



Newsletter #2

Data environment in the welding use case



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.



Data environment in the welding use case:

The *metaFacturing* project has the overall goal of establishing a more resilient production process by researching the development of an AI-based digital twin for metal part production, thereby reducing costly rework and scrap.

Research and development (R&D) engineers and line operators will be assisted by AI-based applications that will provide explainable information about and resolve root causes of the defects in the context of the casting and welding manufacturing processes. To enable the development of two corresponding demonstrators a data processing strategy is being defined implemented.

Both processes, casting and welding, are complex processes with a large number of process variants, non-linear correlations and differences between simulation and production. Additionally, these processes are challenging in terms of integrating different data types from different data sources and using the combined data.

Especially the welding use case relies on the integration of diverse types of data from different systems owned by different data providers. To be able to validate the AI-solutions in realistic conditions, data is generated and collected in both laboratory environment and industrial production lines.



In the laboratory environment at Leichtmetallkopetenzzentrum Ranshofen (LKR) dedicated trials are carried out based on initially defined design of experiments. Following raw data is being collected, processed and integrated in a standard format to be used for further analysis tasks:

Data	Laboratory	Production line
Welding process data <i>Signals/time series at low and high frequency</i>	LKR and Fronius welding systems	Fronius welding system
Robot data <i>Time series</i>	LKR system is mapping the robot positions to the welding signals.	Two different interfaces, from KUKA and FILL, are available in the production line
Video data <i>Video frames</i>	Recorded during welding by Fronius ArcView2 camera	
Quality assurance data <i>Image data & measurements from visual inspection system</i>	Provided by Vitronic system	Provided by Vitronic system
Quality assurance data <i>Image data & measurements from destructive testing</i>	Provided by Benteler	Provided by Benteler
Quality assurance and traceability data <i>Structured data including manual inspection information</i>		The FILL automation systems from the line are recording the traceability data and the quality information reported by the line operators.

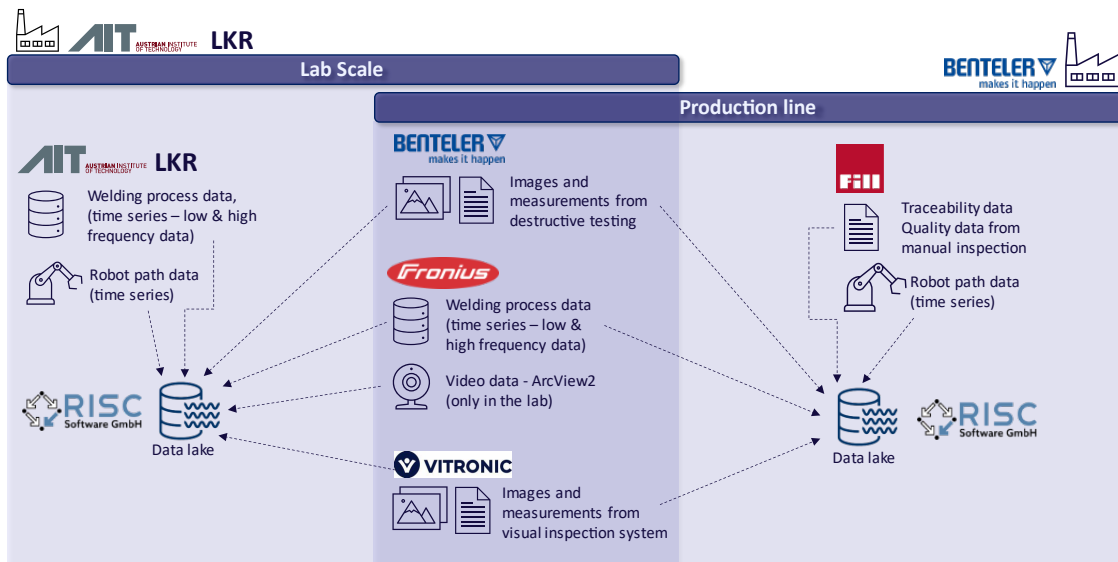


Figure 1: Overview of the data environment in the welding use case