



Sustainable Manufacturing in Materials Industry

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Overview of the DiMAT Materials Environmental and Cost Life Cycle Assessment (DiMEC-LCA) tool

Sustainable manufacturing in the materials industry requires thorough evaluation of environmental and economic impacts to enhance resource efficiency and long-term existence. The European materials sector plays a pivotal role in industrial development but struggles with integrating digital technologies. The DiMAT project addresses this issue by developing Open Digital Tools to improve sustainability, efficiency, and competitiveness in material production. By leveraging digital advancements and life cycle assessment principles, DiMEC-LCA aims to enhance decision-making in materials design, processing, and manufacturing.

A key challenge in sustainable manufacturing is the high resource consumption, waste generation, and carbon emissions associated with traditional material production. While Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) are widely used methodologies for evaluating sustainability, many small and medium enterprises encounter difficulties in applying them due to cost and complexity. The DiMEC-LCA tool aims to bridge this gap by offering a cost-effective, user-friendly system that enables businesses to analyse environmental and financial performance metrics with greater accessibility and accuracy.

Through LCA and LCC, companies gain insights into the environmental and economic impact of each stage of their production processes. This detailed analysis helps identify "hotspots" areas with the highest resource consumption, waste, or emissions

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DiMAT

Holistic digital transformation
of the SMEs manufacturing industry

By addressing these hotspots, businesses can lower costs, reduce energy consumption, and make more sustainable choices. Furthermore, LCA and LCC support companies comply with regulations related to carbon footprints, potentially avoiding costly taxes and penalties.

To support these analysis, DiMEC-LCA tool provides high-level graphical outputs that simplify the interpretation of environmental and economic assessments. It goes beyond complex data sets by generating structured, user-driven outputs that facilitate decision-making.

The tool's capabilities are demonstrated through the pilot cases of DiMAT project: synthetic textile production, UAV manufacturing with advanced composites, innovative glass forming, and accelerated product development in graphite materials.

Additionally, it integrates key performance indicators (KPIs) from the materials value chain, ensuring a systematic evaluation. Benchmarking and design optimization functions further enhance its ability to identify sustainability hotspots and improving production efficiency.

The adoption of DiMEC-LCA represents a significant step in the digitalization of sustainability assessment in the European materials industry. As regulatory and market pressures for sustainability intensify, the integration of digital LCA tools will be essential for maintaining competitiveness.

By providing a practical solution for environmental and economic evaluations, DiMEC-LCA empowers SMEs to implement sustainable manufacturing practices more effectively.

Watch the preliminary demo video here: <https://www.youtube.com/watch?v=gIrhGQVjGk>.

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