

# THE ROLE OF DIGITALIZATION IN ADVANCED CHILLER PLATFORMS: ENHANCING MANUFACTURING EFFICIENCY AND PRODUCT QUALITY

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Digitalization is transforming manufacturing, enabling enhanced operations, improved product quality, and increased efficiency. Although the refrigeration sector has been slower to adopt these advancements, digital systems offer the tight process control essential for profitability. A Fully digitalized platform delivers consistent performance, reduces human error, and supports real-time monitoring and adjustments. This shift is evident in an advanced chiller platform that offers automated, precise control over critical environmental factors. For Syfilco, a manufacturer producing films from raw synthetic materials, integrating Oxford Energy Solution's fully digitized platform has optimized operations by maintaining exact environmental conditions.



Established in 1979 in Exeter, Ontario, Syfilco Ltd. stands as a testament to Canadian innovation and a dynamic force in the textile industry. They are a leading manufacturer of industrial knitted fabrics and netting products, carving a niche in the market with a commitment to quality, efficiency, and adaptability. The wide range of knitted nettings and fabrics created at the facility find applications in diverse fields, ranging from the practicalities of hay bale wrap to the critical realm of erosion control. With a keen eye on the evolving needs of the market, the company focuses on manufacturing high quality products while optimizing production processes to meet the demands of an ever-changing landscape.

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## SYFILCO'S STREAMLINED PRODUCTION PROCESS

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Syfilco streamlines its production by extruding raw synthetic materials, eliminating the need for outsourcing and gaining greater control over the entire manufacturing process. For one product line, materials start as pellets, are extruded, and then blown into thin polyethylene films, which are cooled to achieve the desired thickness and quality. This process, which is facilitated by air from a heat exchanger, requires precision cooling and air control to ensure the films meet the strict standards required for their intended use. The blown films are then fed into industrial knitting machines, where they are crafted into a durable netting structure.

When the mill introduced a fiber spinning line, (*also initially in pellet form*), to produce extruded filament polypropylene yarn, it necessitated an upgrade to a chiller capable of meeting the higher humidity control and extra process cooling demands. Melt spinning Polypropylene fiber requires more precise humidity management to maintain structural integrity than polyethylene film. The quality of Syfilco's knitted products depends heavily on both the manufacturing process and tightly controlled environmental conditions maintained during production. Temperature, humidity, and air quality are critical, as moisture control directly impacts consistency. Without proper regulation, fluctuating humidity and temperature can lead to condensation, causing defects in film or fiber that compromise finished products' quality and durability. Syfilco's ability to control these variables with precision is crucial in maintaining the high-quality standards of their products.

After launching the first fiber line, Syfilco collaborated with Oxford Energy Solutions to gather data and fine-tune environmental controls, ensuring consistent, high-quality film and fiber production in preparation for additional lines in the spring of 2024. A digitalized chiller platform now integrates process cooling and environmental management across the facility, ensuring optimal conditions for both extrusion products.

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## THE IMPACT OF DIGITALIZED CHILLER PLATFORMS

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Oxford's platform, integrated with an industrial air handler, plays a crucial role in maintaining tightly controlled environmental conditions at Syfilco. Industrial air handling systems are designed to condition both fresh and recirculated air, managing temperature and humidity levels for manufacturing environments. Accuracy in environmental management is essential in industries where excess moisture can damage products or where overly dry conditions could cause static buildup or compromise product quality. Integrated systems with electronic controls create a stable environment that supports efficient manufacturing and ensures that both workers and equipment operate effectively.

Responding to a constant influx of data, Oxford's automated platform optimizes temperatures and airflow throughout the plant. The fully digitized system allows staff to monitor and adjust conditions in real-time, locally and remotely, ensuring that the extrusion and knitting processes operate under ideal conditions. Its comprehensive connectivity facilitates quick adjustments and proactive maintenance, enhancing the system's ability to handle the complexities of air distribution. An interactive HMI screen provides a detailed visual of airflow, temperatures and key data points throughout the facility, giving

staff complete oversight of the environment, with historical data logged automatically.

While providing precise control over temperature and humidity, the platform optimizes energy use and reduces operational costs. Automated scheduling features allow Syfilco to optimize settings and coordinate production schedules, conserving energy during periods of inactivity. Digital controls fine-tune glycol flow regulation, dynamically responding to real-time demands. This allows for efficient management of air distribution across different facility zones, where airflow and cooling are carefully controlled.

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## **OPTIMIZING AIR QUALITY AND EFFICIENCY**

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In textile production environments like Syfilco's, airborne particulates can compromise product quality. Oxford's platform integrates sophisticated filtration that continuously monitors air quality and prevents the recirculation of contaminated air. Based on real-time air quality data, fresh air is circulated, filtered, cooled, and dehumidified as needed, creating a controlled environment for both production quality and employee well-being.

The platform's digital capabilities extend to optimizing air exchange, balancing the inflow of outside air based on temperature conditions. This strategy reduces the reliance on mechanical cooling systems by taking advantage of cooler external air to reduce internal temperatures. During colder months or when processes require heat retention, the platform reduces outside air intake to conserve energy, maintaining ideal production conditions while minimizing energy use.

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## **HARNESSING DATA AND DIGITALIZATION FOR ENHANCED MANUFACTURING EFFICIENCY**

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Digitalizing the entire system has proven to be a powerful tool for improving manufacturing operations. Digitalization provides a wealth of data points that empower informed, data-driven decision-making. With Oxford's integrated platform, all system aspects are automatically logged, offering insights that help optimize operations. Precise control over temperature, humidity, and air quality supports a stable production environment, promoting uninterrupted, high-quality output while reducing energy use. Through digital platforms, manufacturers can expect ongoing improvements in productivity, stability, product quality, and profitability. 