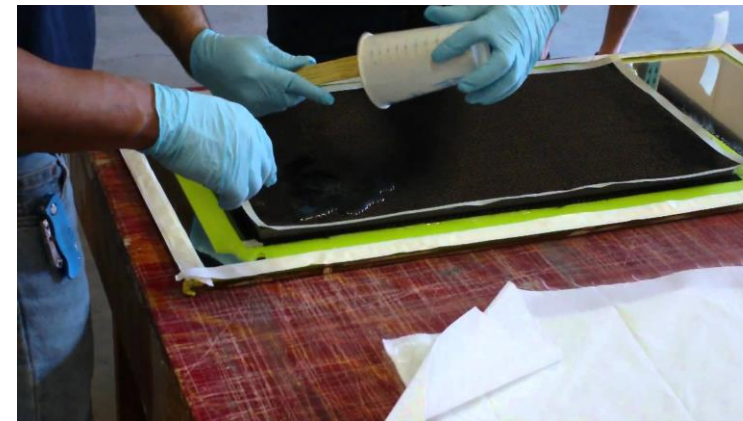


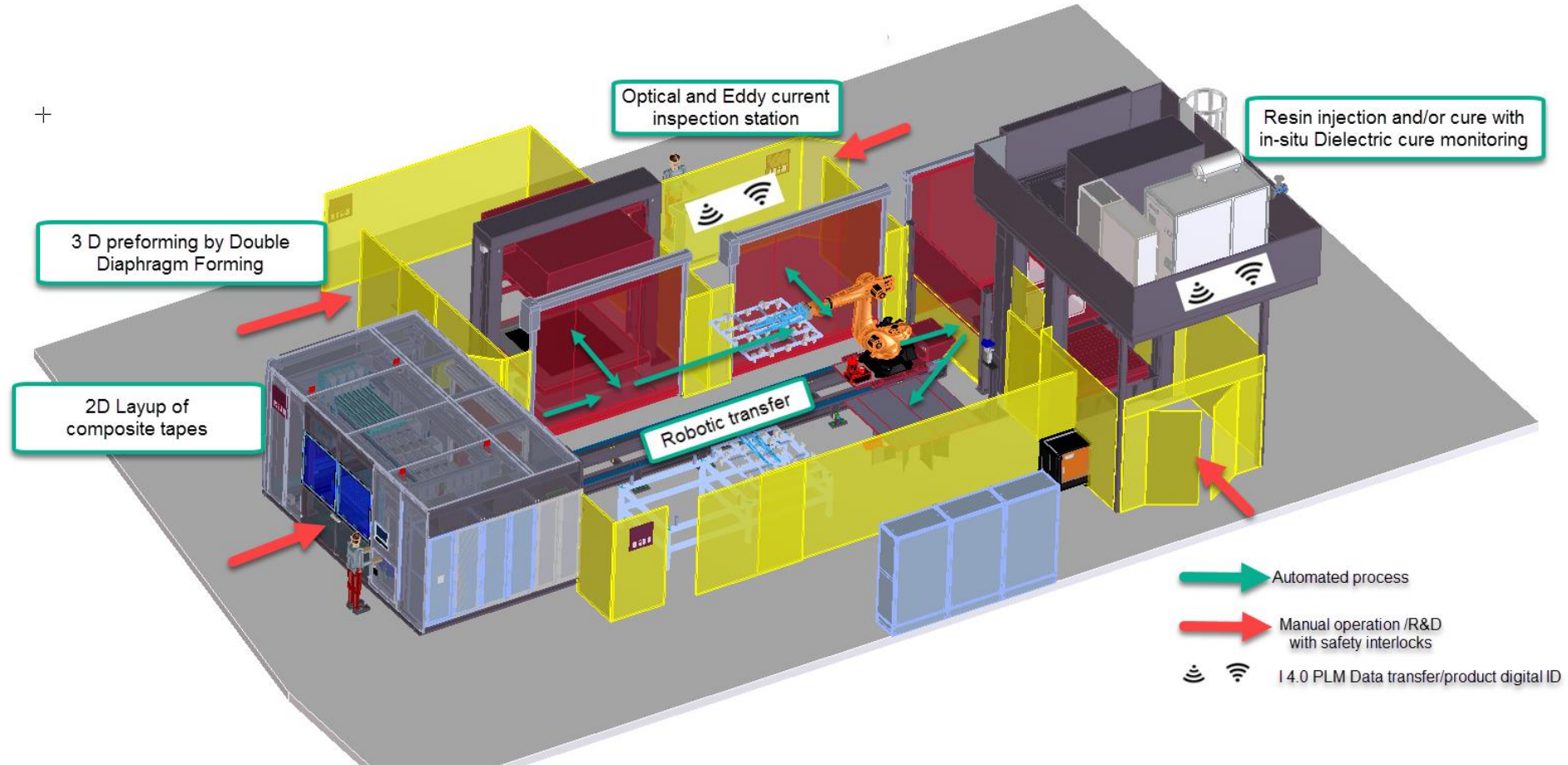
SWINBURNE UNIVERSITY OF TECHNOLOGY

Challenges for Carbon Fibre Composite Manufacture

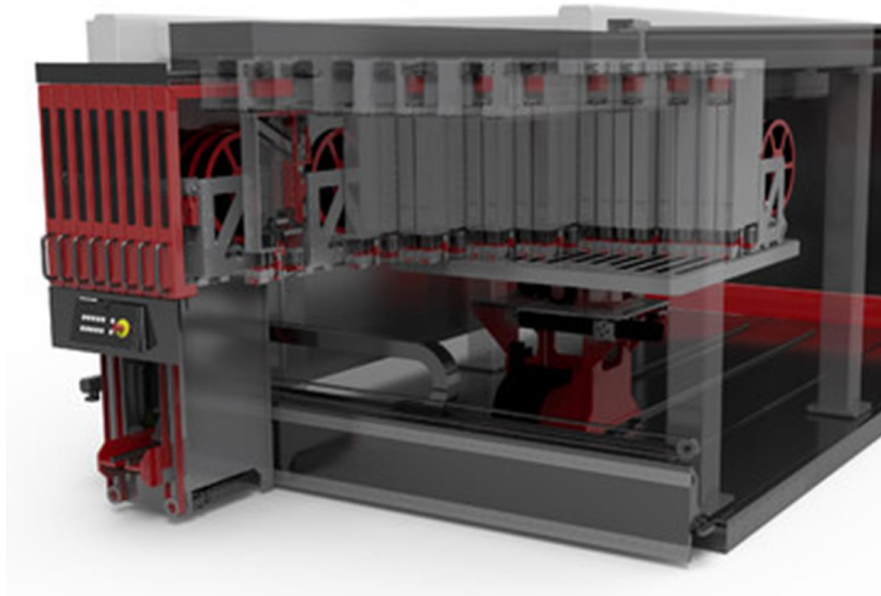
- Key challenges are cost and rate
- Global design teams – standardization, collaboration, parallelization of work flows
- Smart materials, embedded sensors, predictive maintenance
- Process Simulation Control hardware and systems integration
- Process flexibility



Industry 4.0 Testlab for 3D Printing of Composites The Fully Digitalized Pilot Plant



Industry 4.0 Testlab for 3D Printing of Composites

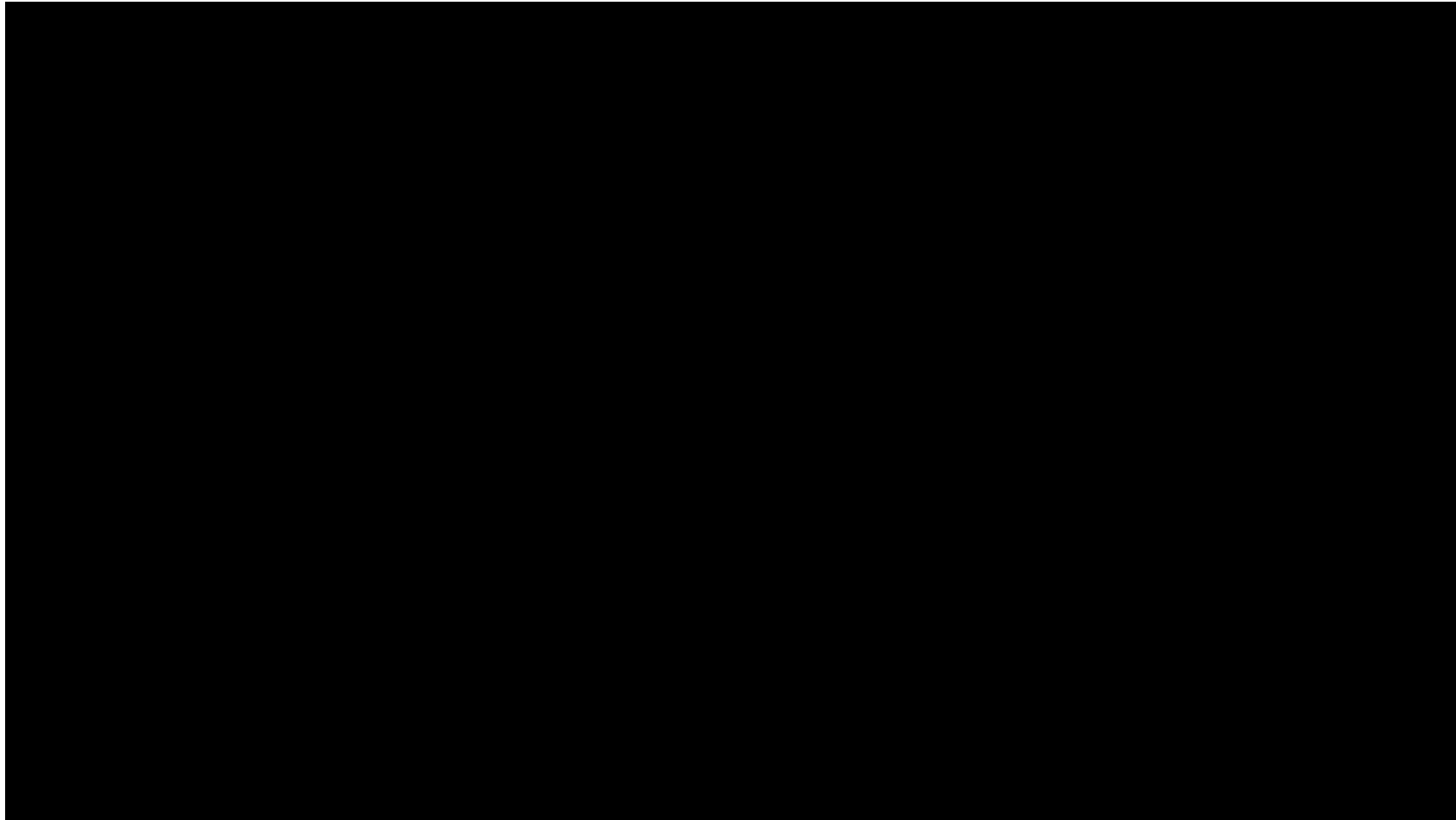


<https://youtu.be/hgkopga7u10>

FILL MULTILAYER PROCESS

- WORLD FIRST
- Capable of creating a 2D near net shape preform (this reduces carbon fibre waste from 60% to 10%)
- RAPID – one layer of fibre every 15 second
- INDUSTRIAL scale parts 1.6 x 1.6m

Fill Multilayer Process



<https://youtu.be/hgkopga7u10>

Global Innovation Linkage Project



Swinburne University of Technology and its international industry and research partners have been awarded received \$1 million of research funding through the Global Innovation Linkages Program led by the Department of Industry, Innovation and Science (AusIndustry).

The total value of the project is \$3.6 million. The project is focused on Industry 4.0 manufacturing of high volume lightweight composites.



ARENA2036



ARENA2036 Research Campus at the University of Stuttgart

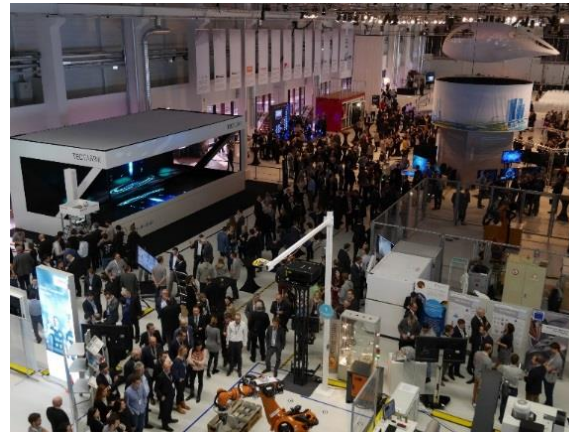


ARENA2036 – Active Research Environment for the Next Generation of Automobiles

ARENA2036 is the largest and the leading research platform for mobility in Germany. Here, the entire value chain of the coming fully digitized vehicle is conceived and implemented. At the point of intersection where science and industry meet, ARENA2036 is the initiator of sustainable automotive engineering and automobile production for the next generation of vehicles, whereby mobility based on flexibility is understood as key element.

- LeiFu (Intelligent lightweight design with functional integration)
- DigitPro (Digital Prototype – new materials and processes)
- ForschFab (Research Factory – production of the future)
- Khoch3 (Creativity, Cooperation, Competence Transfer)

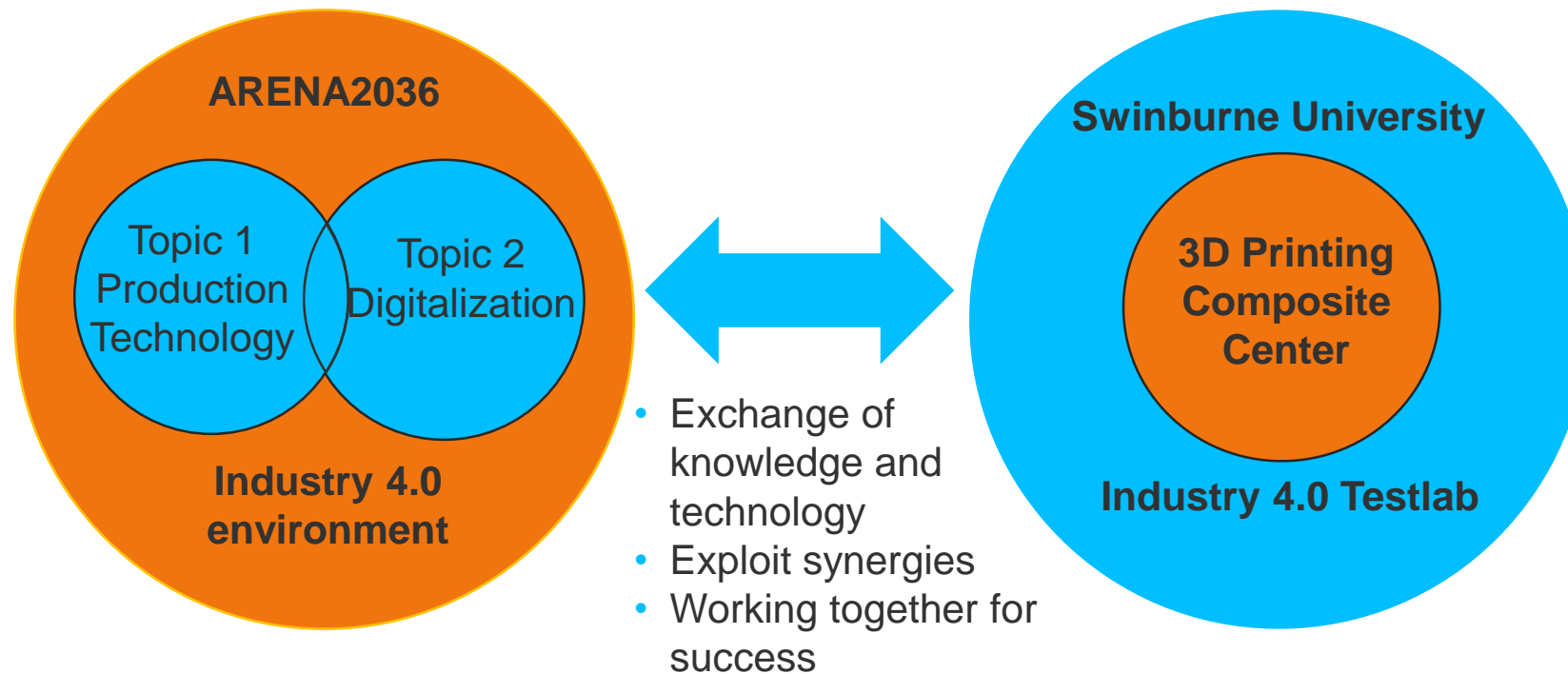
ARENA2036



Interspin – Internationalization of Excellence Clusters

Cooperation between ARENA2036 and Swinburne University

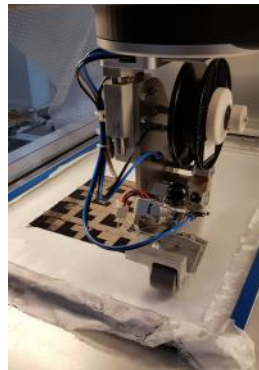
Application for 2 x 1 million euro projects through the BMBF (Germany) to support collaborative research



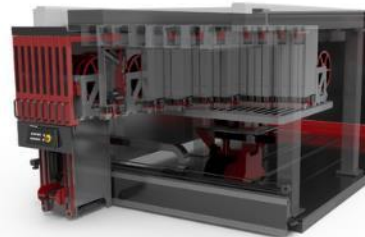
Integration of flexible and reconfigurable preforming systems



Automated 2D Layup systems



Fixed tow placement by M&A Dieterle/IFB



FILL Multilayer

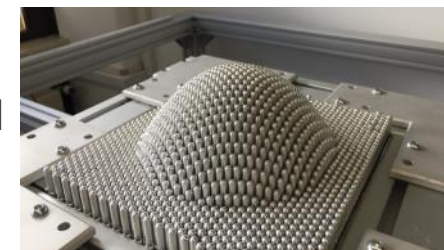
Automatically configured draping systems



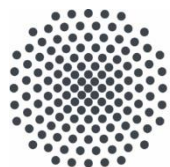
Flexible draping cell at IFB



Dynapixel tool by CIKONI

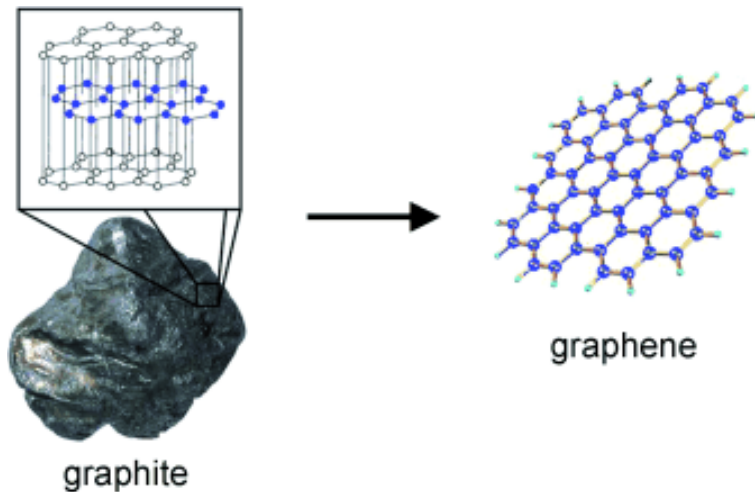


„any geometry, any volume“



Graphene Supply Chain Certification

- Key challenges – scale de-risking supply chain
- Imagine Intelligent Materials - focusing on high volume applications
- 1st product release: imagine X-3[®] with Geofabrics (Aust)
- Global geosynthetics sector will be \$18B market by 2018*
- Certification and licensing business model



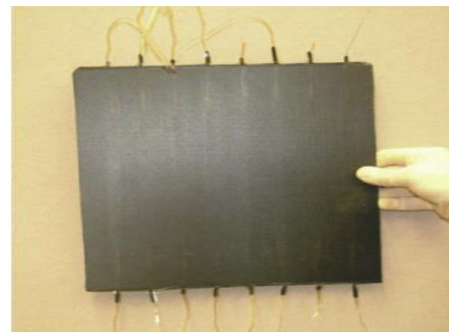
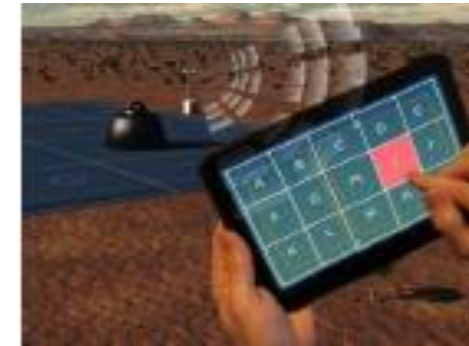
“When Graphene becomes price competitive.....it could significantly disrupt the manufacturing and infrastructure industries”

The Fourth Industrial Revolution (2016)
by Prof Klaus Schwab

Graphene Enabled Smart Structural Composites

Multifunctional structural composite materials

- Strain/stress sensing (structural vibration control, traffic monitoring)
- Damage sensing (structural health monitoring)
- Temperature sensing (thermal control and structural performance control)
- Thermoelectricity (thermal control and energy saving)
- Flow sensing



Graphene Enabled Smart Composite Demonstrator



THANK YOU

