WHIRLPOOL CORPORATION

PURSUING DATA FOR GLOBAL PREDICTIVE ANALYTICS STRATEGIC FRAMEWORK

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Whirlpool is the world's leading global manufacturer and marketer of home appliances generating more than $20.7 billion in revenue in 2016. The Advanced Manufacturing (AM) team represents the innovative hub of Whirlpool's strategic push towards achieving Industry 4.0 standards across the enterprise. As part of this effort, the AM team sought opportunities to implement a predictive analytics program on a manufacturing process. The SARES Line in Cleveland, Tennessee, which manufactures oven cavities for the Minerva oven line, was identified as an ideal candidate for this project.

The oven cavity rib stamping press, the first value-add process on the SARES line, presented a unique challenge to Whirlpool's manufacturing team. For unknown reasons, oven cavities exhibited rib cracks resulting from the forming process. These cracks, which seemed to occur randomly and relatively frequently, represented component defects that resulted in scrap. Machine availability was also negatively impacted by rib cracking due to the required maintenance procedures following a rib crack instance. Solving this problem would allow Whirlpool to save over $150K annually on this one process alone.

To address this opportunity, the Tauber team used predictive analytics powered by a neural network to uncover fundamental relationships among a dozen variables that potentially contribute to rib cracking. The team first conducted thorough research and data collection to understand and characterize the stamping process. They then made several trips to Tennessee in order to observe conditions on the manufacturing floor, establish data acquisition infrastructure by reprogramming the machine controller, and manually collect over 5,500 rib height measurements. The accumulated data was synthesized and provided to the neural network; the results revealed underlying relationships between raw material properties, the stamping press operating parameters, and oven cavity design that could reduce the occurrence of rib cracking by 50% and improve OEE by nearly 18.5% on the SARES line.

The findings of the preliminary model contributed to the Tauber team's strategic framework for expanding the scope of predictive analytics applications. These strategic recommendations will allow Whirlpool an opportunity to recognize cost savings exceeding $12M globally over the next three to five years and gain valuable process insights. Additionally, these improvements will enable Whirlpool to continue to deliver the highest quality appliances to consumers around the world.