



Newsletter #2

Lab Test & Simulation



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Lab Test & Simulation:

Two Weeks Before Christmas: Advancing Welding Research

Two weeks before Christmas, we conducted the second experimental campaign for the welding Use Case in our lab.

This marked an exciting milestone after weeks of detailed discussions within the consortium and meticulous preparations.

Unlike the first experiment, which focused on gathering data from a single weld seam, this campaign examined an entire welding sequence.

To ensure real-world relevance, the lab setup was designed to closely replicate the welding booth used by our industry partner, Benteler. Key components of this setup included:

- **Data Acquisition:** Achieved through collaboration with Fronius using the WeldCube system.
- **Visual Inspection:** Performed with VIRO WSI, integrated with Weldloop from Vitronic. We provided Vitronic a remote connection to enable live sharing of visual inspection data.

Beyond the standard procedures, additional advanced data-tracking measures were implemented:

1. **Fronius Support Device:** Used to monitor the power source in detail and to log robot and traceability data. It also provides real-time weld tracking.
2. **High-Frequency Data Acquisition:** Welding parameters were recorded as time-series data with a 10 kHz sampling rate using the LKR Data-Mining System and the iba analyzer.
3. **Integrated OPC UA Interface:** Enabled seamless streaming and storage of positional data for Vitronic, Fronius, and other systems.

4. **Part Traceability:** Every part was assigned a unique identifier for precise tracking.
5. **Fronius ArcView2:** Captured high-resolution images and videos of the welding process.
6. **Power Consumption Monitoring:** Collected for life-cycle assessment (LCA) purposes.

The collected data will be shared as Apache Parquet files among project partners for various applications:

- **RISC:** Machine learning model development.
- **ISQ:** Life-cycle assessment (LCA) and life-cycle cost (LCC) analysis.
- **AIT:** Image processing tasks.
- **LKR:** Internal data analysis and research.

Additionally, a separate batch of experiments incorporated thermal monitoring, generating crucial data to validate the simulation model we have developed. Insights from this model will enable us to produce synthetic data for further enhancement of the machine learning models.

This campaign represents a significant step forward in our collaborative effort to innovate and optimize welding processes.

