PROJECT FACTSHEET

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PAX

Achieving operational excellence and product quality improvement through data-driven refinement of manufacturing process parameters

Inspiration

Manufacturing industries are at the forefront of the Industry 4.0 revolution, creating significant impact in operational excellence of production systems and value chains for the business which can have far-reaching effects even on a country's economy. Advanced analytics and data-driven processes are at the core of Industry 4.0. Ensuring high-quality products, predictive maintenance or active monitoring, all of these use-cases are strongly reliant on advanced analytics and data-driven learning systems. Product quality improvement is a pervasive problem faced by all manufacturing entities. It is also a fundamental step towards reducing costs, delays and for improving customer satisfaction. Relying on long-term human expertise alone has strong limitations. Defects are often a result of complex phenomena that arise due to non-optimized process parameters.

Therefore, at the core of this problem is the need to establish the relationships between different operating conditions and the final quality outcome. PAX proposes to utilize state of the art analytics and machine learning techniques and construct novel algorithms to uncover these complex relationships.

Innovation

The PAX project aims to design an automated learning system capable of monitoring and flagging process parameters to mitigate defects in any manufacturing process flow. PAX is specifically aimed at advancing the state of the art in defect classification and knowledge extraction, with industry-driven validation on concrete use cases.

In close collaboration with ArcelorMittal, LIST will study few specific defect types to construct a general framework for defect analysis and mitigation. With proven experience in business analytics applied to industry, LIST researchers will develop novel models and algorithms. The models and algorithms will be first validated on historical data, followed later by a direct validation within ArcelorMittal's infrastructure and systems.

Impact

PAX project will contribute in assisting human experts or operators with information provided by predictive models. Models that can extract information from a large array of heterogeneous manufacturing process parameters, e.g. environment conditions, control inputs, chemical composition, etc. This will further enable a better understanding of the manufacturing process and, on the long term, will operationalise the link between process parameters and product quality.

PAX will result in the design of a new advanced automated learning system able to make recommendations regarding the setup of the process parameters to ensure high-quality products. In a second stage, the expertise and knowledge gathered within PAX will be integrated in a more generic framework aimed at the Industry 4.0 at large.

Partners
ArcelorMittal (LU)

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