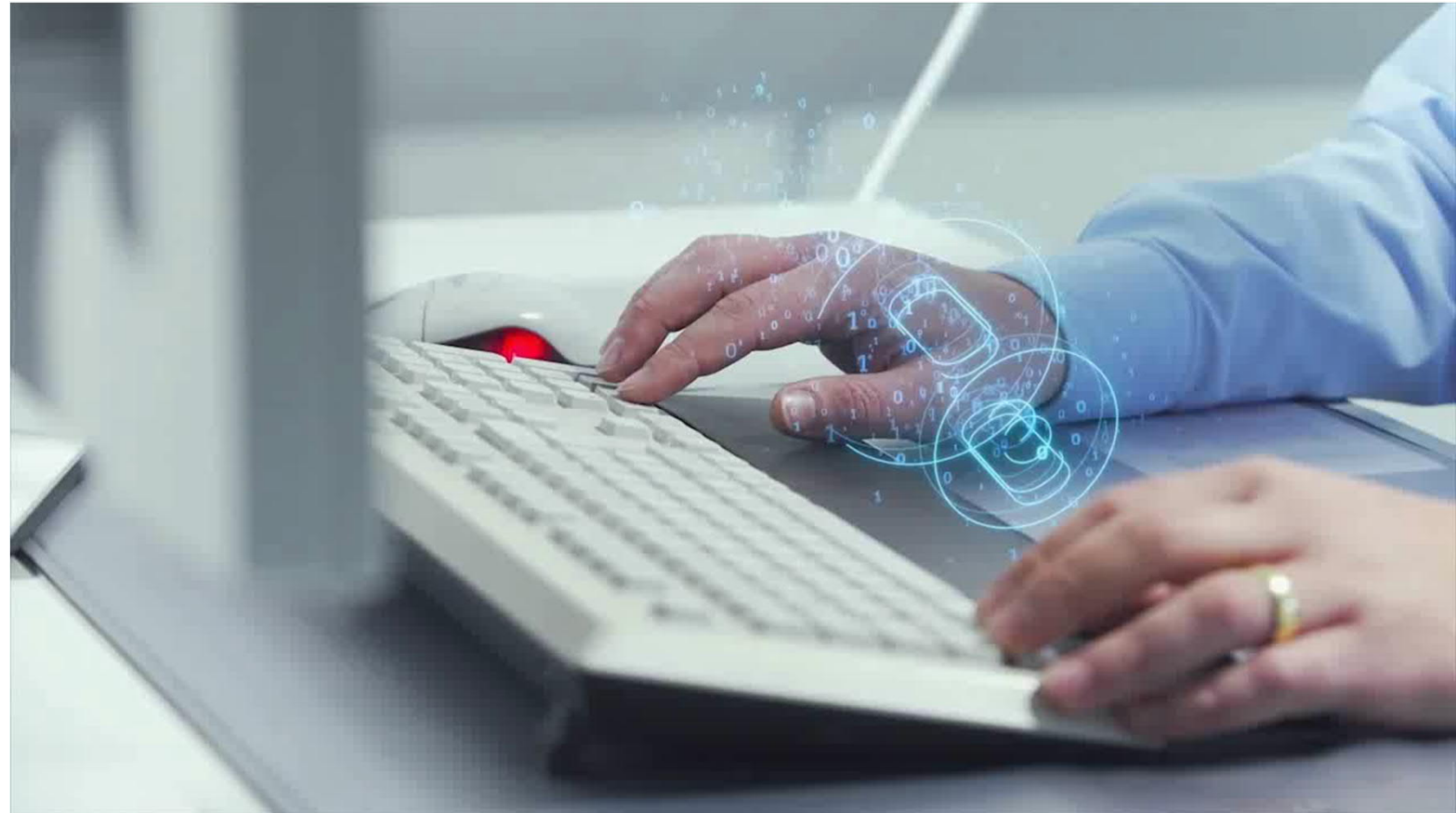
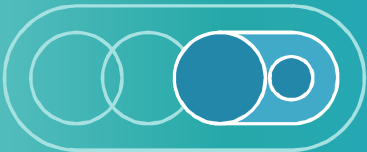
# Continuously improve product and production in the real world





Monitoring of all  
machines –  
everywhere and  
anytime

MindSphere application –  
Manage MyMachines

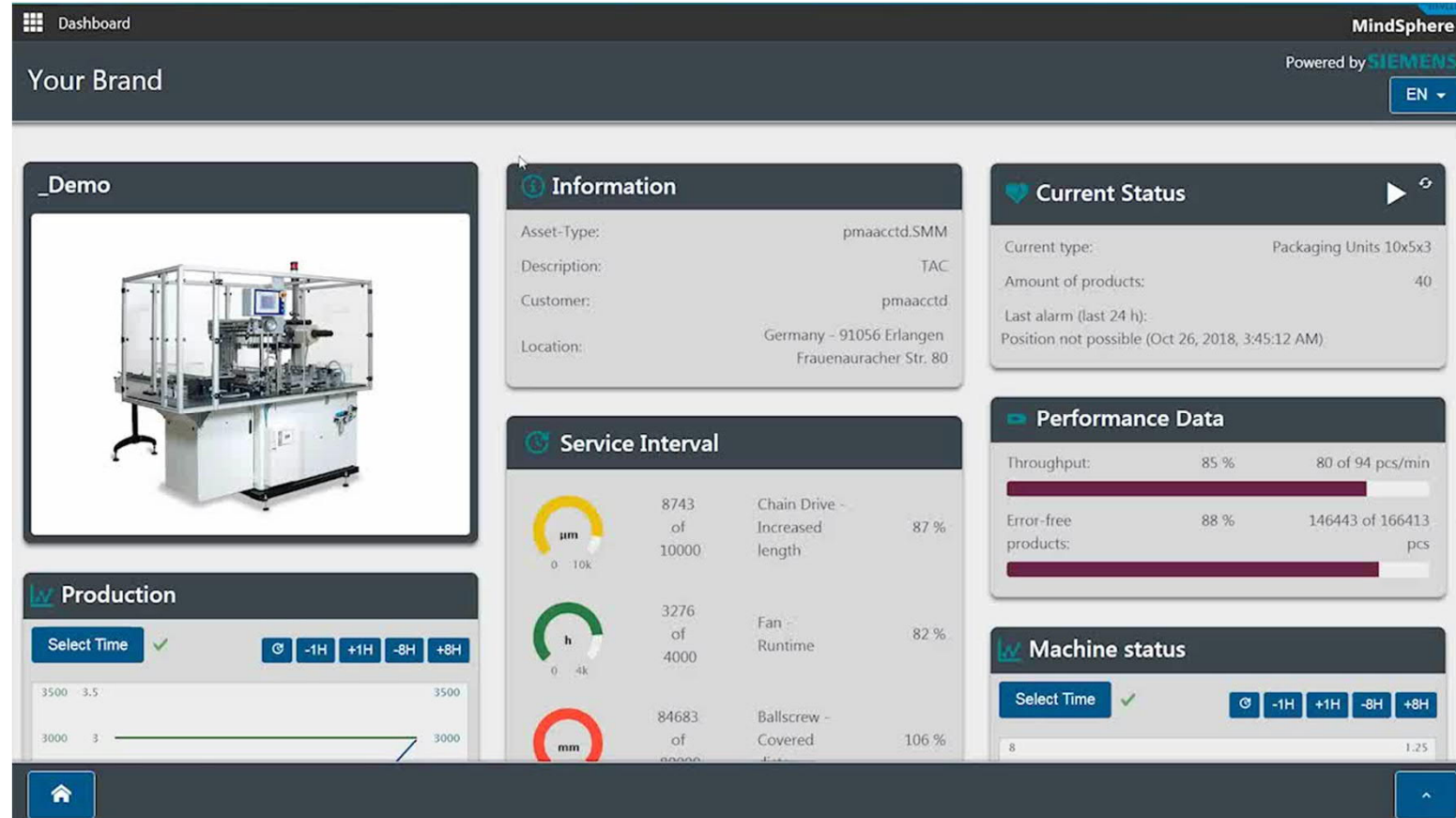
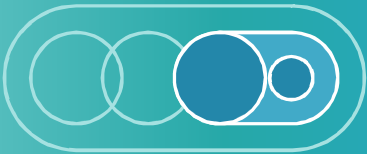


# Digital Twin Performance – Real machine in operation

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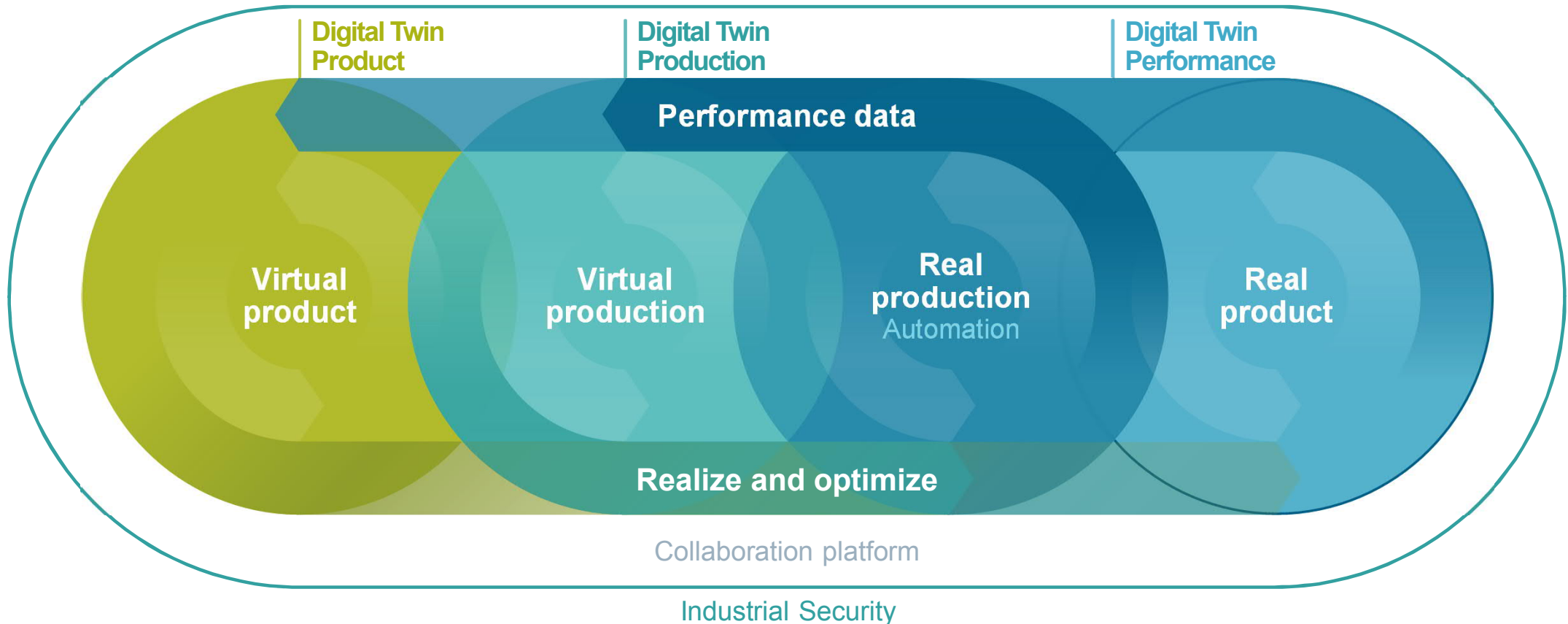
Optimize  
maintenance  
intervals  
by tracking  
machine  
condition

**SIMATIC MindSphere**  
application –  
Machine Monitor



# Continuously improve product and production in the real world

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We help our customers beyond portfolio to master their digital transformation



## Consulting

Making sure our customers' way towards digital transformation is the right one

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## Implementation

Helping customers implement and optimize the digital enterprise

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## Optimization

Continuous improvement by analyzing ongoing operations

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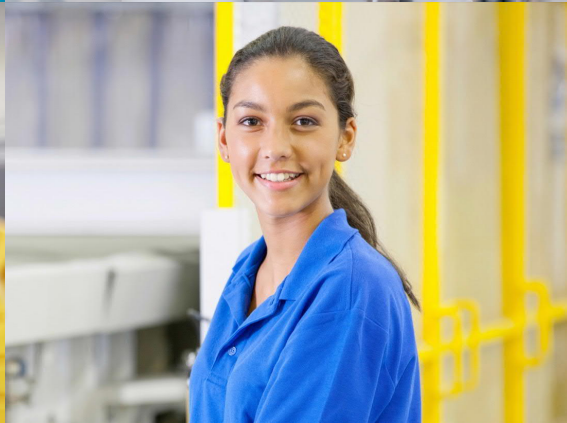
## Financing

Supporting customers with smart financing solutions

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# The experts from Digital Enterprise Services





A close-up portrait of a woman with vibrant, straight pink hair and large, dark, wrap-around sunglasses. She is wearing bright pink lipstick and a pink strap is visible on her shoulder. The background is a solid teal color.

SIEMENS

The future of  
manufacturing  
will be completely  
consumer-centric.



A close-up portrait of a woman with vibrant, straight pink hair and large, dark-tinted sunglasses. She is looking slightly to the side with a subtle smile. The background is a solid teal color.

SIEMENS

individual products

fast delivery

best quality

sustainable products

healthy products

traceable origin



SIEMENS

Fast delivery

**Systems that  
make decisions  
on their own**



The Siemens logo is positioned in the top right corner of the image. It consists of the word "SIEMENS" in a bold, white, sans-serif typeface. The background of the entire slide is a dark blue, textured space with a faint, glowing map of the world. Overlaid on the map are several icons of computer monitors, each displaying a stylized factory icon. These monitors are connected by a network of thin, white lines, suggesting a global digital infrastructure or data flow. The overall aesthetic is high-tech and futuristic.

SIEMENS

Individual products

**Produce as  
flexibly as possible,  
anywhere, anytime**



SIEMENS

calculating  
CO<sub>2</sub> footprint

A  
B  
C

Sustainable products

**Knowing the exact  
CO<sub>2</sub> footprint of  
anything we build**

CO<sub>2</sub> PER MONTH  
E NAME

Usage of Resource Group: Counting



Usage of Resource Group: Operations



Usage of Resource Group: Planning



SIEMENS

# Human vs. Machine?

The digital  
future starts  
today.