Flex4Res

Data spaces for flexible production lines and supply chains

Use case with voestalpine
Reconfiguration of manufacturing processes during production

The challenge

The products required by customers vary in size and shape and can only be machined on machinery providing the necessary capabilities, which also vary on other factors such as tools. Therefore, highly flexible production planning and scheduling, also depending on the current machine state and manufacturing utilities, is needed. Additionally, external influences in form of disruptions in the supply chain lead to disruptions in voestalpine's shopfloor. So agile reconfiguration is crucial to optimise the production flow.

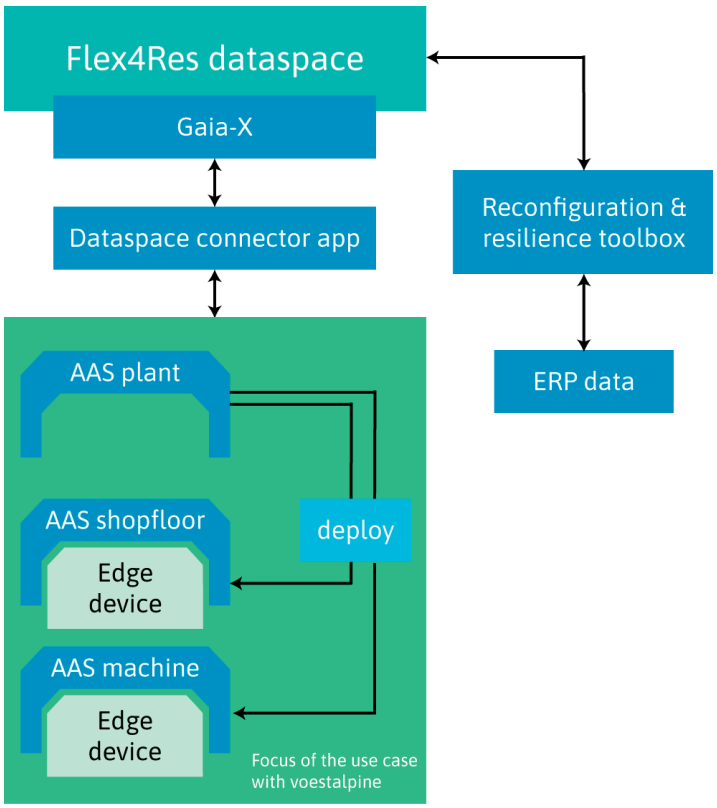
The vision of the future process

The goal is to establish an adaptable and dynamic manufacturing environment through the integration of a flexible and agile matrix production. This involves the seamless reconfiguration of the manufacturing process during production, utilising techniques like Automated Guided Vehicles (AGVs) and process routing configurations.

Simultaneously, a resilience toolbox will be developed to incorporate ERP and machine capability data along with the current configuration status into a comprehensive model. This approach enhances system resilience by providing a holistic representation of the production environment.

A model-based reconfiguration mechanism will complement this, facilitating a fluid and flexible product flow throughout the factory. This agile production process, guided by sensors and case-based reasoning, allows for efficient adaptation to change requirements, detect errors and suggest reconfiguration measures if needed.

The resilience toolbox evaluates missing capabilities and proposes necessary reconfigurations, particularly in the face of disruptions originating from the supply chain. This result in a flexible and agile matrix production system that allows the on-the-fly reconfiguration of the manufacturing process during production.



www.flex4res.eu
media@flex4resproject.eu

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About voestalpine

Voestalpine High Performance Metals DIGITAL SOLUTIONS GmbH is a member of the voestalpine Group. They identify, develop, implement and roll-out relevant scalable digital products and services based on internal needs and engages in enabling the organisations to sustain the change. Therefore, they offer scalable products and solutions in the fields of AI, IIoT, automation & robotics and sensors. Specialised education in digitalisation and data science & AI, as well as consulting services, are provided for individual success.

About Flex4Res

Flex4Res aims to provide an open platform to support production network reconfiguration for resilient manufacturing value chains. In four industrial pilot projects, the project team will test and validate the integrated solutions on the reconfiguration of different hierarchical levels from the value chain to machines and devices. The research project was launched on 1 January 2023, runs for three years and is led by the Laboratory for Manufacturing Systems & Automation. The funding framework is provided by the European Health and Digital Executive Agency (HaDEA) as part of the European Union's Horizon Europe research and innovation programme.

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SAVVY · SIDENOR · SORALUCE · Universität Siegen · voestalpine ONE STEP AHEAD.

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