



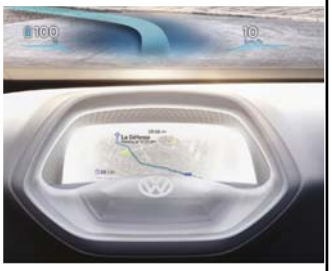

Digitization of manufacturing technologies for production of the future

Dr. Martin Goede, Volkswagen AG

Digitalisierung in der Produktion, 07. Dezember 2017, Wolfsburg

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Challenges for vehicle manufacturing of the future

Complexity increase of competition-relevant requirements

Model variety and drive variants

Demand of innovations through new competitors

Environmental awareness and sustainability

Complexity of partner and supplier networks

Complex and fast-paced software landscape

Big data as business model and data security

Intelligent equipment and production services

Generation change and customer needs

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Challenges for vehicle manufacturing of the future
Complexity increase of competition-relevant requirements

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Challenges for vehicle manufacturing of the future
E-mobility in volume segment

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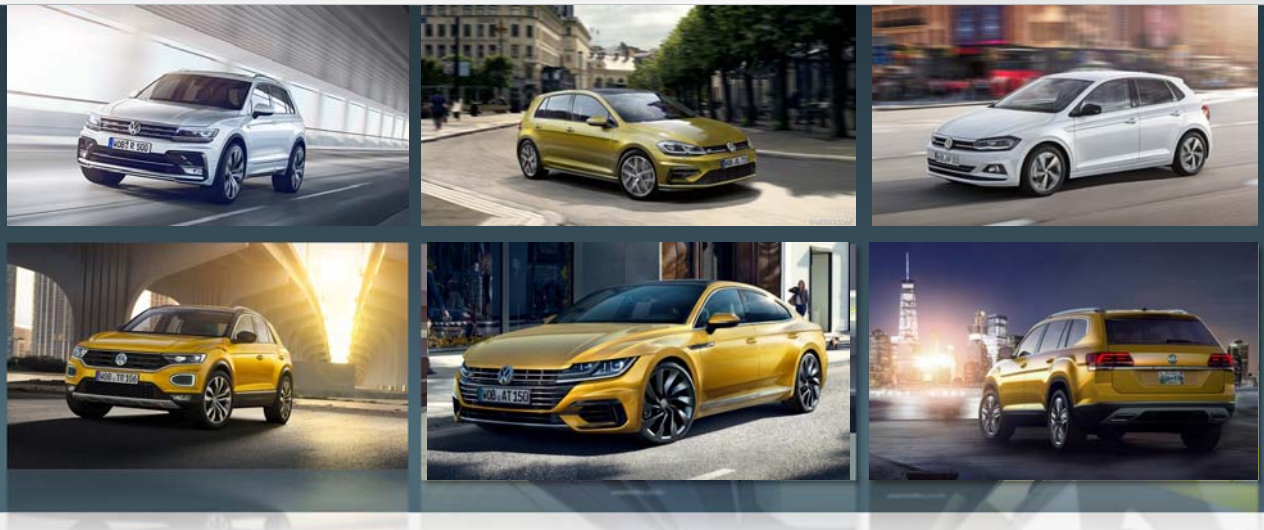
Product architecture today



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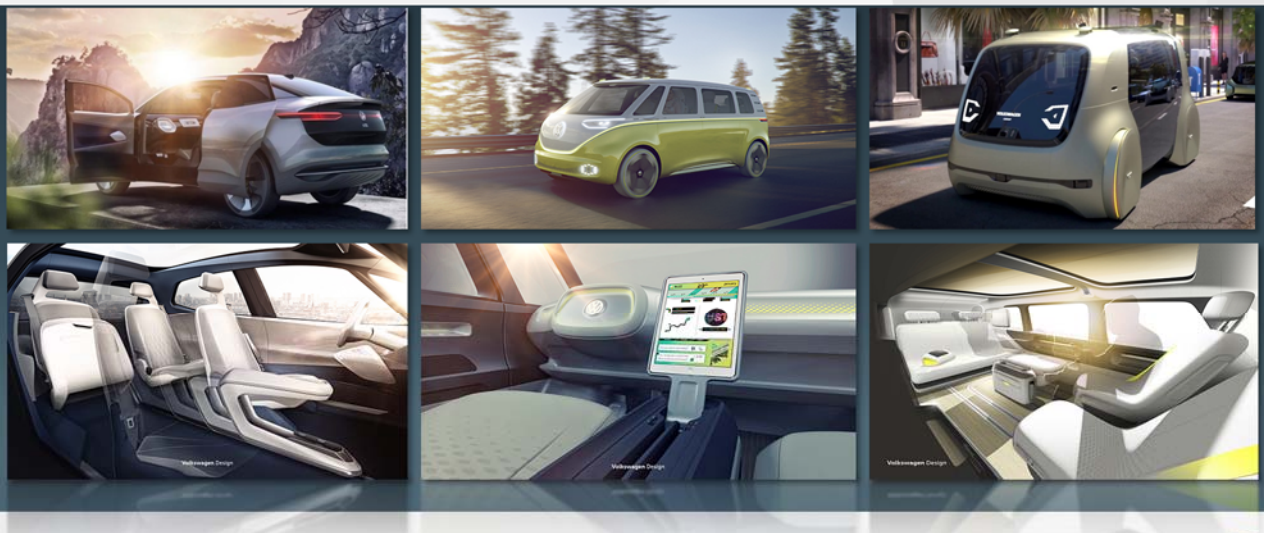
Product architecture of the future



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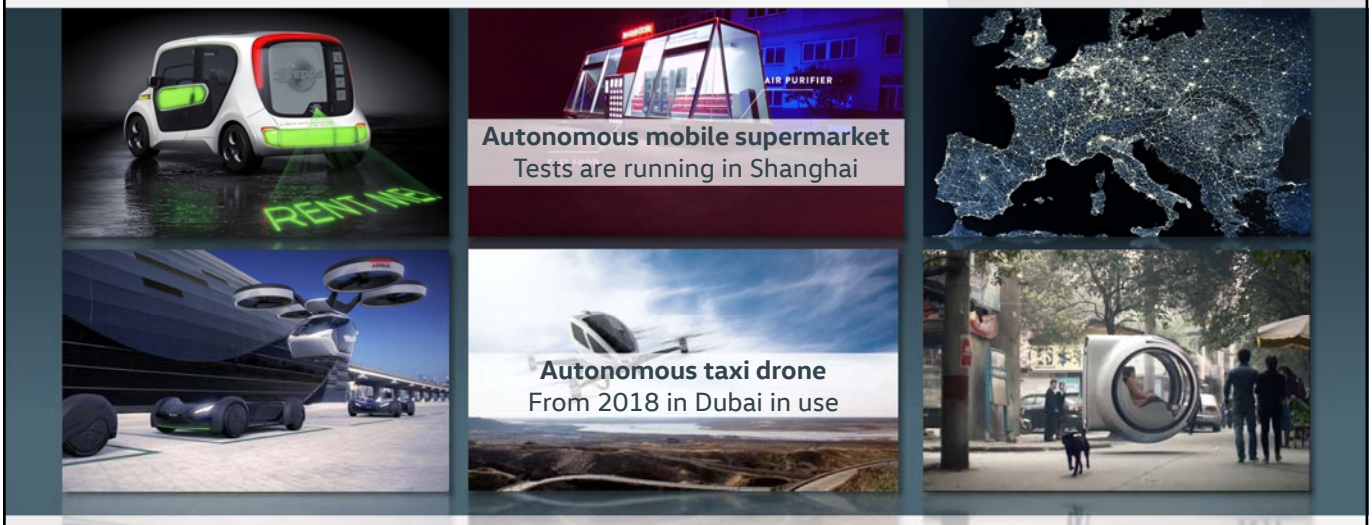
Product architecture of the future – next generation



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Challenges for vehicle manufacturing of the future

Change of added value

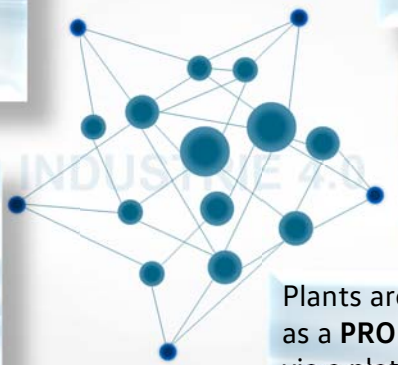
New technologies and higher customer requirements change the **PRODUCT.**


Innovative product design


Modular product design

Autonomically controlled **PROCESSES** for efficient production and logistics

Consistent optimization



Customers are involved as new **PLAYERS** in value creation and optimization.

Open Innovation

Use of **BIG DATA** to control business processes and new business cases


Data driven business models


Production as a service

Plants are organized and optimized as a **PRODUCTION NETWORK** via a platform.


Flexible product works

Value creation platform

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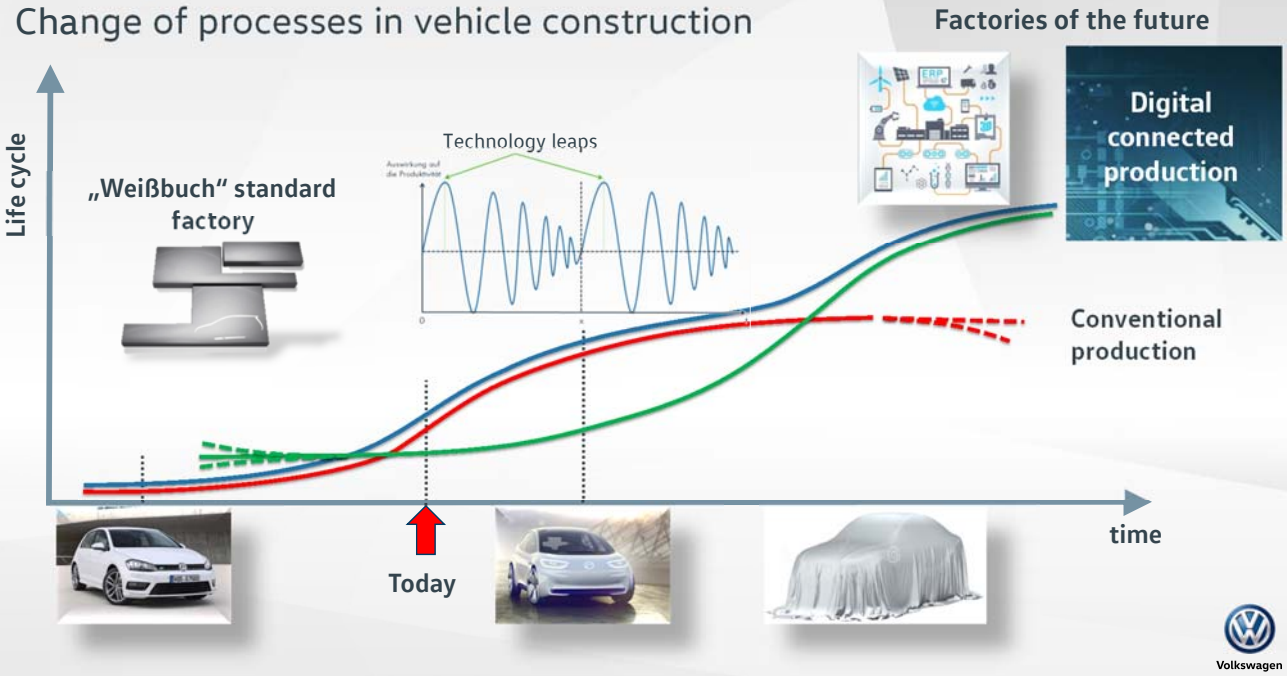
Digitally connected vehicle production of the future

Change of processes in vehicle construction



Digital connected Production at Volkswagen

Key factors

Digital Process Chain

Continuous data supply and use in the **production network** leads to efficient value chains.

Flexible Production

Modular manufacturing systems enable flexible, **agile production**.

Internet of Things

Self-optimizing systems, reduced integration effort and permanent information.

Human Empowerment

Digitally supported **decision processes** and coexistence of human and machine.

Big Data & Smart Analysis

Plant monitoring and **self-control** increase availability and reduce maintenance.

Artificial Intelligence

Independently operating systems, self-learning systems and assistants relieve the strain on people.

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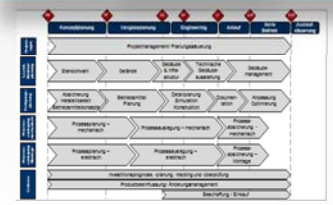
Key factors – Digital Process Chain

Consistent development, planning and production

Current Factory and planning processes (2016)

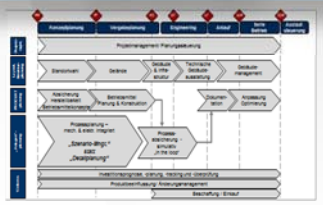


Disruptive change

Autonomous and **universally** usable systems of the future with **independent** implementation of the **production steps**.

→ **Scenario management** instead of **detailed layout and Plant planning** (including process simulation and flexibility, quality and cost assessment)

Factory and planning processes of the future (2025)



New processes require new planning systems

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Key factor Human Empowerment

Complexity control by digital assistants

Analogous

Computer-based

System supported

Connected

Mobile

Intuitive

We bring technology closer to the people.

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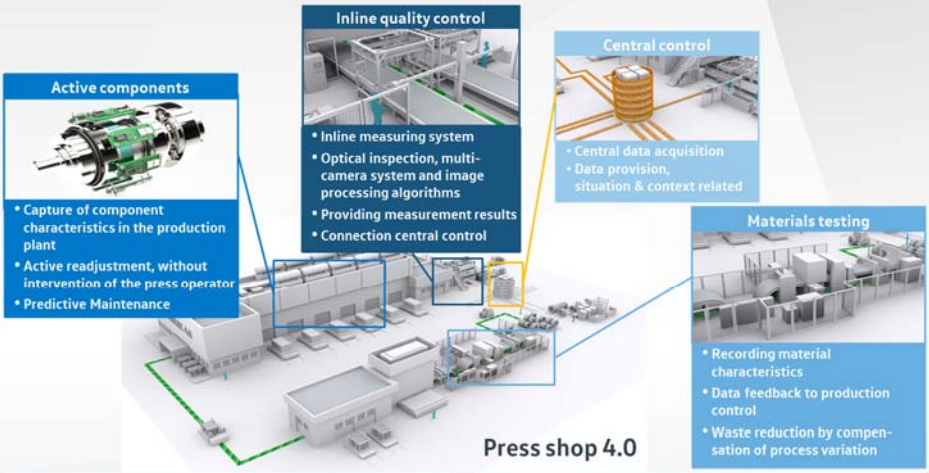
Key factor - Big Data und Smart Analysis

Performance increase through intelligent machines and systems



- Press shop with self-controlling processes by coupling innovative technologies
- More transparency and productivity

- Reduced machine downtime
- 100% testing
- Reduction waste

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Key factor – Artifical intelligence

Performance increase through intelligent software and machines

Smart Personal Assistent

Chatbots do simple tasks:

- Home-automation
- Task lists
- Opel: Test drive
- BMW: Home & Car

Automated Speech Recognition

Chatbots recognize natural language

- Use in schools / universities
- Control of software
- Convert error description into standard text

Neural Machine Translation

Detection and translation of different languages

- Loss of communication limits
- Cultures are approaching

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Key factor – Artifical intelligence

Performance increase through intelligent software and machines

Classic construction	Optimisazion by simulation	Automated design
		
Design according to the experience of the designer	Design according to simulation loops	Design and construction according to genetic algorithms, production by 3D printing
• Weight: ↑	• Weight: →	• Weight: ↓
• Cost: ↑	• Cost: ↗	• Cost: ↓

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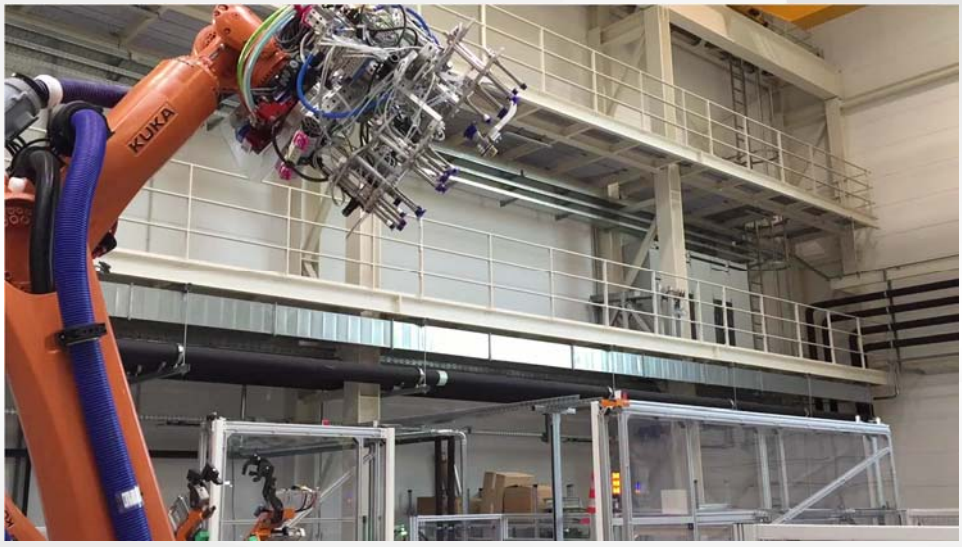
Key factor – Flexible production (Gripper)



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Concept "moving screwing module" for flow operation (VW Tiguan) - Volkswagen Osnabrück

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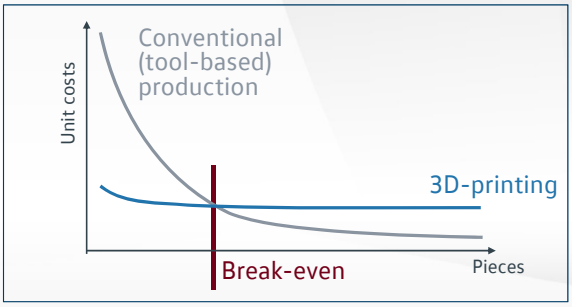
Potentials of new production technologies
Generative production of tools and components

1 Extended design freedom

- Advanced design options
- Functionalization

2 Individualisation and variant variety

- Individualization
- Complexity



3 Accelerated development cycles / Time-to-market

There are high potentials for the automotive industry

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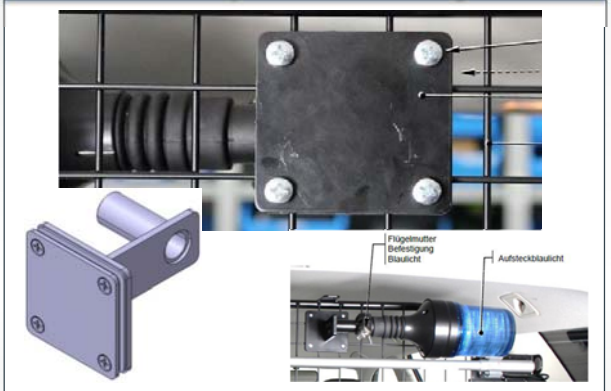
Potentials of new production technologies
Generative production of plastic components

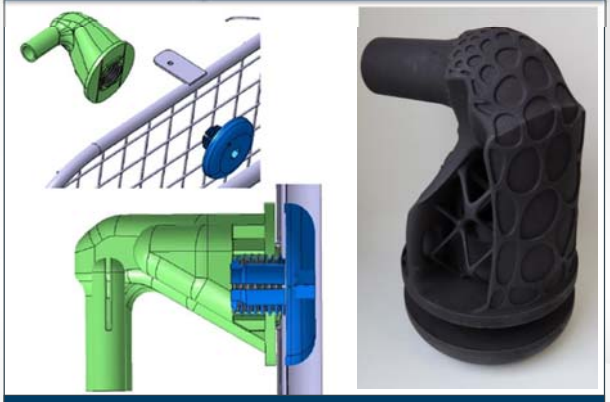
Series production today



Flashing blue light holder, Duplicate part R-GmbH
Weight: 687 Gramm (steel)

Small batch: < 500 Units/Year

Series production tomorrow



Flashing blue light holder, 3D printing, SLS-method
Weight: 137 Gramm (plastic PA12)

Small batch: < 500 Units/Year

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3D-Printing „Vision 2025“

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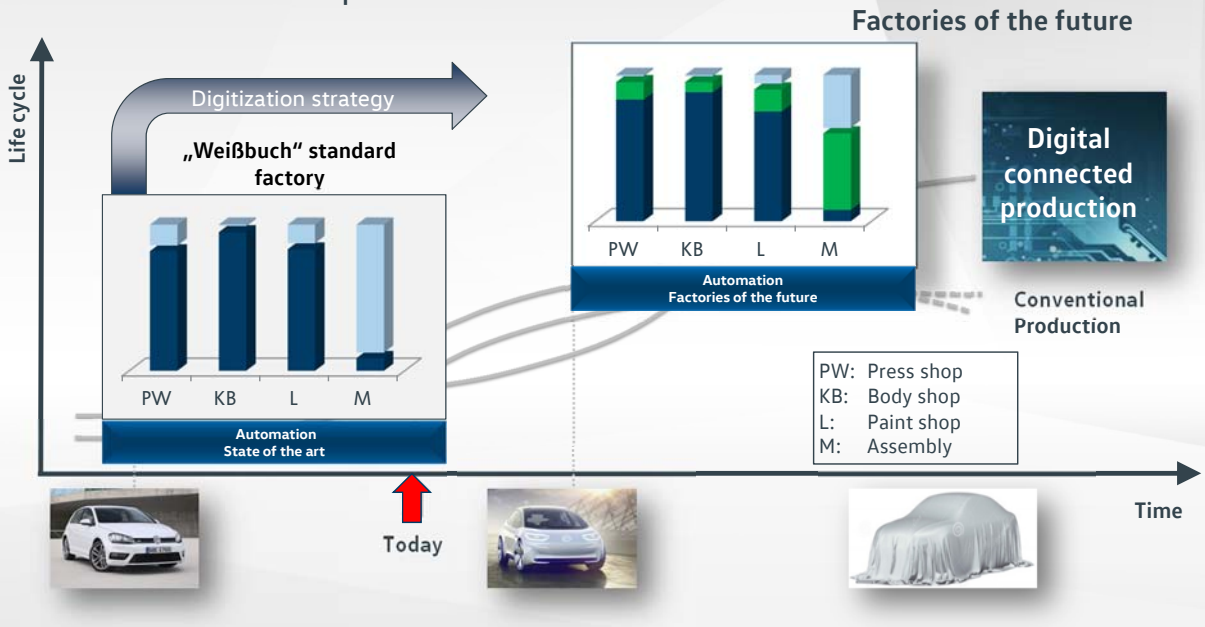
Efficient production and factory automation

Automation in vehicle production



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Efficient volume production technologies in factories of the future

Conclusions

- Intensive transformation of products
- Significant Technology push
- Increase of Complexity

- Improving economic and ecologic efficiency
- Digitalization of entire Process Chain

- New Dimension of Innovation implementation
- New Dimension of Collaboration networks

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Digitization of manufacturing technologies
for production of the future

Thanks for your attention!

Dr. Martin Goede, Volkswagen AG

Medienworkshop Digitalisierung in der Produktion, 07. Dezember 2017, Wolfsburg

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