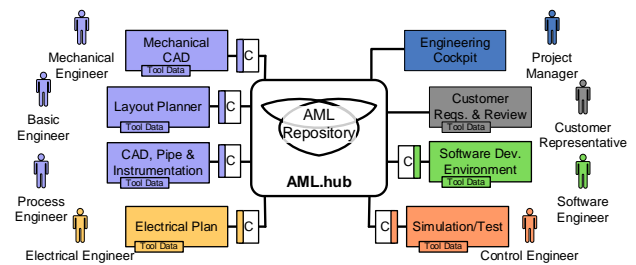# More Efficient Engineering with AutomationML Models



The **parallel engineering of industrial plants** requires effective and efficient collaboration of domain experts, such as mechanical, electrical, and software engineers, and of their specialized software tools. Most of the projects apply discipline-specific best-practice software tools. However, the structure of generated engineering data does not support seamless collaboration.

For existing plants, which have been automated in a traditional way, the integration of engineering is valuable and important. However, for Industrie 4.0 solutions, which are to be changed repeatedly along their life cycle, this integration is indispensable since only machine-processable lifelong documentation of all systems enables their evolution.

Tool networks in distributed engineering projects of industrial plants exchange data point-to-point. However, this type of data exchange

- hinder Round-Trip-Engineering;
- enables the management of data consistency insufficiently;
- makes it hard to access data for engineering processes on project level, e.g., for risk management or test automation.

Although if tool networks apply open data exchange formats, such as *AutomationML*,

- exchanged data are not available for querying via interfaces in a uniform way,
- data are not linked to support engineering processes on project level.

*AutomationML* models close the gap between engineering processes and software tool data of related disciplines and enable the planning of industrial plants according to Industrie 4.0 needs:

- efficient and parallel Round-Trip Engineering with versioned *AutomationML* models;
- improved project controlling based on traceable engineering contributions and process steps;
- efficient generation of simulation based on *AutomationML* models.

Using *AutomationML* data as models represent the foundation for better understanding engineering data, understandable for humans and maschines, required for advanced analysis tasks and for efficient navigation between individual views of different disciplines. Based on *AutomationML* models users are able to plan and operate industrial plants more efficient.

*logi.cals* and the *CDL-Flex research laboratory* at *TU Vienna* have developed the **AutomationML Hub**, which enables for project participants to define a common set of data to be stored in a *AML-repository*. This approach minimizes the risk of changes that are not addressed correctly and reduces costs for change management and quality assurance in a project team significantly.

The **AutomationML Hub** approach systematically integrates data from tool networks, using the *AutomationML* standard, and enables automating engineering processes within the tool network. Project participants are able to combine engineering data consistently with project information, such as the status of objects in the engineering process for re-using them in advanced processes.

In a representative standard example, storing *AutomationML* data has been evaluated at the University of Magdeburg with our cooperation partner IAF. This example illustrates how data received from three different disciplines and from runtime can be investigated by using a standard query language.

At **ANDRITZ HYDRO**, an international hydro power plant engineering company, and at further industry partners the **AutomationML Hub** has been implemented to support automated change management processes across disciplines. This approach enables the introduction of c**omprehensive versioning approaches of engineering models** in short cycles and supports **early detection and repair of defects**.

The *AML Analyzer* builds on the *AutomationML Hub* and enables an efficient analysis of *AutomationML* plant models across various domains and disciplines and a simple integration of complementary data derived from the Web. Therefore, the *AML Analyzer* supports early defect detection based on consistency checks of AML-files and *AutomationML* models.

The popular **software modelling tool** *Enterprise Architect* supports the creation and usage of *AutomationML* models based on CDL-Flex extensions.

## Benefits of AutomationML models for flexible automation systems

- **Reduction of Engineering Costs** due to improved communication between disciplines.
- **Reduction of System-Downtime** based on improved availability of engineering artifacts.
- **Efficient Quality Assurance** based on traceable and systematic tool networks.
- **High Flexibility** because of an increased availablity of related software tools.
- **Suitability** for automation engineering experts because they can work offline, if required.
- **Low Risk** due to stepwise introduction of the integration solution.

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