BORGWARNER MORSE SYSTEMS

Developing Strategy for Automated Chain Inspection

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BorgWarner is a leading global automotive supplier with $9.8B in revenue in 2017. BorgWarner's Morse Systems division provides components for automatic transmission and engine timing applications, with this project focusing on chains used in engine timing applications. In Morse Systems Arcore (MSA-Italy), a large component of the cost of chain production is visual inspection to ensure product quality, a non-value-adding but necessary activity. This project sought to develop a strategy for the elimination of this step to improve customer quality, decrease inspection costs, and reduce ergonomic risk. Potential for this project includes expansion to seven additional global facilities.

The Tauber team conducted a technological assessment of proposed solutions that could detect all defects currently found in visual inspection. Defect types were categorized based on the technologies capable of their detection, and pilot studies of these technologies were completed. This included validation of eddy current sensing for the detection of missing components and a feasibility study for artificial intelligence in chain inspection. Alongside technical development, an attribute study was conducted to establish the current state effectiveness of visual inspection. These studies informed a recommendation around the system design of a future state, fully automated chain inspection system.

A comprehensive cost benefit analysis was conducted for a pilot assembly line, providing a robust decision-making tool for the expansion of automated inspection to other chain assembly lines. The cost analysis tool built in the possibility for an imperfect technical system to demonstrate the financial impact under different scenarios. In addition to financial considerations, a strategic approach was taken toward managing key stakeholders in the project. Outputs included a stakeholder map and risk assessment capturing the concerns of key stakeholders. From this analysis, an engagement strategy was developed to manage high-priority risks.

Upon conclusion of the project, the team developed a roadmap for continued technical development in pursuit of fully automated inspection. In the immediate term, recommendations provided by the team can decrease inspection times by 33%, improve customer quality, and reduce ergonomic risk for visual inspectors. Furthermore, a strategy of process control recommended by the team can limit defective production and reduce scrap costs. Moving from the single pilot line, the team provided recommendations around the expansion of automated inspection within MSA and to other global Morse Systems facilities.