Optimising production processes and shaping circular economy

Industrial Systems Engineering (ISyE) is a research group of the Department of Industrial Systems Engineering and Product Design (EA18) at Ghent University. It operates as a core lab within the Production cluster of the strategic research centre Flanders Make. The core competences of the multidisciplinary team of seven professors and 38 researchers lie in the design, optimisation and validation of production and logistics systems.

Project Portfolio

Our project portfolio includes fundamental research in three areas of competence: (1) stochastic optimisation and simulation; (2) intelligent decision support systems; and (3) manufacturing knowledge and automation engineering," Professor Dr Johannes Cottyn says. The further valorisation of the innovative project results is done through collective industrial research with our industrial partners. This industrial collaboration is coordinated from the Industrial Research Fund (IOF) Machineries & Factories of Ghent University," Prof. Cottyn explains.

© ISyE - Prof. dr. Johannes Cottyn

"Our lab infrastructure reflects real production environments and state-of-the-art technology. The research results are validated and demonstrated within the application labs Smart & Agile Assembly and Smart Production Organisation of the Machinery & Mechatronics Centre, as part of the West Flanders Factories for the Future initiative."

Smart Production Organisation Lab

The Smart Production Organisation Lab opened its doors in 2019, as one of five high-tech laboratories for mechanical engineering and mechatronics in the province of West Flanders. There, they aim to help manufacturing companies take the step towards Industry 4.0.

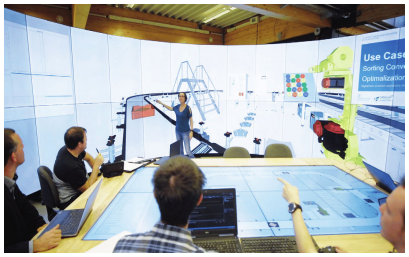
“In the Smart Production Organisation Lab, we want to improve existing production systems by linking them to their digital twins,” Prof. Cottyn explains. “Through those digital simulations, we can facilitate a lot of operational improvements of production systems through interactive and company-specific analyses.”

For this purpose, the application lab is equipped with a high-resolution 180-degree video wall and an interactive meeting table for multiscreen sharing. “The video wall is an alternative to immersive glasses. By bringing the digital twin of the production system to the table, we can maintain interaction between participants. This is crucial in the high complexity of such engineering and optimisation processes.”

Demanding Market

Customers of manufacturing companies increasingly expect customised products, delivered quickly and preferably at no extra cost. Those who manage to respond to this are immediately a solid step ahead of the competition. “We help them realise the necessary switch to smart, digital factories. In our lab, companies developing production systems, machines, subsystems or process software have the opportunity to test out the latest production technologies and manufacturing processes in real conditions.”

Technologically, a lot is already possible, but methods to build those digital models cost-efficiently and to further automate decision support are particularly lacking. “To make this more accessible, we are working with technology suppliers on data capture and integration platforms based on industry standards.



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With this, we want to use the power of large masses of data from industrial reality to automatically identify relationships between the recorded data, integrate this information into virtual models and thus make it usable for the optimisation of industrial production processes."

Circular Passport

To this end, the Lab will move to a brand new building in spring 2023. "We will also work there on a European project to give manufactured metal components a digital passport. Such a passport can be very useful in an economy where the circular reuse of materials and components is growing in importance."

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