

Design of an Automated Fabric Loader for Spreading Machines

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Abstract

In the apparel industry, fabric loaders feed the fabric rolls to spreading machines. Those fabric loaders are optimized only for roll-form fabrics. Textile manufacturers relax the fabric rolls for most types of fabrics, from pure cotton to silk and wool into fabric bales to remove built-in fabric tensions. These relaxed bale-form fabrics are manually loaded into the spreading machines. This process takes considerable time and labor and affects the efficiency of the fabric spreading process. The main aim of this research is to design and implement an automated fabric loader that can efficiently load and unload roll-form and bale-form fabrics to the spreading machine. The potential advantages of designing an automated fabric loader include reducing manual intervention, improving workplace safety, and eliminating labor shortages. It also increases product quality as less fabric is damaged due to manual loading, decreasing lead times and manufacturing costs. The initial step of this research involves a CAD design. Next, a robust, lightweight frame will be designed to support the entire system. The loader will be equipped with two specialized feeding systems: one for roll-form fabrics and another for bale-form fabrics allowing for seamless transition with various fabric types. An integrated electronic control system with sensors will detect fabric types, dimensions, and positions, ensuring precise handling and minimizing damage. A built-in conveyor transports fabric from the loader to the spreading machine. Additionally, an interface will be added to the system to set parameters, monitor the loading process, and troubleshoot any issues quickly, enhancing user experience and operational efficiency. The proposed automated fabric loader represents a significant advancement in the apparel industry enhancing overall production throughout in textile manufacturing.

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