

ADOPTION OF INDUSTRY 4.0 IN MANUFACTURING

How the Nonwoven Industry
Can Benefit from Machine
Learning and Data Analytics



Bridge Automation empowers manufacturers to make timely, data-driven decisions and optimize their operations for maximum efficiency. We specialize in providing advanced industrial data analytics visualization dashboards, machine learning solutions, digital manufacturing services, and automation system integration to streamline your manufacturing and business operations. Our team of experts leverages the latest technologies to deliver innovative solutions tailored to meet your unique needs.

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In the nonwoven industry, there are several critical processes that require accurate monitoring and maintenance to ensure optimal performance and product quality. In this post, Bridge Automation will explore two examples of machine learning applications that can help optimize nonwoven industry processes.

CALENDER MONITORING SYSTEM

Problem: Calendering machines typically use heated rolls with patterns to thermally bond layers of material and compress materials into a uniform thickness. Sheet wrapping is a common problem in these machines. When fibers from the material being processed wrap around the rolls, it quickly increases the diameter of the roll and can damage the machine if not stopped quickly. The average downtime for a calendering line is approximately 1.5 hours per day.

How Bridge Automation can help: One of the most common reasons for fiber wrapping is quality issues that arise during the spinning process. By monitoring the parameters in this process, a machine learning model can be trained to find patterns in the data that lead to quality problems in the fiber and cause fiber wrapping after entering the calender. Once a model is trained, it can detect deviations from the normal procedure and suggest adjustments accordingly to prevent fiber wrapping.

To take this optimization to a higher level, a deep-learning-based vision system can be implemented to automatically inspect the material, prior to entering the calendering rolls, and predict the probability of fiber wrapping. This deep learning model will be able to recognize visual patterns on the material and detect visual abnormalities.

The two proposed solutions above proactively mitigate the occurrence of fiber wrapping. It is also possible to monitor the status of the calender using a similar vision system and trigger an alarm the moment fiber wrapping occurs in the event early detection has failed.

What you achieve: This solution can help operators address the issue quickly, reducing downtime by 30-50%, and increasing daily production by up to 5% based on industry downtime averages.

QC FOR MATERIAL THICKNESS AND DEFECTS

Problem: Quality control is crucial in the nonwoven industry, as even minor defects in the material can significantly impact the final product's quality.

How Bridge Automation can help: A machine learning system can be implemented in your existing infrastructure, to monitor the operating machine's parameters, and suggest changes that would result in higher quality fiber and less frequent quality problems. As the model learns from historical data from your machine, it can identify patterns in the machine's parameters that cause different material quality.

What you achieve: Higher average product quality and consistency in the material can reduce waste generated during downstream processes (30-50%), such as cutting and laminating. Improved product quality would also reduce the need for rework and rejected products.

Improved product quality can also lead to increased customer satisfaction, resulting in increased sales and repeat business. According to a study by the American Society for Quality, a nonprofit professional association, a 5% improvement in customer satisfaction can result in a 25-85% increase in profits.

