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What Makes Layers Stick? Lessons from a Real-World DoE

ESBELT, a manufacturer of conveyor belts, was preparing to replace a critical machine in its production line and aimed to ensure a robust technology transfer. The machine fused multiple textile layers using a specific combination of temperature, air flow, tension and speed. Product quality was primarily evaluated by layer adherence, a critical-to-quality characteristic assessed destructively in the lab.

To support the redesign of the new machine, we conducted a sequential design of experiments (DoE) to gain a deeper understanding of the process. The project faced numerous practical challenges, including experimental constraints, measurement limitations, and short-term process variability. In this talk we will share the strategy used to structure the experimentation, the tactics applied to overcome obstacles in setup and execution, and the key learnings that emerged along the way.

The investigation followed a structured 10-step methodology aligned with statistical engineering principles. This included defining the problem and objectives, mapping the system, assessing measurement variability, identifying potential control and noise factors, considering design options under constraints, selecting and executing an appropriate experimental plan, and analyzing and interpreting the results to support decision-making.

This presentation offers a real-world application of DoE in an industrial setting, illustrating how careful experimental planning and flexibility in execution delivered valuable insights. The project ultimately resulted in a clearer understanding of the process and provided actionable input for equipment redesign and enhanced process monitoring.

Special/ Invited session

Classification

Mainly application

Keywords

Design of Experiments (DoE), Experimental Strategy, Statistical Engineering, Process Optimization, Industrial Case Study

Primary authors: POZUETA, Lourdes (AVANCEX +I, S.L.); Dr VIVES-MESTRES, Marina (Universitat de Girona); Ms VILLASEÑOR, Paloma (ESBELT S.A.U.)

Presenters: POZUETA, Lourdes (AVANCEX +I, S.L.); Dr VIVES-MESTRES, Marina (Universitat de Girona)

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