European Industry Partnerships – Lighthouses to Thrive in the New Digital Age

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5G for Smart Manufacturing

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Production research from the cutting edge to 5G - Yesterday

Georg Schlesinger
(1874-1949)

"The dividends sit on the cutting edge of the steel, but the speed of these cutting edges is a function of the machines that move them." (1911)

Value creation starts with producing chips!

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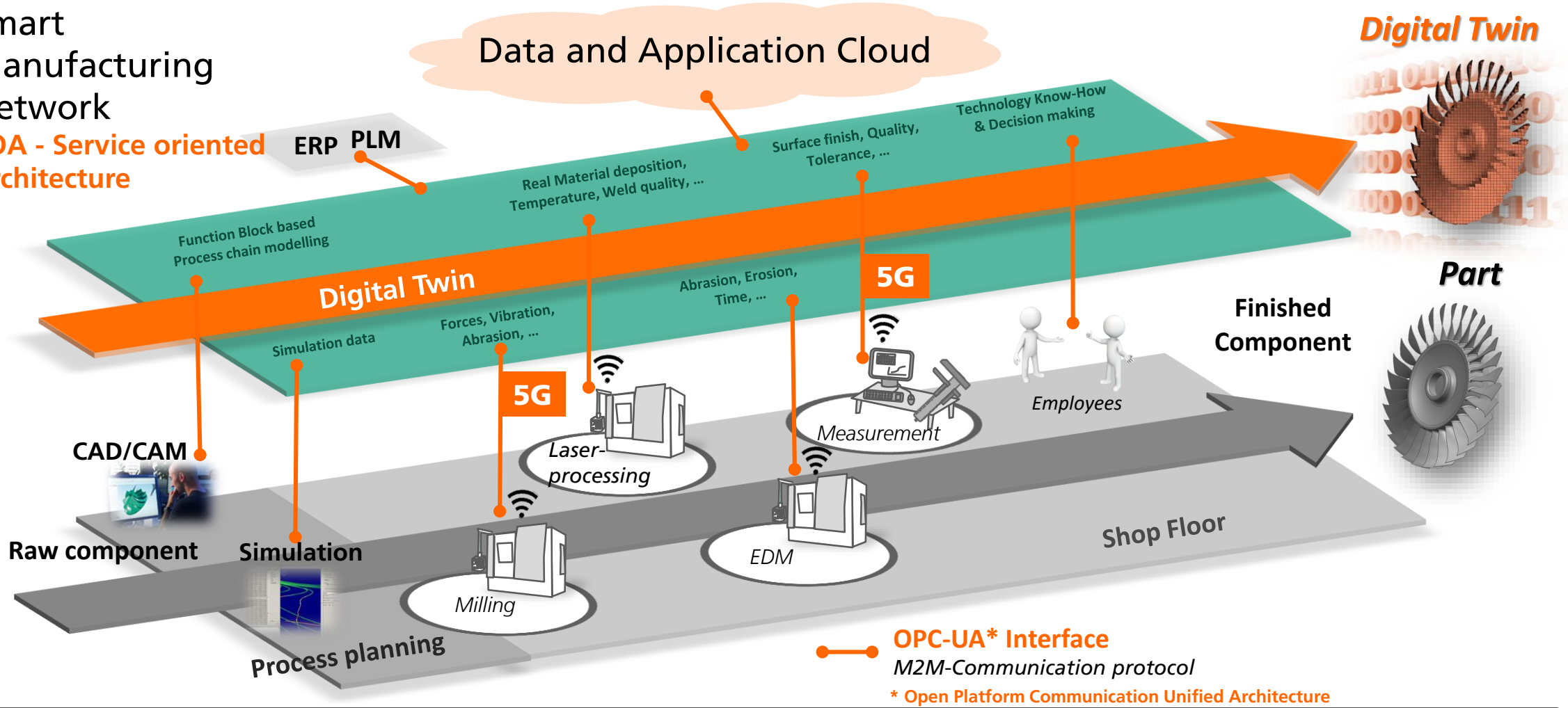
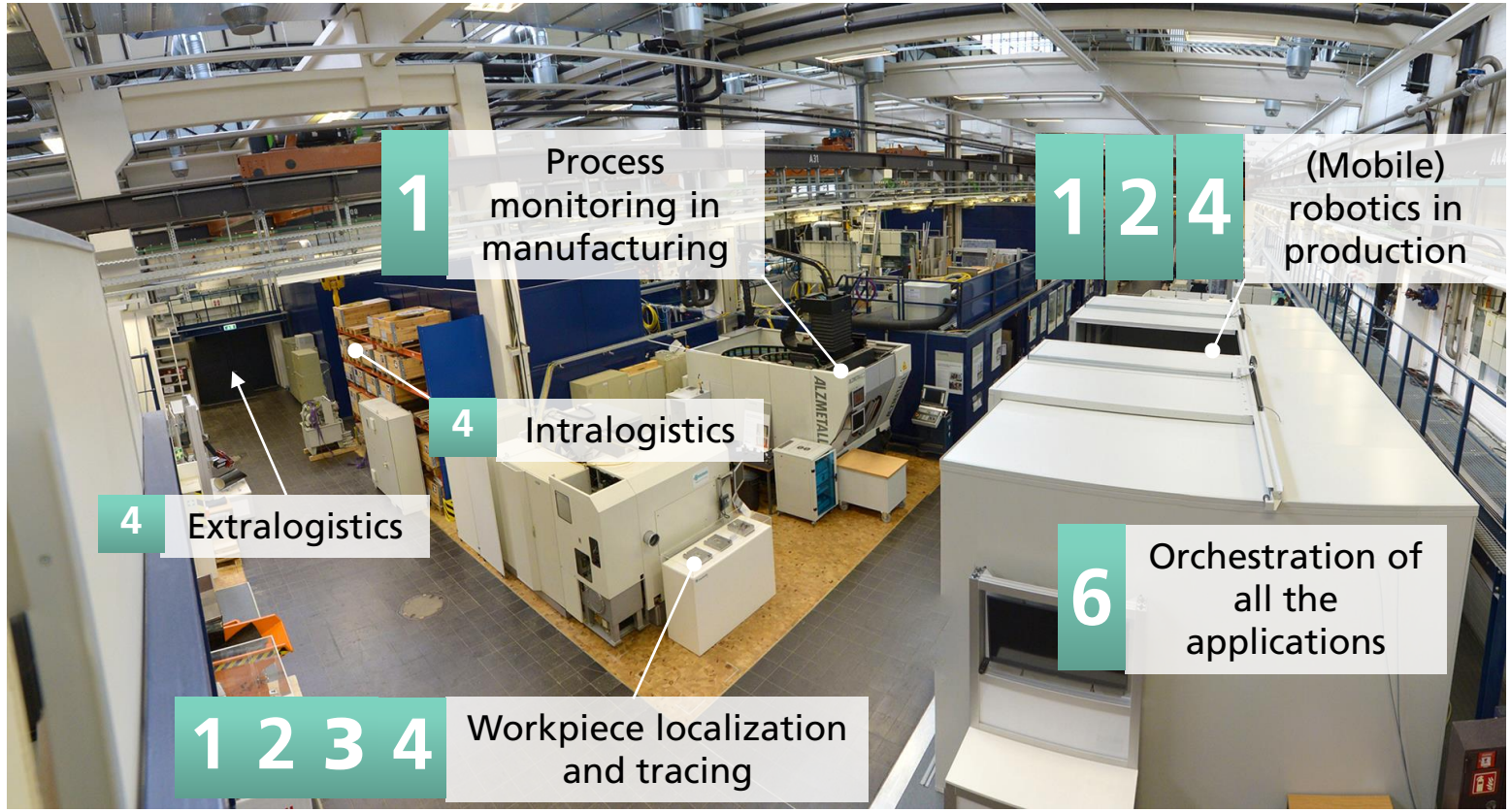
Target Architecture: Smart Manufacturing Network



Use case scenarios for 5G in production



1	Ultra-reliable low latency communication (URLLC)
2	Enhanced mobile broadband (eMBB)
3	Massive machine-type communication (mMTC)
4	Localization
5	Cross-site end-to-end communication
6	Slicing

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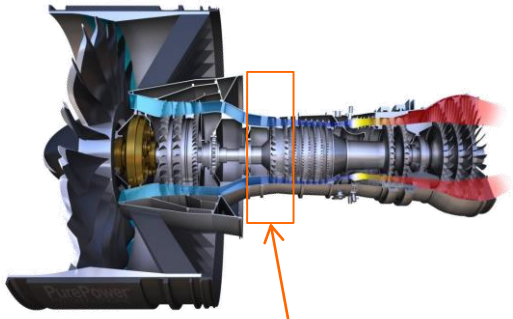
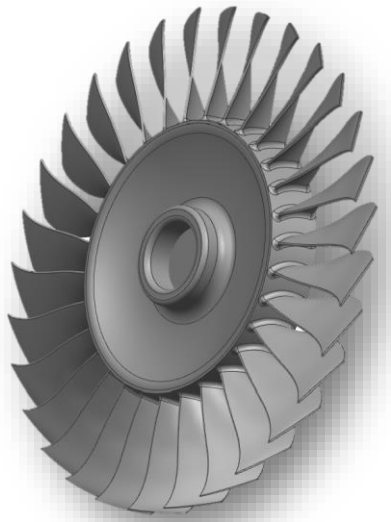
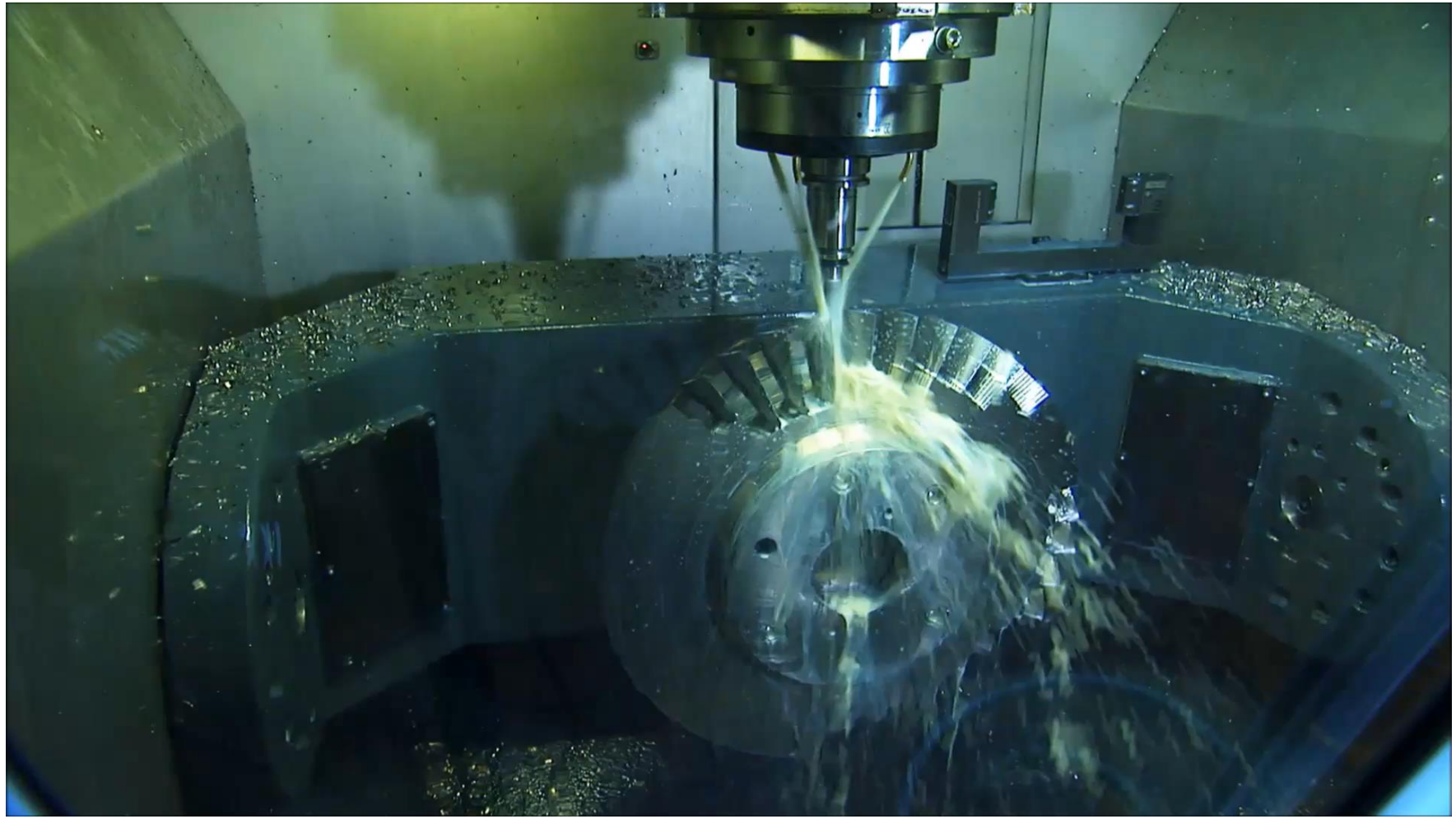
5-axis milling of BLISKs

Pratt & Whitney PW1100G Engine







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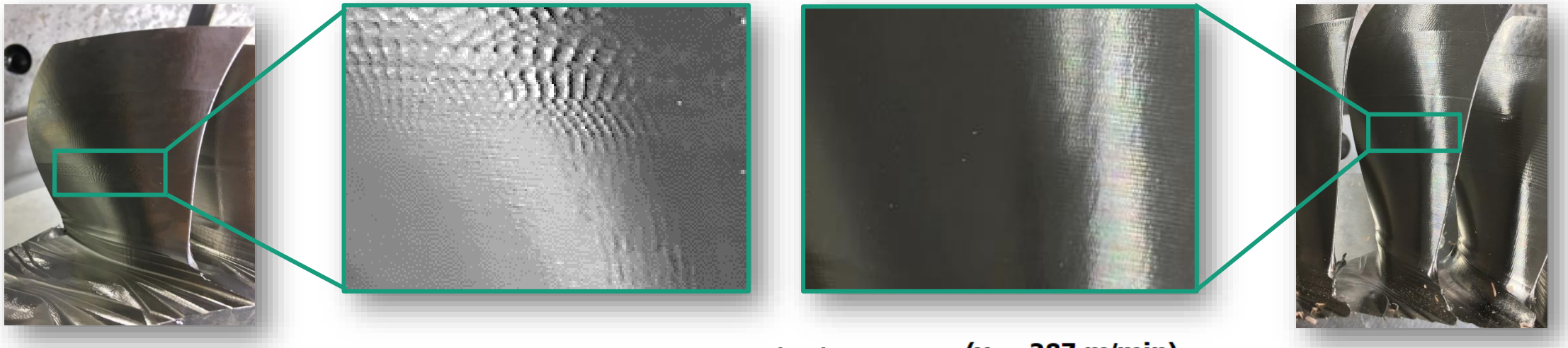
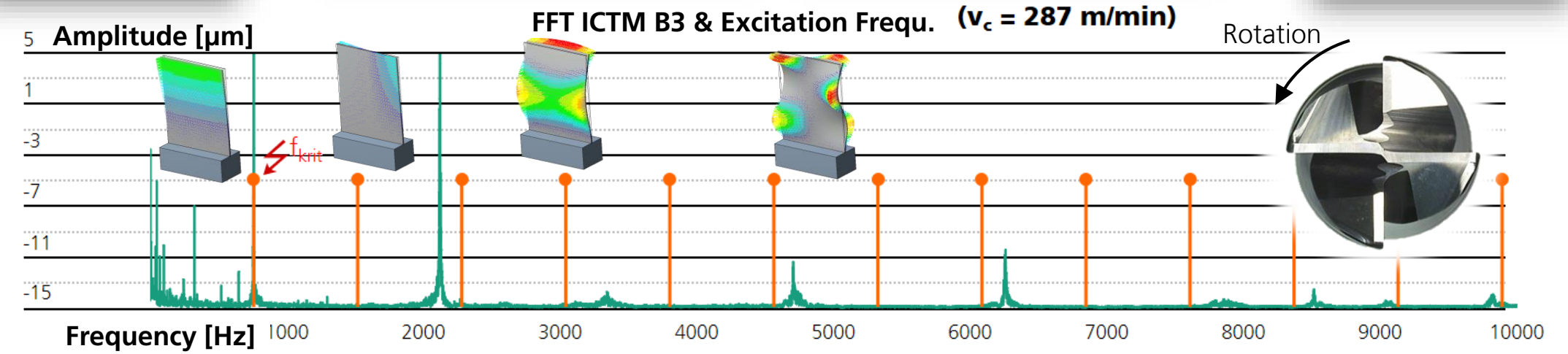
Stability Indication from FFT





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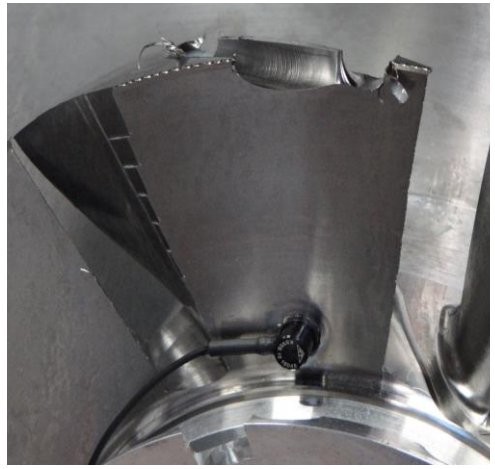
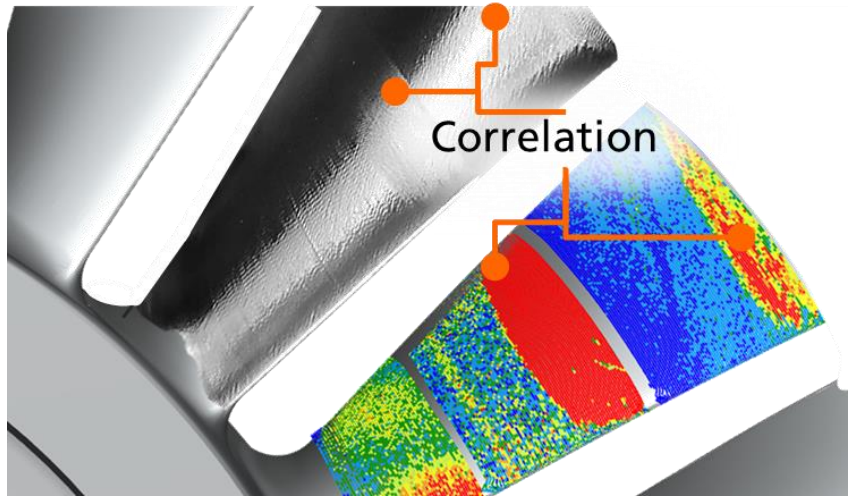
5G Use Case Blisk Manufacturing



- Blisks (= blade integrated disks) are integral parts of modern turbomachines
- Manufacturing is mainly done by different milling process steps
- Manufacturing needs to be monitored to avoid flaws (e.g. vibration marks using acceleration sensor)
- 5G transmission of sensor data enables real-time process control



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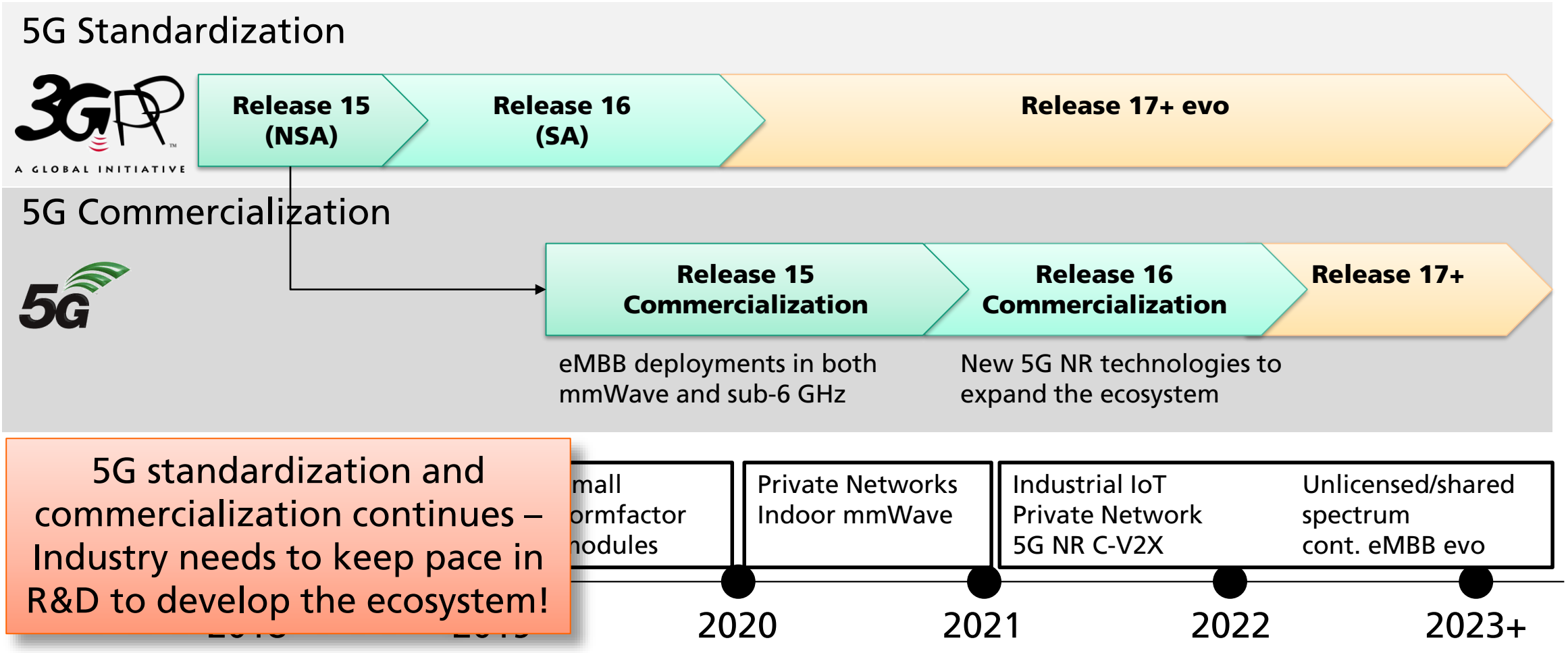
Convergence of 5G and production



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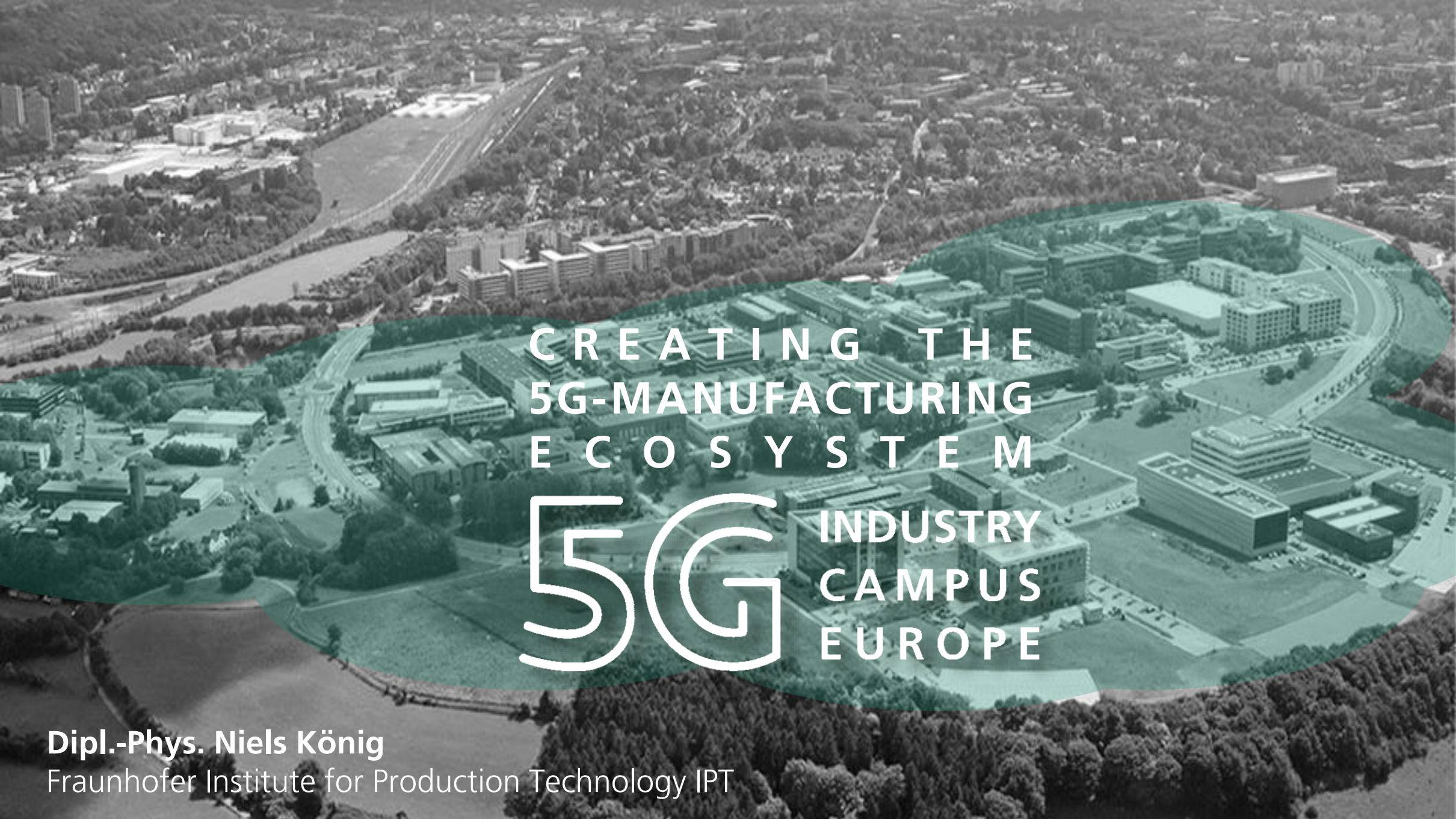

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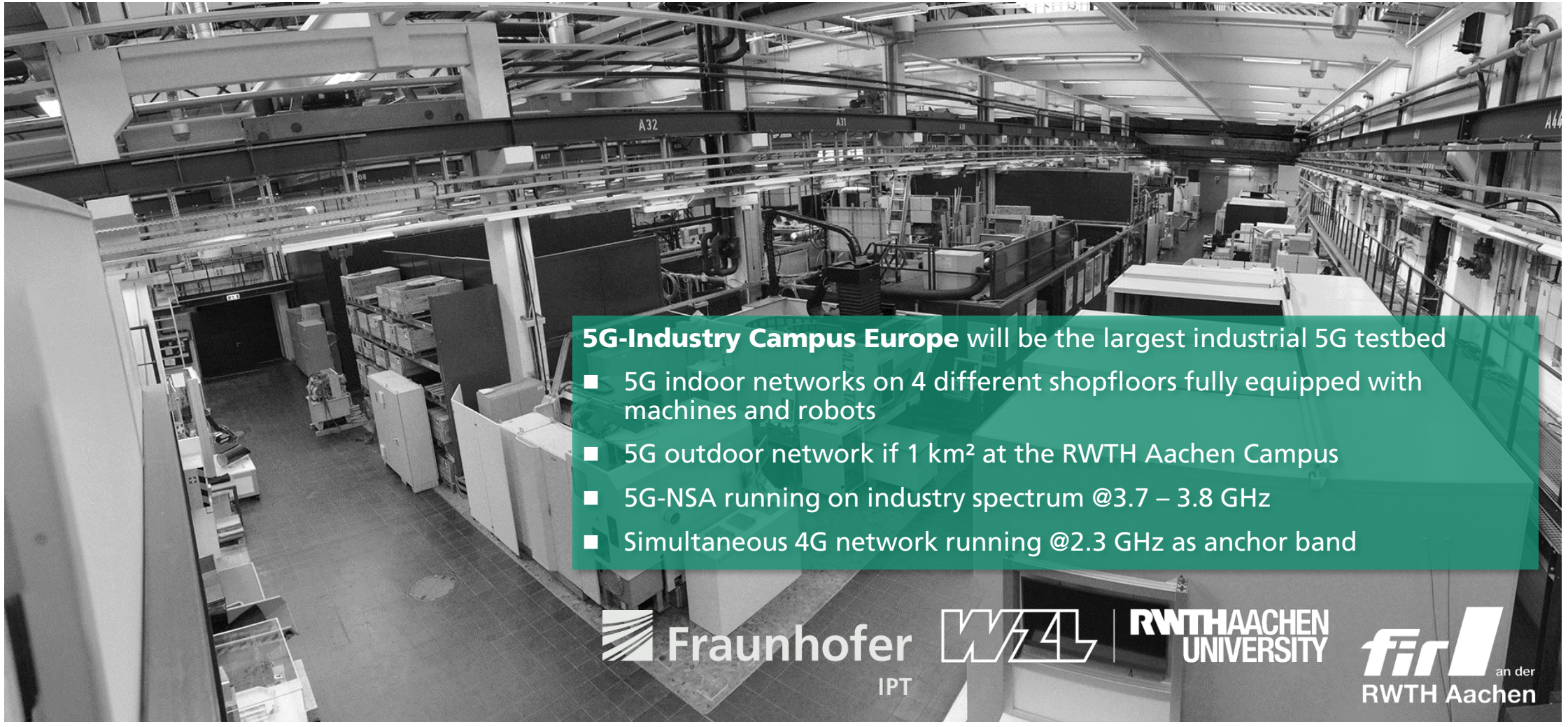
Project for build-up and establishing

5G-Industry Campus Europe



5G INDUSTRY CAMPUS EUROPE

Implementation projects 5G-Industry Campus Europe

5G-AE Sensor

- development of wireless acoustic emission (AE) sensor
- detection of tool breakage and wear

5G-Logistics

- AGV navigation
- transition from indoor to outdoor network
- remote navigation

5G-Multisensor

- multi-sensor platform
- workpiece monitoring and localization
- machine condition monitoring

5G-Blockchain

- data economy for multiple data streams
- connected to blockchain operations

5G-Robotics

- mobile robotics
- sensor guided operation with centralized data processing

5G-Cockpit

- production cockpit with 5G remote machine and sensor connectivity
- digital twin visualization

5G-3D

- wireless optical 3D laser scanner
- seamless machine and robot integration and synchronization

5G-Edge-Cloud

- integration of on-premise edge-cloud
- low-latency data analytics for closed-loop operations

Thank you for your attention!

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