openZDM's Proof of Concept redefines Manufacturing Excellence

[Brussels, March 2024] In a transformative journey toward zero-defect manufacturing and sustainability, the openZDM project has reached a significant milestone with its Proof of Concept. This milestone marks the testing phase of the end-to-end integrated openZDM pipeline, showcasing the first implementations of key components communicating seamlessly through the platform in a real-world use case.

The Architecture of the openZDM platform is ingeniously organised into distinct layers, each playing a crucial role in achieving a flawless and sustainable manufacturing process:

- **External Data Source & Infrastructure Layer:** This layer incorporates a database with historical data, a non-destructive inspection (NDI) system, and integrated equipment from the use case environment, ensuring a solid foundation.

- **Integration Layer:** Connecting external components to the platform, this layer relies on the Asset Administration Shell (AAS) for flexible integration of new assets. The AAS API facilitates seamless access to data, ensuring a dynamic and adaptable integration process.

- **Data Layer:** All data related to Asset Administration Shells and information sent to the platform are housed in the data layer, providing a centralised repository for crucial manufacturing data.

- **Service Layer:** Offering interfaces to business layer applications, this layer grants access to historical data stored in the data layer. User management APIs, based on Keycloak, ensure secure and efficient access to the platform.

- **Business Layer:** This layer comprises a user interface application and a backend component that integrates various business layer applications, including:

○ Digital Twin Toolset: Enabling real-time data access, visualisation, and simulations, this toolset supports enhanced decision-making through 2D, 3D, and point cloud visualisation.

○ Data-Driven Quality Assessment: Conducting multi-target predictions and real-time defect detection using NDI data, this module ensures the dimensional characteristics and quality of products.

○ Decision Support Tool (DST): Connected with the Digital Twin Toolset, DST employs an SLSQP algorithm to optimise input parameters for improved cost/benefit indicators.

● **Authentication & Authorisation:** Keycloak provides robust functionality for authentication and authorization, ensuring the security of the entire manufacturing process.

Future Deployments and Flexibility

The described deployment approach will be replicated for all openZDM pilots, accommodating different configurations, equipment, and NDIs. As the project progresses, new components and functionalities will be seamlessly added to the layers, ensuring continuous improvement and adaptability.

Crucially, the AAS approach adopted by openZDM enables the connection of new assets to the platform without altering its code. This flexibility allows for the development of new models and configurations, providing manufacturers with a future-proof solution for their evolving needs.

The Era of Manufacturing Excellence

At its core, the openZDM project envisions a manufacturing ecosystem where high-quality products are crafted with precision, waste is minimised, and energy consumption is reduced. The emphasis on efficiency and return on investments underscores the project's commitment to providing not just a solution but a transformative approach to manufacturing practices.

By implementing advanced methodologies and cutting-edge technologies validated and demonstrated through five industrial pilots, this initiative supported by the Horizon Europe Programme, aspires to revolutionise the manufacturing sector, ushering in a new era of sustainability and efficiency.

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