



Project Profile

AIToC

Using AI to improve manufacturing engineering

Through the use of artificial intelligence (AI), the ITEA project AIToC (Artificial Intelligence supported Tool Chain in Manufacturing Engineering) will develop new and existing tools in an integrated toolchain to support early-phase decision-making in manufacturing engineering. The interoperability of these tools will be developed using neutral, standardised data formats.

Addressing the challenge

Modern manufacturing engineering relies on software tools for planning, simulation and automation, which face interoperability issues due to missing standards and incompatibilities. The fact that tools must be adapted to each company's needs – combined with general weaknesses in product & production definitions & requirements and the need to create digital models & representations manually – creates a huge amount of work for engineers. This is further compounded by the many variants and combinations for production systems, making the simulation and evaluation of even a small set of alternatives difficult.

Proposed solutions

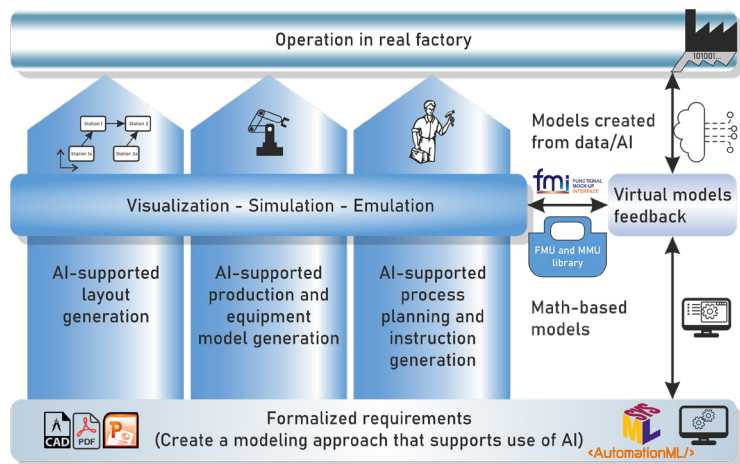
AIToC will develop an integrated manufacturing engineering toolchain to support decision-making from the very early stages of production. This (further) development of new and existing tools will support the definition & management of product & production requirements and the generation of process plans, equipment models & layout, all of which will use AI to handle the large amounts of data created and learn from existing solutions. Technical results will be delivered in four specific areas:

1. structured model-driven requirements that translate product characteristics into controllable production variables and system requirements for clear, consistent validation;

2. assisted generation of alternatives, decision support from expert systems and multi-objective optimisation;
3. assisted or automated generation of virtual models of production processes, tooling and equipment;
4. and a consistent information chain for interoperable visualisation and simulation-based validation & verification based on neutral formats.

environments. This will have a substantial impact on production efficiency, model quality and lead times for simulations in industry. For example, time savings in specific phrases of the engineering toolchain are expected to be as high as 30%, with the knock-on benefit of reduced costs for end-users. The ability to simulate and evaluate a greater number of alternatives will also open up new functionalities and potential domains.

In the wider context, greater engineering chain efficiency for European manufacturing companies will help to improve production competitiveness at a global level, while the use of and contribution to standards will promote widespread deployment of the



^ Key elements of the AIToC framework

These innovations will be implemented using technologies such as knowledge management & expert systems, natural language processing and machine learning.

Projected results and impact

By focusing on tool interoperability and plug & play capabilities, AIToC will allow for flexibility in the creation of simulation

technologies and tools. This will help to give AIToC a long-lasting influence even after the project comes to a conclusion.



Project start
October 2020

Project leader
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Project website
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Project end
February 2024

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ITEA is the Eureka R&D&I Cluster on software innovation, enabling a large international community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society. ITEA is part of the Eureka Clusters Programme (ECP).

<https://itea4.org>

