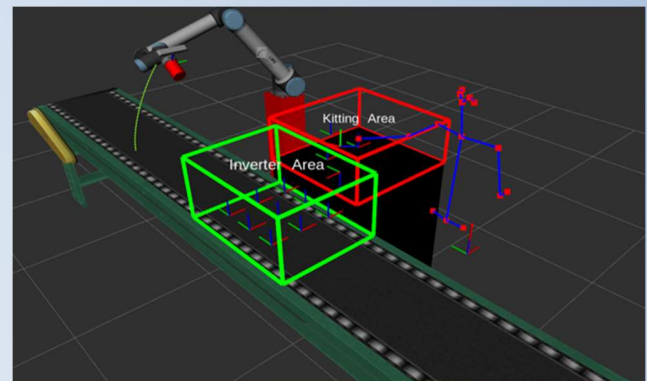




ASSISTANT NEWSLETTER

ASSISTANT PROJECT

The challenges of today's manufacturing systems lie in the difficulty of designing and controlling a complex manufacturing system that manages multiple data sources, large number of finished items and components, parameters (e.g., demand, processing times, component arrival dates) that vary significantly and are difficult to predict accurately. In this complex manufacturing system new tools and resources are frequently acquired or modified, and the performance of these tools and their impact on the production system is also difficult to predict. These systems are becoming increasingly robotic, with humans and machines collaborating to achieve the goals of the plant. In these highly automated and reconfigurable manufacturing systems, workers must be multi-skilled and move from one workstation to another. In such a system, workers are more exposed to injuries, and it is crucial to consider safety and ergonomics.



ASSISTANT SOLUTIONS

To provide solutions to these challenges, ASSISTANT project provides Artificial Intelligence-based decision support tools to make tactical and operational decisions in manufacturing. It includes:

- An intelligent digital twin for process design or redesign: what resources, tools, skills do we need, and how can we organize them?
- An intelligent digital twin for production planning: How much do we produce each week?
- An intelligent digital twin for scheduling: Assignment of products to the machine and the order in which operations are performed
- A data fabric that collects data from IOT devices, machines, operators, and existing software. Data will be cleaned and stored in dynamic knowledge bases.
- Tools for safe decision actuation, and control. This includes the development of flexible cognition methods and resource management for collision-free planning and adaptive motion planning on the shop floor.

ASSISTANT does not aim to replace humans in the decision-making process; rather, it offers tools based on Artificial Intelligence that work in synergy with humans while respecting ethics in/by design philosophy.

ASSISTANT Members' meeting in Belgium

For the first time, on May 12-13, 2022, ASSISTANT project members met in Belgium for several important meetings and workshops such as the executive meeting, the working session on domain model integration, presentation of ethics framework, and the visit tour to the Atlas Copco workshop following by other discussions on the project next steps.



Fig 1: ASSISTANT consortium on Infracflex demo at Flanders Make, May 12-13, 2022, Belgium



Fig 2: ASSISTANT consortium in work session at Flanders Make, May 12-13, 2022, Belgium

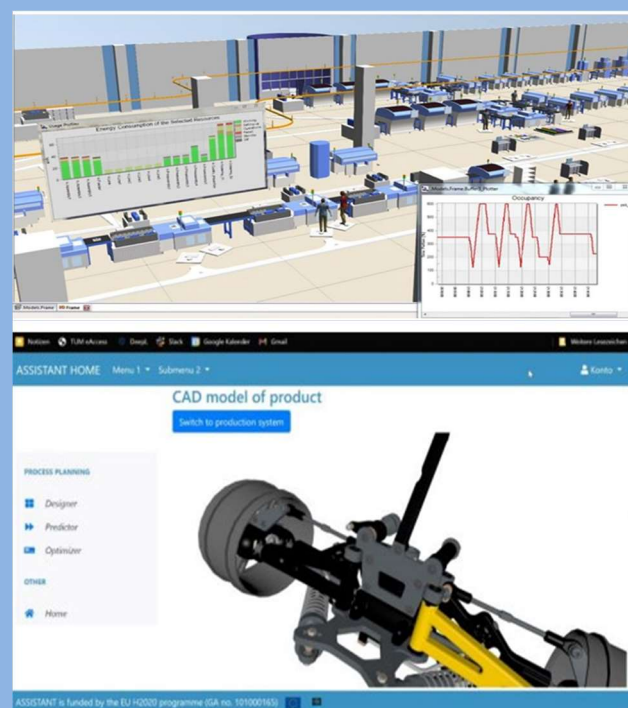


Fig 3: ASSISTANT consortium, May 12-13, 2022, Belgium

Other Project News

Within the framework of ASSISTANT, three prototypes have been developed. The first prototype is related to the concrete digital twin applied to Siemens Energy Use case. The simulation unit is developed using Tecnomatix Plant Simulation, a software from Siemens Digital industries.

The second prototype is related to the concrete digital twin for process planning. The concepts and implementation of generic digital twins for process planning and product redesign are already realized.



The third prototype is related to digital twin for reconfigurable manufacturing execution. The initial development infrastructure and the design of its interaction with the execution system are already realized.



Reminder and update on the MIM 2022 conference

ASSISTANT project is organizing a session at the MIM 2022 conference on the New Challenges for Management and Control in the Industry 4.0 era. The conference will be held in Nantes from June 22, 2022, to June 24, 2022. Seven scientific articles from the ASSISTANT project were accepted for presentation and publication.

- The Development Process of Responsible AI: The Case of ASSISTANT (Johan Buchholz*, Benedict Lang, eduardo vyhmeister)
- Knowledge Graphs in Digital Twins for Manufacturing - Lessons Learned from an Industrial Case at Atlas Copco Airpower. (Bart Meyers*, Johan Van Noten, Pieter Lietaert, Bavo Tielemans, Hristo Hristov, Davy Maes, Klaas Jan Gadeyne)
- Domain Models and Data Modeling As Drivers for Data Management: The ASSISTANT Data Fabric Approach. (P.-O. Ostberg, eduardo vyhmeister*, Gabriel Gonzalez-Castañé, Bart Meyers, Johan Van Noten)
- Multi-Partners Digital Project Twin: A Tool for Project Monitoring (FELICIEN Barhebwa-Mushamuka*, Sarah Wagner)
- Predicting Makespan in Flexible Job Shop Scheduling Problem Using Machine Learning (David Tremblet*, Simon Thevenin, Alexandre Dolgui)
- Mixed-Model Assembly Line Design with New Product Variants in Production Generations (Seyyed Ehsan Hashemi Petroodi*, Simon Thevenin, Alexandre Dolgui)
- Decision Modeling for an ISA-95 based Production Ontology (Annelie Sohr*, Franz Georg Listl, Katharina Ecker, Jan Fischer, Jan Christoph Wehrstedt, Michael Weyrich)



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