

## Smart Factories: European research project focuses on the human component in tomorrow's production

The large scale European research project "FACTS4WORKERS" with a project volume of 7.9 million Euros and 15 European research partners over a time span of four years deals with the topic of "Industry 4.0" and focuses on the human component of modern production. MIVP is a project partner and contributes their expertise in the field of implementing the Smart Factory solutions. The consortium lead by VIRTUAL VEHICLE Research Center wants to show, how to create attractive and intelligent work places in a factory of the future and how therefore Europe can be boosted as a production location. Improved training and increase of investment in factories will help bring Europe new and better jobs.

**Professor Gerhard is the Scientific Head** of this research project which started in December 2014



Production is moving constantly away from European high-wage countries to so-called "best-cost" countries or to locations with low energy cost. To fight this trend the European industry is challenged to develop intelligent added-value concepts for the field of production. The EU-commission wants to reverse "the shrinking role of the industry" and restore the "attractiveness of Europe as a production location", says the responsible commissioner Antonio Tajani. With more investment in factories and research & development the amount the industry contributes to the European economic output should be increased from currently 15 to 20 per cent by 2020.

### Ambitious goals in research

The results of this research project are supposed to initiate a new industrial era, which is characterized by the so-called "Smart Factory". The "Smart Workers" in those production sites will be ideally supported by information and communication technology in order to improve the manufacturing process regarding flexibility, efficiency, and reliability. This results in a local benefit in competition, and (central) European production locations can be secured in the long term.

### Smart Factory

In a "Smart Factory", the production site of the future, the focus lies on the worker as the most flexible element involved in the manufacturing process. He or she becomes a "production knowledge worker" and is supported by optimized information and communication technology, self-learning working environment, and in-situ learning while operating the machine.

The intended digitalisation is not limited to single factories, it will affect entire added value networks. This can be achieved via so-called "cyber-physical systems", which are systems consisting of various components (IT, software, mechanical parts, etc.) that communicate via the internet or other means of communication.

### The human component - a key factor

In addition to this technical approach, there also has to be a focus on the role of the worker as the human component and key factor in the manufacturing process. Here the term "knowledge work" is coined. Knowledge work is completely different from traditional automated routine activities in a factory. It is defined by an entirely new, complex, and autonomous work environment. Furthermore, "Smart Workers" develop new ways of continuous improvement of knowledge exchange on their own at the work place.

"We have to bring into question, how people work and learn, how they interact with new technologies, and how they can create an added value to the industry by working at an attractive and demanding work place", explains Martin Wifling, coordinator of FACTS4WORKERS at the VIRTUAL VEHICLE Research Center in Graz. The answers to these questions are the key to successful and human-centred solutions of information and communication strategies within manufacturing processes.

By reflecting on the situation of the worker in the manufacturing process it is possible to increase their satisfaction and motivation, which can lead to an overall increase of productivity by 10 per cent. The main research focus in this project, though, lies in "creating a significantly more attractive work area in manufacturing in Europe so that more people choose this demanding and ever changing occupational field", says Wifling.

FACTS4WORKERS focuses on the following use cases:

#### Assisted machine operator

Due to the individualisation of products the batch sizes decrease. At the same time the rate of highly special and quickly changing information from multiple sources increases. Though, manual action by the operator is still necessary. At this point innovative interaction mechanisms such as data goggles are being used to display crucial information to the operator during the manufacturing process. Elements such as checklists, job specifications, manuals, and work orders, which are being printed from MES- and ERP-systems and are still commonly used, will disappear over time.

#### Human centred knowledge management

The necessary information will be delivered to the Smart Worker just in time in order to improve the production sequence. Furthermore, a new culture is being established, in which knowledge is shared voluntarily and proactively. Accessories in the working area should show intuitive interaction mechanisms such as voice-, touch-, or gesture-activation instead of text input. Practical knowledge can be transferred easier with graphical animations or videos than in written form.

#### Self-learning work places

Machines, tools, and other infrastructures in Smart Factories are considered to be intelligent. The output data of this infrastructure has to be exchanged effectively, so that it is possible to efficiently produce smaller sized batches. Already today there is more data output in production than ever before. This data has to be intelligently linked in order to take care of maintenance, spare parts, mounting of machines etc. in advance.

#### In-situ learning in the production process

When it comes to in-situ learning the Smart Worker is being focused on as the "learner". Mobile, personalised, and situation-adaptive learning systems support life-long learning and cross-generational passing on of know-how, especially regarding demographic change. New production workers are brought to the manufacturing level of Smart Workers through context-based learning, concepts of manufacturing laboratories (FabLabs), and simulations in virtual reality environments. Data goggles and wearables offer ideal in- and output options for various use cases.

A step-by-step realization of Smart Factories is able to restructure production centres with production work undergoing an economic and social change of values. Production sites therefore are not only stabilised on a technological and economic, but also on a social level.