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From Vision to Impact

Innovating Quality Management: Pioneering Cloud-Edge-IoT and Digital Twin Solutions in Manufacturing.

Background

In the dynamic manufacturing world, where optimisation and automation are key, CEI (Cloud-Edge-IoT) technology is revolutionising the industry. With its ability to leverage sensors, controllers, and robots, CEI is predominantly used within production environments, warehouses, and waste sites. Its primary objectives include enhancing economic and energetic efficiency, improving throughput, ensuring better safety measures, enhancing product quality, and creating improved working conditions for skilled production personnel. However, despite its potential, data-sharing remains uncommon in this sector, hindered by a lack of trust and technological capacity.

The Company



SCAMM is a renowned manufacturing company in the metal sheet industry, specialising in high-technology integrated solutions. With 70+ years of experience, SCAMM provides customised sheet metal solutions for industries like home appliances, power distribution, lighting, packaging, fans, and furniture. They actively collaborate with clients, utilising their expertise to develop innovative solutions. SCAMM's global presence includes manufacturing facilities in Italy, the USA, and a commercial office in China, driving international growth. As they strive for optimisation, efficiency, and product quality, SCAMM is eager to explore the potential of the Cloud-Edge-IoT ecosystem to overcome existing system challenges.

The Needs

SCAMM aims to strategically reposition itself in the post-COVID world market while implementing AI optimisation and predictive tools for their reconfigurable pressing lines. Their focus is on automating quality control and process monitoring using sensors and process data. SCAMM seeks to streamline their pressing lines, improve operational efficiency, and ensure product quality. This strategic approach enables them to make data-driven decisions and adapt to the evolving market landscape. Cloud-Edge-IoT technology offers the potential to meet these needs and enhance their manufacturing operations.

"We are going beyond saving time and material for a single item. Digital twins and CEI/AI technologies allow us to plan production efficiently, meet customer demand, and reduce tedious tasks for workers"

Fabrizio Mazzoleni, General Manager, SCAMM



The solution

SCAMM has implemented a cutting-edge Cloud-Edge-IoT solution to address their manufacturing requirements. This solution involves the creation of a digital twin to revolutionise SCAMM's quality monitoring process. By deploying a network of sensors and controllers, SCAMM can detect anomalies in production and learn from skilled labourers' responses through an assistance system. This system prompts intervention and suggests suitable parameter settings based on historical data. The collected real-time data is processed and analysed at the edge, reducing data volume and enabling quick decision-making. Additionally, the system integrates with cloud services for advanced analytics, predictive maintenance, and remote monitoring. SCAMM aims to achieve enhanced process optimisation, product quality, and operational efficiency through this Cloud-Edge-IoT implementation.

The Challenge

Implementing Cloud-Edge-IoT in a manufacturing setting presents specific challenges. Ensuring seamless integration with existing infrastructure, handling data security and privacy concerns, and training employees to adapt to the new system are key challenges addressed during the implementation. SCAMM has successfully navigated these challenges by collaborating with its service provider, Intellimech, and leveraging its expertise in CEI technologies.

The service provider



Intellimech is a private consortium of 51 companies established in 2007 in Bergamo, Italy. It focuses on interdisciplinary research in mechatronics for various industrial sectors. Intellimech fosters collaboration, knowledge exchange, and innovation with its extensive network of participating companies across Italy. The consortium plays a key role in driving advancements in mechatronics and supporting the development of cutting-edge solutions. Intellimech is a trusted partner for businesses seeking to undertake digital transformation, also leveraging Cloud-Edge-IoT technologies.



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Projects involved

This use case is supported by:

AI REDGIO 5.0 is a collaborative network of 15 EU countries aimed at implementing a competitive AI-at-the-Edge Digital Transformation of Small and Medium-sized Enterprises (SMEs) following the Industry 5.0 paradigm. AI REDGIO 5.0 aims to renew and extend the partnerships born from the ICT Innovation for Manufacturing SMEs (I4MS) initiative and the Vanguard initiative, in particular by leveraging the network of Digital Innovation Hubs (DIHS) consolidated within the Horizon 2020 "AI REGIO" 4.0 project.



The use case will leverage the outcomes achieved in the INTEGRABLE experiment supported by **DIGITbrain**, a project enabling EU manufacturing SMEs to benefit from an augmented digital-twin concept called Digital Product Brain (DPB).



Impact

Beyond the expected benefits for the involved companies, the implementation of Cloud-Edge-IoT technology in manufacturing has far-reaching societal benefits. By optimising production processes, reducing waste, and improving product quality, SCAMM contributes to a more sustainable and efficient manufacturing industry. Real-time insights and predictive analytics enable faster decision-making, improving resource allocation and reducing environmental impact. Additionally, the automation of repetitive tasks enhances worker well-being, creating a more conducive working environment. The Cloud-Edge-IoT implementation at SCAMM sets a positive example for other manufacturing companies, inspiring them to embrace digital transformation and reap similar benefits.

Future developments

Looking ahead, SCAMM aims to enhance their Cloud-Edge-IoT implementation by incorporating advanced AI algorithms for predictive maintenance and expanding data analytics capabilities. They envision establishing a CEI infrastructure that enables data-driven services and information exchange with stakeholders downstream in the manufacturing value chain, including OEMs and private end-users of their manufacturing lines. This requires equipping lines with CEI capability and connecting them to a platform for data-sharing and after-sales digital services. Funding models like public-private partnerships or grants can support the solution's long-term viability. Regular maintenance and updates will be prioritised to stay at the forefront of technological advancements. The digital twin application mentioned earlier is intended to be extended to cover the entire production process, maximising its benefits.



"Harnessing the fusion of IoT, Edge, and Cloud capabilities allows us to effortlessly bridge the gap between the physical and digital domains through innovative possibilities that enhance our understanding and powered decision making"
Davide Pasanisi, AI Engineer, Intellimech Consortium

Recommendations for policymaking

Based on this story, policymakers should focus on the following key areas to promote the adoption and scalability of Cloud-Edge-IoT (CEI) solutions in the manufacturing sector:

- ▶ **Standardisation and Scalability:** Support interoperability and scalability of CEI solutions through standardisation initiatives.
- ▶ **Usability and Training:** Enhance CEI usability and provide professional training for workers to maximise benefits and productivity.
- ▶ **Robust Infrastructure:** Encourage investments in reliable CEI infrastructure for stable operations and expansion.
- ▶ **High-Value Use Cases:** Foster collaboration to identify economically valuable CEI use cases and share best practices.
- ▶ **Fair Infrastructure Distribution:** Ensure equitable access to CEI infrastructure, promoting fair competition and preventing monopolies.

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