DiMAT

Holistic digital transformation
of the SMEs manufacturing industry

Transforming Europe's Synthetic Textiles Industry with DiMAT: A Project for Digital Modelling and Optimization

AITEX

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AITEX through DiMAT is driving the digital transformation in Europe's synthetic textile sector, increasing sustainability and global competitiveness

Introduction

In an increasingly globalised and competitive world, digitalisation and Industry 4.0 have become essential drivers for business success. The European research project: DiMAT, in which AITEX participates, in collaboration with 18 partners, aims to accelerate the adoption of digital technologies in the European synthetic textile industry. By providing innovative tools for digital simulation, modelling, and optimisation of industrial processes, DiMAT aims to transform the sector and increase the competitiveness of small and medium-sized enterprises (SMEs) and mid-caps across Europe.

Background

The DiMAT project brings together leading companies in the materials industry and scientific experts from across Europe to drive digital transformation in the synthetic textiles sector. A key focus of the project is to optimise manufacturing processes, such as melt spinning, which is fundamental to the production of synthetic yarns. In melt spinning polymer granules are melted and extruded through spinnerets to form continuous filaments, which are then cooled, stretched, and solidified into yarn. This process is widely used to produce synthetic fibres such as polyester and nylon.

DiMAT aims to provide an affordable simulation and optimisation system through the development and implementation of Open Digital Tools, covering each stage of the materials value chain—from design and processing to manufacturing. By integrating digital tools that model and simulate complex processes such as melt spinning, DiMAT seeks to improve product quality, resource efficiency, and sustainability. Ultimately, these digitalisation efforts are helping the European synthetic textile industry to increase its competitiveness and to adopt a more advanced, resilient, and environmentally responsible approach to production.

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Supporting Points

The core of DiMAT consists of three integrated suites, each addressing a key stage of material manufacturing: the Data and Assessment Suite, the Modelling and Design Suite, and the Simulation and Optimisation Suite. Together, these tools enable synthetic textile manufacturers to optimise complex manufacturing processes—such as compounding, melt spinning, and net knitting—through data-driven insights and accurate digital simulations.
The Data and Assessment Suite provides a secure and efficient platform for storing, sharing, and analysing materials data, fostering collaboration between industry stakeholders. This suite facilitates consistent, accurate data management, which is critical for tracking and improving material performance and sustainability over time.

The Modelling and Design Suite enables manufacturers to design materials based on specific structural, mechanical, and performance properties, allowing them to predict material behaviour before production. This capability is invaluable for processes like compounding, where raw polymers are blended with additives to create customised materials with enhanced properties such as UV resistance or improved strength. By accurately modelling these materials, manufacturers can avoid costly trial-and-error physical testing, reducing waste and accelerating product development.

The Simulation and Optimisation Suite allows companies to create simulations that replicate complex manufacturing processes, such as melt spinning and net knitting. In melt spinning, for example, the suite enables simulations of polymer melting, extrusion, cooling, and stretching—all of which directly affect the final properties of synthetic yarns. By simulating these stages, manufacturers can fine-tune parameters to achieve optimal yarn strength, durability, and elasticity without relying on physical prototypes. In net knitting, simulations help manufacturers understand and optimise the mechanical properties of the knitted structure, ensuring that final products, such as fishing nets, are more resilient and tailored to their intended applications.

To validate these tools, DiMAT will run four pilot projects across Europe, working with key industry players in sectors such as textiles, composites, glass, and graphite. As part of the polymer pilot, AITEX (melt spinning) is working with NATUREPLAST (compounding) and TECNORED (net knitting) to develop an advanced monofilament for fishing nets, demonstrating the value of digital tools in improving product performance. By allowing precise control over every stage of the production process, DiMAT's suites enable manufacturers to improve efficiency, quality, and sustainability, ultimately advancing the European synthetic textile industry and strengthening its competitive edge in the global marketplace.

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Conclusion

The DiMAT project presents a unique opportunity for European SMEs and mid-caps in the synthetic textile sector to improve their global competitiveness and lead the way in industrial digitalisation. By providing accessible tools for modelling, simulation, and optimisation, DiMAT promotes sustainable and resilient practices that enable companies to adapt more effectively to market changes. As the project progresses, the potential for Europe's synthetic textiles industry to innovate, compete, and thrive on the global stage continues to grow.

To accelerate this transformation, DiMAT is offering an open call for early adopters, giving companies the opportunity to use and validate these advanced toolkits in real-world applications. By engaging with the project and integrating these digital solutions, early adopters will play a crucial role in refining the tools, ensuring their practical effectiveness, and helping to shape the future of the industry. The success of DiMAT will not only advance technological capabilities, but also have a positive environmental impact and promote sustainable development across the sector.

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