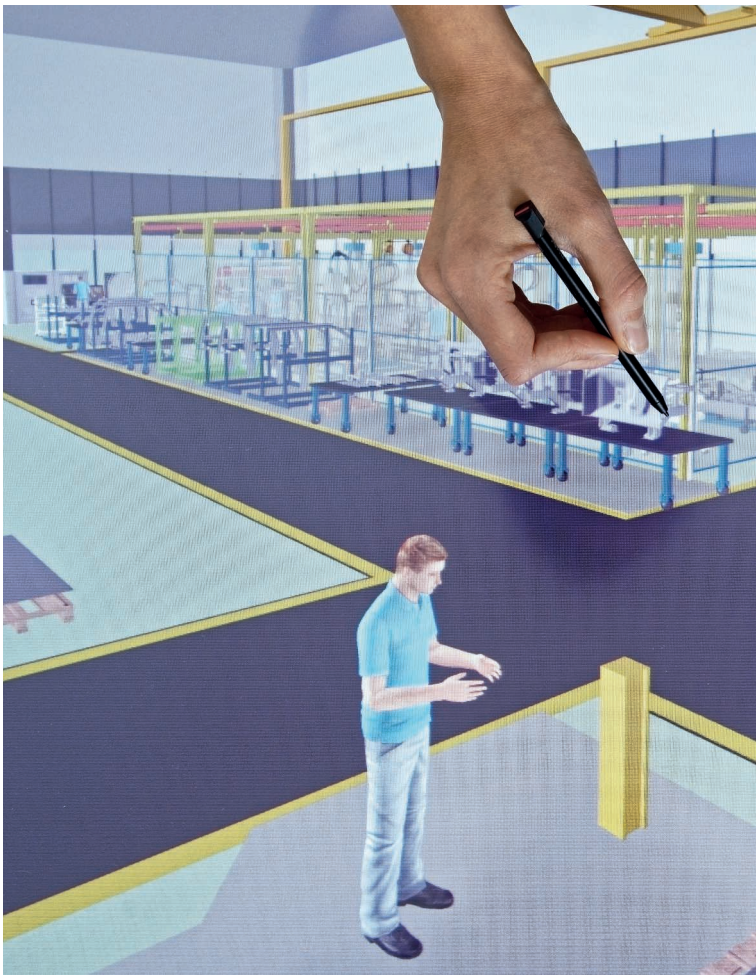
The Internet of Production will change the world

RWTH Aachen University is one of Europe's leading universities of technology. Its vision is to tackle today's global challenges — starting with how to digitalize production engineering.



RWTH's mission is to become the pacemaker for digitalization in production engineering – thereby helping manufacturing industries become more competitive, speed up their innovation process, and educate their experts and operators. This great ambition is embodied in RWTH's new Cluster of Excellence: the Internet of Production. Head of the Cluster at RWTH's Laboratory for Machine Tools and Production Engineering, Christian Brecher, declares: "In this Cluster, a blueprint for the Internet of Production will be researched and validated in practice." And this is truly unique.

For more than ten years, RWTH has benefitted from substantial funding provided by the Excellence Initiative, enabling it to pursue its vision of becoming 'The Integrated Interdisciplinary University of Technology', and tackling global challenges such as Industry 4.0. Today, RWTH is recognized as one of Europe's leading universities of technology in the Times Higher Education World University Rankings. Over the past decade, RWTH has expanded its student body, academic staff, and budget by more than 50%. A total of 45,000 students are currently enrolled in 157 courses of study at the university, which boasts a particularly diverse student body with more than 10,000 international students from over 125 countries.

In 2017, RWTH received total funding in the amount of 948 million euros, of which 360 million was secured from external sources RWTH graduates are highly sought-after, particularly in the fields of mechanical engineering, electrical engineering, business and economics. In fact, the university secured place 60 for global graduate employability in the 2019 QS World Rankings. RWTH aims to promote a unique research environment that embraces the convergence of humanities, economics, and engineering, alongside natural and life sciences.

MEETING FUTURE CHALLENGES

RWTH was very successful in the recent Excellence Strategy competition run by the German federal and state governments. Thanks to this initiative, RWTH now receives funding for three Clusters of Excellence: the Fuel Science Center; the Internet of Production; and Matter and Light for Quantum Computing (ML4Q), which was developed together with the University of Cologne and the University of Bonn. "This great result will be instrumental in driving the University forward", declares Ulrich Rüdiger, rector of RWTH Aachen University.

"This is a very appealing and welcoming place for research, work, and study. A place to be." Matthias Wessling, the university's vice-rector for research and structure, adds: "We feel acknowledged in our choice and definition of research areas, which the reviewers deemed apt for addressing future challenges of great societal relevance."

The Fuel Science Center will develop methods and generateinsights regarding the move away from fossil fuel-based engines to adaptive production and drive systems that are based on renewable energy and alternative carbon sources.

The aim of ML4Q is to develop new computing and networking architectures using the principles of quantum mechanics. The Internet of Production describes the transfer of the Internet of Things to the world of production. "Modern production is characterized by vast amounts of data. However, these data are neither easily accessible, interpretable, nor connected to the development of knowledge," explains Christian Brecher. "With the Internet of Production, our vision is to enable a new level of cross-domain collaboration by providing semantically adequate and context-aware data from

The planning table in the Aachener Produktionstechnik means that planning and designing a factory that includes plants and machines can be almost completely digital.

A research group tests industrial robots.

A team uses the virtual reality aixCAVE to help them visualise a geological investigation.

CREDIT FOR ALL PHOTOS: RWTH AACHEN UNIVERSITY/PETER WINANDY

production, development, and operation."

RWTH's research infrastructure boasts an extraordinarily wide range of production technologies. Working with metals, plastics, textiles, and composites, researchers can apply their knowledge of these materials using technologies such as casting, molding, forming, machining, joining, and additive manufacturing. The RWTH Aachen Campus — one of the largest research sites in Europe — is formed of multiple labs that inspire the development and validation of the Internet of Production concept. "Bolstered by our strong competencies in computer science, we have created a unique 'playground' that brings computer scientists and engineers together," says Brecher.

"WE CREATE A UNIQUE 'PLAYGROUND' FOR BRINGING COMPUTER SCIENTISTS AND ENGINEERS TOGETHER."

Production is a powerhouse for the economy and makes innovations reality. And as in all areas of research, society, and industry, digitalization is a challenge that can only be answered on a global scale. Matthias Brockmann, managing director of the Internet of Production Cluster of Excellence, explains: "For our approach it means we can scale up the number of available experiments. Our idea of a 'World Wide Lab' is one that regards every operation in real production to be a potential experiment."

RWTH is a diverse establishment with more than 30 institutes in total that covers the disciplines of engineering, materials science, computer science, humanities, and business administration. This diversity inspires the Internet of Production cluster, which is pursuing the same research roadmap.

Here, young researchers take on great responsibility right from the beginning. "The future of digitalization in production is not an isolated task for computer science or engineering," explains Matthias Jarke, head of Computer Science 5 – Information Systems at RWTH, and executive director of the Fraunhofer Institute for Applied Information Technology. "What we need is a collaborative revolution covering many disciplines." ■

RWTH AACHEN UNIVERSITY