intel + Lenovo | SMARTIA

Lenovo and Smartia Solution for Anomaly Detection and Waste Reduction in Manufacturing

Predicting production outcomes in complex manufacturing processes using machine learning

Overview

Lenovo, Intel, Smartia, a leading UK Industrial AI & IoT technology company, and the National Composites Centre (NCC) in Bristol collaborated on a composite manufacturing solution used to predict the outcome of a manufactured composite part before the manufacturing process of that part is completed. The National Research Council of Canada and Complex Systems Inc. were also involved in developing the solution.

This solution's objective is to reduce manufacturing costs through decreasing the amount of components that are scrapped because of a failure in the manufacturing process. Failed processes can be quickly identified and the part can be saved. Identifying the failaure early allows for it to be corrected and the process can be repeated at a much lower cost, eliminating the need to scrap the part and start over.

The Challenge

Automated Fiber Placement (AFP) systems are very complex mechanical systems involving a high number of moving parts and have many parameters that affect the behavior of the system during manufacturing. Physics based approaches to AFP process modeling have failed to deliver an industrially applicable output due to the high variability of input materials and process controls. A new system was needed that could cope with the many materials, parameters and processes.

The composite manufacturing process is very expensive and labor intensive as layering carbon onto metallic aerospace surfaces is extremely difficult. The ability to predict manufacturing parameters that lead to quality products is key to reducing production costs and enabling "getting it right the first time" manufacturing. Smartia rose to this manufacturing challenge with Lenovo and Intel.
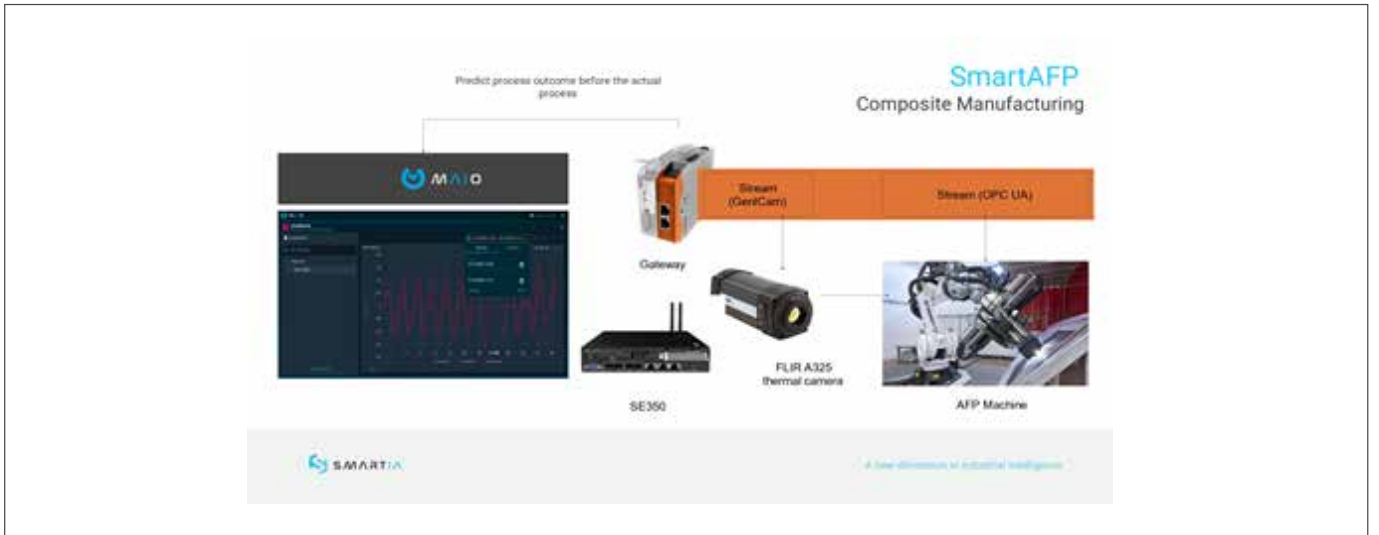
💡 The Solution

Using the Lenovo ThinkEdge SE350 edge server powered by Intel, Smartia provides scalable AI solutions that connect and transform industrial data into actionable insights. MAIO, Smartia's industrial intelligence platform combines edge computing, big data technology and AI-driven applications to provide a complete digital solution for the manufacturing and engineering industries. The solution is designed for industrial environments and can be ordered with a choice of CPUs, memory, storage, and networking options (wired and wireless).

Smartia worked with NCC to:

- Deploy and test an industrial intelligence platform to improve data collection and model deployment

- Collect and curate in-process data from a complex, 3D preform through structured manufacturing trials

- Develop machine learning models that link manufacturing parameters to quality

- Validate the data-driven approach
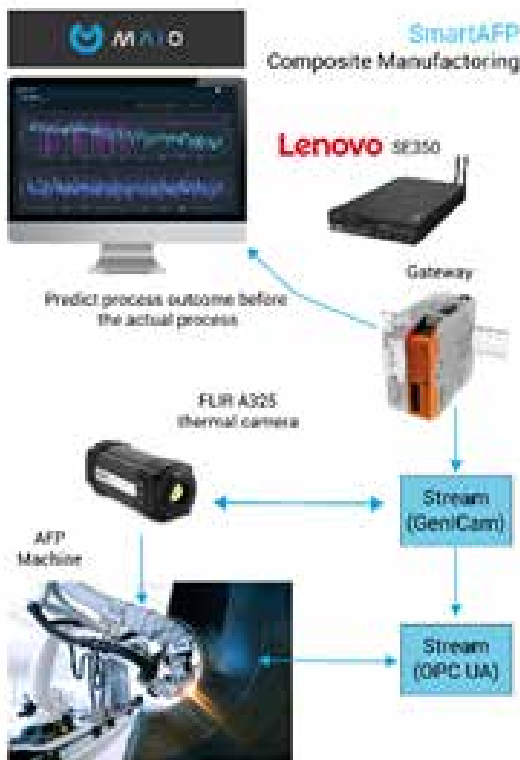
🖥️ Validated Architecture

- Lenovo ThinkEdge SE350
- Intel® Xeon® Scalable Processor32GB RAM
- 2TB storage
- NVIDIA A2 accelerator
- AFP Machine
- Thermal Cameras (quantity defined by Smartial)
- Smartial MAIO, Annual subscription

📋 The Results

Machine learning (ML) and computer vision AI technologies have allowed the composite manufacturing process to be smoother and greatly reduce anomalies. Thermal cameras installed alongside the robotic arm capture real time data during the manufacturing process. The ML model predicts, monitors and optimizes the production process based on these inputs resulting in saved time.

The Smart AFP application is deployed from Smartia's MAIO platform. Its license subscription model will keep the initial investment costs low, thus removing or reducing the financial hurdles to adopting this technology. Based on the research already conducted, which looked at the end-user cost savings after deploying Smart AFP in the manufacturing process, annual costs for a Smart AFP solution would typically return at least a 10-fold return on investment through cost savings.

📝 Summary

Lenovo, Intel and Smartia through the MAIO platform uses ML and computer vision to enable the composite manufacturing process to be smoother and greatly reduce anomalies. Thermal cameras installed alongside the robotic arm capture real time data during the manufacturing process. The ML model predicts, monitors and optimizes the production process based on these inputs. This application would easily be replicated for other high value manufacturing production processes where there are large amount of process failures or high levels of scrapped materials.

⚙️ Resources

- [Lenovo Think Edge SE450](#)
- [Smartia](#)

Why Lenovo

Lenovo Ai-ready infrastructure and expertise span the data center to the cloud, client, and edge. Lenovo partners with industry leaders like Intel to ensure the best possible performance for AI in the field or data center. Lenovo offers proven, ready-to-deploy infrastructure solutions optimized for industry-leading independent software vendors (ISVs) and designed for any size or scale. With worldwide Lenovo AI Centers of Innovation and Excellence, Lenovo extends Ai expertise to our partners and customers. Lastly, Lenovo supports the most significant AI software vendors through the Lenovo AI Innovators program, ensuring the best AI software suns seamlessly on Lenovo infrastructure. To find out more visit **www.lenovo.com.**

Intel® Xeon® Scalable Processor

With consistent, predictable performance, Intel® Xeon® Scalable processors give you fast, reliable processing across each of your AI environments. Intel's continued innovation brings to the cloud new integrated features, such as Intel® Deep Learning Boost (Intel® DL Boost) to accelerate performance for artificial intelligence workloads and reduce the need for custom accelerators like GPUs.

For More Information

To learn more about this solution, contact your Lenovo Business Partner.