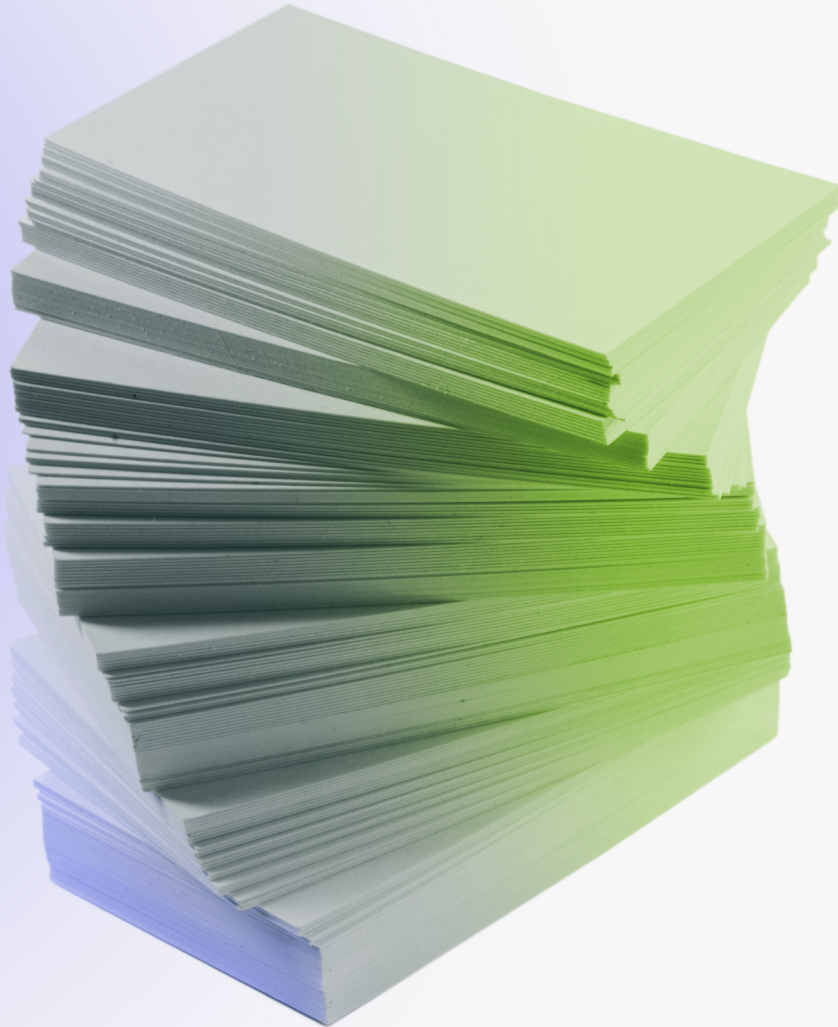


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Focus on operational excellence and technological innovation

Having an innovation strategy goes beyond the development of new technologies or products, as it must be rooted in the business model, organisational processes and business culture. It is essential for the long-term progress of companies, with changes that amplify their performance, guide their investments and define new areas of research.

The Altri Group is positioned at the forefront of excellence innovation, and is a recognised partner of its stakeholders, offering focused, lean, and high added value solutions.

<p>Develop new products with the internal know-how that allows the Group to develop, produce and market products of higher added value.</p>	<p>Assess new ventures and businesses keep up-to-date information on core areas and the ongoing prospecting of new business opportunities within the sector and in adjacent areas.</p>
<p>Identify and develop innovative processes and technology that sustain the efficiency of productive processes and support the production of new products.</p>	<p>Develop intellectual capital by the consolidation and systematisation of fundamental scientific and technical knowledge, which enables staff training or skill development that ensures long-term sustainability.</p>
<p>State-of-the-art monitoring of the technology that may significantly impact the business and development of benchmarks to identify areas for improvement and risks.</p>	<p>Consolidate R&D activities to be the pivot agent for coordination and systematisation of all R&D&I (Research, Development, and Innovation) activities for the technological domain of Altri.</p>

↳ Innovation projects include different themes

- Cellulose Fibres and New Fibrous Products
- Cellulose Chemical Specialties
- New Processes and Technologies for Cellulose Fiber Production
- Waste recovery and Process Streams

Our innovation projects focus on the creation of economic value and intellectual capital in four strategic axes, in areas adjacent to the current business, aiming at the creation of new products and, whenever possible, based on the Circular Economy. The choice of strategic areas of development takes into account the potential applications of wood and biomass, explored for decades by the cellulosic fibre industry.



Research & Development Projects (R&D)



Project for the development of new solvents and the dissolution and regeneration of fibres that aims to extend the use of textile fibre raw material in the dissolving pulp for stationery.

Funding



Partnerships



Status

Ongoing until 2023



Contribution to sustainability

Study of alternative fibrous materials to produce cellulosic-based textile fibres with a lower consumption intensity and a lower environmental footprint.



Progress in 2022

- A decisive step towards the use of novel solvents for the dissolution of cellulosic pulps – in the coming years, a pilot installation will be possible;
- Advances in enzymatic treatment that allow for some increased yield by the use of paper grade pulps instead of conventional dissolving wood pulps;
- Economic and environmental feasibility studies show that the textile fibre manufacturing process with this new solvent will be competitive with first- and second-generation ionic liquids and may become competitive with the Lyocell process.



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FIBER4FIBER

Project that aims to develop Caima's dissolving pulp for its optimisation in the applications of cellulosic-based textile fibres, namely for Viscose and Lyocell processes.

Funding



Partnerships



Status

Ongoing until 2023



Contribution to sustainability

By optimising the dissolving pulp product, it allows efficiency increase of life cycle conversion from wood to textile fibre. It consolidates the vision for the production of raw materials for a market of cellulosic-based textile fibres that are the sustainable alternative to cotton fibres and synthetic fibres, e.g. Polyester.



Progress in 2022

- Construction and installation of a dope preparation and dope spinning line. This pilot went into service in November at Centi's new facilities in Vila Nova de Famalicão and will allow for the first time in Portugal to produce, at a lab scale, Viscose and Lyocell textile fibres (continuous filament) from Altri Group's dissolving pulp.
- Technical conditions are thus created so that the cellulosic pulps currently produced or to be produced by the Altri Group can, over the next few years, be tested in the country. The knowledge obtained will certainly be relevant for the Group, but also for companies and R&D institutions that use or intend to better study these sustainable cellulosic fibres.
- Consolidation of knowledge about the behaviour of phosphorescent markers in the pulp, thus creating conditions for tracing the origin of the product from the final textile purchased by the consumer to the pulp from which it comes.



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Initiated in 2022, this project is a development of the FIBER4FIBER project, which will consolidate the technical infrastructure created by this project, as well as include eventual pilot upgrades and the acquisition of new analytical equipment.

The ambition will be to create the necessary conditions so that, in Portugal, a relevant technological R&D infrastructure can be developed to support an Iberian textile industry with a growing weight of MMCF (Man Made Cellulosic Fibres). Teams of researchers are being strengthened in this initial phase by Centi and CITEVE (Altri's national partners) concurrently with the acquisition of equipment, enabling consistent collaboration with the Altri Group over the following few years.



Status

Ongoing until 2025



Contribution to sustainability

Development and training of knowledge and physical and human infrastructure in the field of regenerated cellulose fibres and non-woven fabrics.

Funding



Partnerships



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B2-SOLUTIONS

Bioplastics development project for application in flexible paper-coating and bio-composite plastics for application in semi-rigid and rigid plastics in the production of injection molding components for the automotive industry and other industries.

Funding



Partnerships



Status

Ongoing until 2023



Contribution to sustainability

Evaluation of the use of fibrous and non-fibrous chains, sub-chains or waste from the pulp industry for recovery in the production of composites, replacing plastic materials of a fossil nature.



Progress in 2022

In 2022, this project was characterized by the production of flexible films for covering packaging paper that meet minimum criteria for thickness and mechanical strength. The project group is also working on resistance to air and water vapour;

Grinding the pulp and pre-washing the sludge allowed for more homogeneous mixtures to be obtained, obtaining materials with mechanical properties closer to those of commercial plastics. This development is especially relevant because it opens good prospects for using materials containing cellulose in the automotive industry, which is one of the main objectives of the project.

HIGH2RPAPER

Project for the development of a new recycled paper incorporating raw pulp from waste from the eucalyptus bleached pulp industry, based on the principles of the circular economy, giving rise to products of higher added value.

Funding



Partnerships



Status

Ongoing until 2023



Contribution to sustainability

Recovery of fibrous waste from the pulp industry to produce cardboard or carton products “coreboard”.



Progress in 2022

- The challenge encountered in 2021 regarding some loss of mechanical properties of the composite material made up of recycled fibre and waste from pulp production, was overcome in 2022, by performing a refining and washing pre-treatment of the material recovered by Biotek;
- The addition of starch to the base composite also allowed obtaining mechanical properties that are close to the project's objectives;
- First larger-scale test on the Coreboard Waste Bin, just to fine-tune the operating set-up. These tests will continue in 2023 in order to try to produce, in a first phase, a coreboard type paper with commercial application in less demanding applications.



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ACETIC ACID AND FURFURAL IN CAIMA

This Industrial Innovation project is supported by the knowledge generated in the CaimaChem R&D project and intends to study the industrial viability of recovering acetic and furfural acid, present in evaporation condensates.

Funding



Partnerships



Status

In progress



Contribution to sustainability

The extraction acetic acid and furfural allows to:

- Recover these compounds and minimise the impact on the effluent
- Increase Caima's turnover by adding value to its process without an impact on wood consumption
- Transform a side-stream into a product, leading to a decrease in the organic load of condensate for treatment of effluent, with a reduction in the inherent costs
- Produce two renewable-based products, based on a concept of circular economy, which will add economic, environmental and social value to Caima
- Create Synergy with the biomass boiler, which will produce the renewable base steam needed for the acetic acid and furfural separation unit.

These projects are under development with the aim of recovering these two compounds that will be consumed as raw materials from various chemical industries, thus enabling the environmentally sustainable recovery.



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Forestry Research and Development

Altri bets on scientific research for forest development, this research being a critical success factor, focused on three areas:

- Genetic improvement:**
 started in 1965, with the selection of *Eucalyptus globulus* for growth, basic density and wood cellulose content.
- Management of stands and nutrition:**
 In collaboration with several research institutions, it works to improve the sustainability of eucalyptus plantations. In this area, projects on forestry techniques, study of pests and diseases, and adjustment of production models will be carried out.
- Forestry operations:**
 research area concerns the forestry techniques and systems.



🔍 Influence of Light on Eucalyptus Production

Plant production in a controlled environment can be benefited by the proper management of light intensity, photoperiod and spectral quality. In order to improve the clonal production system in the Viveiros do Furadouro, a subsidiary of Altri Group, in terms of yield of shoots and efficiency in rooting, the effect of the exposure of *Eucalyptus globulus* mother feet to different light spectra for plant production was evaluated in 2022. This test was carried out on a pilot scale in the greenhouse of the production mother feet park of the nurseries of Furadouro.



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operational excellence

Continuous improvement is a permanent commitment to the search for competitive advantage and to the continued strengthening of Altri's position throughout the value chain.

This commitment is reflected in actions consistently implemented in the day-to-day operations.

The willingness to achieve operational excellence is rooted in Altri's business culture, which is reflected in the Altri Operating System.

↳ This management and governance model ensures and enhances the synergies of the ongoing transformation process and intends to:

- **Encourage sharing,** communication, knowledge and experience among colleagues
- **Break paradigms,** including that of independent manufacturing units
- **Stimulate the ability** to identify problems, challenges and opportunities for improvement
- **Collect insights** from already tested actions
- **Clarify issues** and discuss (if possible, validate) in advance the effectiveness of countermeasures identified by the team.



KAIZEN™

In order to ensure the alignment of priorities among the three industrial units of the Group, Altri has been implementing KAIZEN™ methodology since 2016, enhancing the communication in the organisation, ensuring the implementation of strategic decisions and proper prioritisation. All employees are involved, from the top to the point of impact. This methodology focuses on identifying root causes and defining and implementing measures to resolve them. The implementation of this methodology is carried out using various tools, including:

KOBETSU

HOSHIN

The accumulation of Altri's efforts to achieve operational excellence through the various methodologies has been recognised:

↳ Altri Group was distinguished by Kaizen™ Institute with the 1st place among the large companies in Portugal in the category of "Excellence in the Continuous Improvement System". The award distinguishes the projects implemented with the adoption of Kaizen™ methodology, which stand out for efficiency, innovation and excellence, and recognises the companies that have successfully incorporated these principles into their management model.



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Certifications

We focus on continuous improvement through the structuring of processes and activities based on recognised national and international standards, reflected on external certification and recognition. Validation of our processes based on these benchmarks is a seal of confidence that our activity is managed and structured to improve continuously.

REFERENTIAL	ALTRI
ISO 9001 – Quality Management System	All Group companies
ISO 14001 – Environmental Management System	All industrial units
ISO 45001 – Safety and Occupational Health Management System	All industrial units
ISO/IEC 17025 – General requirements for the competence of testing and calibration laboratories	Laboratories to support the process of all industrial units
ISO 50001 – Energy Management System	All industrial units
EMAS – EU Eco-Management and Audit scheme	Celbi and Caima
FSC® – Forest Stewardship Council	Altri Florestal and industrial units
PEFC™ – Programme for the Endorsement of Forest Certification	



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