



CENTER OF EXCELLENCE SMART PRODUCTION

**ACHIEVE MORE
THROUGH RESEARCH & DEVELOPMENT**

ACHIEVE MORE WITH AUSTRIA'S STRONGEST RESEARCH UNIVERSITY

Successful businesses know from experience: Every euro that goes into research and development pays for itself many times over. This is because innovations give those businesses a decisive competitive edge, generating revenue and securing jobs in the long run.

As a centre of research, Upper Austria is in the fast lane, and the University of Applied Sciences Upper Austria (University of Applied Sciences Upper Austria) has become a driving force. Austria's most research-intensive university of applied sciences offers innovative businesses its four campuses and approximately 400 professors and academic staff. Currently, over 400 projects in 17 specialist areas of research are being implemented.

Areas of Applied Research:

- » IT (Hagenberg Campus)
- » Medical Engineering and Applied Social Sciences (Linz Campus)
- » Management (Steyr Campus)
- » Engineering (Wels Campus)

Perfect networking of the campuses makes it possible to achieve an optimal overall solution for each project.

The State of Upper Austria is undertaking joint initiatives in the areas of education, research and business through the strategic economic and research programme to ensure that Upper Austria retains a clear competitive edge.

Becoming a strong international partner means further developing regional production in order to secure a competitive advantage with innovative industrial production processes. Topics such as intelligent production and Industry 4.0 are of particular importance for Upper Austria as a business region.

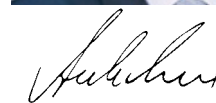
The Center of Excellence for Smart Production was established in order to meet the requirements of the strategic programme 'Innovative Upper Austria 2020'. The Center's projects support the achievement of the programme's strategic objectives.

The State of Upper Austria has in the University of Applied Sciences Upper Austria a longstanding partner in the field of research and development that actively supports the achievement of its strategic objectives.




Mag. Thomas Stelzer
State Governor of Upper Austria




Markus Achleitner
Minister of Economy of Upper Austria



COOPERATION MADE EASY

With more than 400 researchers, the University of Applied Sciences Upper Austria is on hand as a flexible and reliable partner for addressing research and development issues with businesses and institutions from industry and society.

The possibilities for cooperation are numerous and varied:

- » Applied R&D projects with business partners
- » Academic research projects
- » International R&D projects
- » Symposia and workshops
- » Students' bachelor's and master's theses

Project time frames can range from a few months to up to five years.

The University of Applied Sciences Upper Austria aims its R&D support at businesses and institutions from industry and society.

This includes on the one hand businesses which lack personnel resources or have limited financial resources for their own research and development activities (e.g. small and medium-sized enterprises).


On the other hand, solutions for companies needing specialised support (e.g. in the form of special equipment) are also available. For the University of Applied Sciences Upper Austria's cooperation partners, a joint project is, above all, a financially straightforward and efficient undertaking.

Geared towards the needs of the client, innovative solutions will be developed that can be put directly into practice.




Dr. Gerald Reisinger
President University of Applied Sciences Upper Austria




Prok. Prof. Priv.Do. Dipl.-Ing. Dr. Johann Kastner
Vice President FH OÖ Forschungs & Entwicklungs GmbH



Thematic Areas:

- » Internet of Things
- » Business Analytics /Prescriptive Analytics
- » Assistance Systems
- » Human-Centered Technologies
- » Operations Management
- » Additive Manufacturing
- » Product Development
- » Business Model Innovation

ACHIEVE MORE THROUGH SMART PRODUCTION

Intelligent production processes lead to intelligent products. Such products are not only the guarantors but also the prerequisites for the competitiveness of companies in the future. As an innovative business partner, the Center of Excellence specialises in research and transfer related to smart production. Coordination and networking of all relevant departments facilitates a lively exchange of information between the Hagenberg, Steyr and Wels campuses with regard to R&D as well as bachelor's and master's theses. Pilot projects and demonstration projects related to the theme 'Innovative Applications for the Digitisation of Production' are being carried out together with Upper Austrian businesses.

The Center of Excellence focuses on eight thematic areas. These areas can be seamlessly interlinked and form a common competence node that is tailored precisely to the demands of project implementation.

Internet of Things

An essential characteristic of Smart Production—intelligent production—are interconnected and communicating systems. The Internet thus enables communication between geographically distinct production sites, machines, plants, tools, workpiece carriers or products. The core of the Internet of Things thematic area is networking. The scope of activities ranges from virtual sensors, interface technology, sensors and camera systems, sensor-actuator systems and multi-device applications to cloud and high-performance computing.

Business Analytics / Prescriptive Analytics

Know the past, understand the present and shape the future. This sentence perfectly describes the thematic area of Business and Prescriptive Analytics. Intelligent production, in which machines are networked with software systems, generates data. Collecting the raw data, and processing it into a usable form is the first step. In the next step, the data is modelled, interpreted and evaluated. Once the basic knowledge of the underlying processes is in place, they can be used for prediction and optimisation. The

results can be used to support decision making and partly automated recommendations for action can be derived from them. At the core of this thematic area are: machine learning, simulation/optimisation of processes, production systems, material flows and production planning as well as interactive visualisation, optimisation of predictive models and heuristic optimisation.

Assistance Systems

Assistance systems help employees with decision-making and manual work in a wide variety of ways. For example, work instructions can be provided digitally, according to the situation, or quality control can be supported by image recognition systems. The difference to automation technology is the integration of intelligent, self-learning systems and digital representation with virtual and augmented reality. Robotics that interact with people and adapt to their needs—e.g. training status or speed of work—is at the core of the thematic area of assistance systems. In addition, decision support systems, image recognition, object recognition, machine vision, self-driving transport systems and intelligent robot gripping technology are all being worked on and researched in this area.

Human-Centered Technologies

It is undisputed that people are at the heart of smart production— they make decisions and take responsibility. A wide range of technical aids can help people with their work. In the implementation of assistance systems, special care must be taken to ensure that the complexity of the systems does not overshadow the provision of optimum, customised support to the user. Support can be provided by augmenting reality through the use of technologies such as virtual and augmented reality or remote services. Eye tracking can be used, for example, to optimise management cockpits, displays and machine controls. Research in the area of contextual inquiry deals with the optimal presentation for the user. Human-centered technologies are also used for ergonomics studies to gain insight into workplace stress.

Operations Management

The field of operations management deals with the entirety of production processes and their interactions. The scope of activities ranges from the optimisation of production planning

and control, capacity planning and production controlling to machining and forming technology. Linking these processes with the benefits of digitisation offers new opportunities. The simulation of manufacturing processes, predictive maintenance or virtual commissioning are such possibilities.

Additive Manufacturing

The production of components with complex geometries often presents challenges to conventional manufacturing. With additive manufacturing (generative manufacturing processes) it is possible to produce these geometries with a manageable effort. Research into new material compositions, process optimisation, simulation of the manufacturing process and product development are the main fields of activity in this area.

Product Development

A smart production is only fully realised if the product development began with the continuous digitisation of relevant processes. When products communicate with machines, report their status, or store their own manufacturing data, the full range of digitisation can be exploited. The area of product development deals with the digital twin of a product or a machine. In this context, we speak of systems engineering and systems modelling as well as product lifecycle management and product data management. The second focus in this field is physical modelling, parameter identification and control of multi-body systems. Thus, this topic covers everything from pure physical development to the emergence of the digital product.

Business Model Innovation

The changes brought about by smart production also enable a transformation of value creation. New revenue models such as usage-based payment (after actual operating hours) or additional services (predictive maintenance) are made possible by digitisation. Companies can create value networks and reduce system boundaries. Such a transformation can be designed and directed by the appropriate means. In the area of business model innovations, the Center of Excellence for Smart Production links the services surrounding intelligent production.

ACHIEVE MORE WITH THE EXPERTS FOR SMART PRODUCTION

Cutting-Edge Infrastructure on Each Campus

Hagenberg

- » HeuristicLab (open source software for optimisation and data analysis)
- » PPOV-Cockpit (software for optimisation and visualisation of production data)
- » Cloud and high performance computing
- » Mixed Reality Lab
- » Surface Hub
- » Cardboard engineering

Hagenberg Campus

SMART
PRODUCT
Center of Excellence

YOUR POINTS OF CONTACT



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Steyr

- » Simulation generator SimGen
- » Workshop production planning
- » Virtual reality hardware
- » Augmented reality smart glasses
- » OptiTrack motion capture system
- » Industrial camera with Machine Vision software

Wels

- » 3D printing equipment (metal, plastic, plaster)
- » 3D digitising
- » Machine tools (milling, turning, forming)
- » Plastics processing facilities
- » Industrial and lightweight robots
- » Parts transfer system
- » Programmable controllers
- » Various data transfer systems and sensors
- » HMI and communication systems for process tracking
- » Programming and simulation systems for robots
- » Image processing systems
- » X-ray computed tomographs

Wels Campus

CURRENT DEGREE PROGRAMMES



Current Research Projects

- » **Josef Ressel Centre for Advanced Multibody Dynamics** –The FreeDyn software will be used for the first time at this JF Centre to map a racing car in its entirety. For this purpose, the tires, drivetrain, suspension and body of the vehicle will be precisely modelled in order to demonstrate that the software is able to solve such complex problems within a reasonable computing time. With the help of this simulation model, the gas and brake pedal positions as well as the steering angle of the vehicle are to be calculated to minimise the total travel time on a race track.
- » **USIVIS** – The project USIVIS ‘User-Centered Interactive Visualization for Big Data’ deals with new, user-friendly tools for the interactive visualisation of big data. The aim of this project is to fundamentally improve decision support in companies and organisations focusing on Industry 4.0 or finance and controlling through intuitive visualisation and natural operating concepts.

Hagenberg Campus

- M Embedded Systems Design
- M Human-Centered Computing
- M Information-Engineering
und -Management
- B M Mobile Computing
- B M Secure Information Systems
- M Software Engineering

Steyr Campus

- B M Accounting, Controlling and Financial
Management
- M Digital Business Management
- B M Global Sales and Marketing
- B International Logistics Management
- B Marketing and Electronic Business
- M Operations Management
- B Production and Management
- M Supply Chain Management

Wels Campus

- B M Automation Engineering
- B M Mechanical Engineering
- B M Materials and Process Engineering
- B M Innovation Engineering and Management
- B M Mechatronics and Business Management
- B Product Design and
Technical Communication
- B Process Engineering and Production

B = Bachelor's degree programme, M = Master's degree programme

- » **BAPDEC** – For each part, the process data of the previously performed steps are stored in a database. Based on this data, the optimal process parameters are determined for each component. The goal is the automatic adjustment of the production chain to each individual workpiece during the production process in real time.

CENTER OF EXCELLENCE SMART PRODUCTION

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