PROSPECTS 5.0

Prospects 5.0

TRYGONS S.A.

HORIZON EUROPE
This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101135948

Company Profile

- ✓ Greek composite manufacturing company based in Keratea Industrial Park
- ✓ Established in 2007, with more than two decades of composite materials experience
- ✓ 25 employees, including a dedicated 5-person R&D team
- ✓ Manufacturing of lightweight, high-strength composite material products
- ✓ Specialised in naval engineering, high-demand constructions, and complex composite parts
- ✓ Active across marine, automotive, industrial, and defence-oriented applications
- ✓ End-to-end capabilities from concept development and prototyping to validation and production

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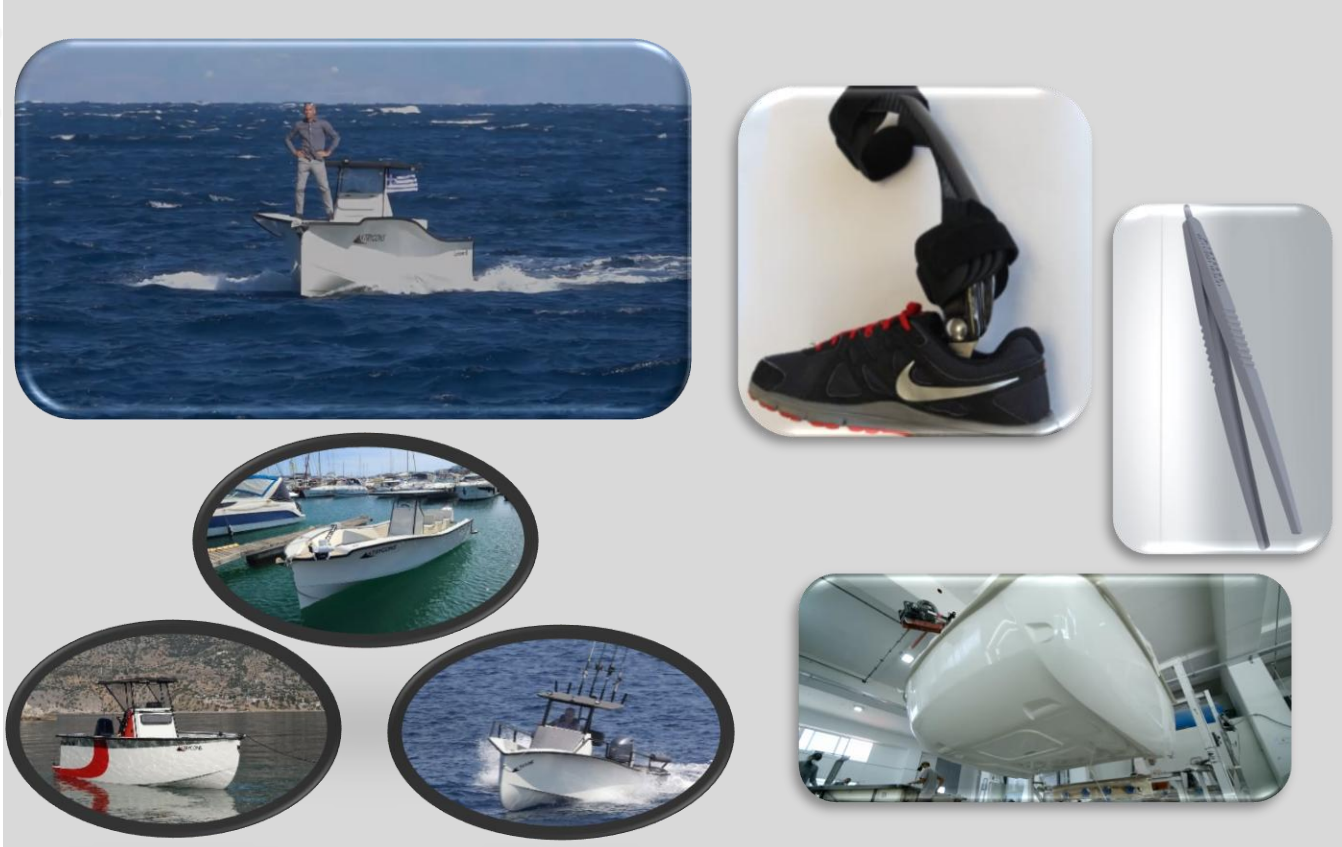
From Maritime Roots to Multi-Sector Manufacturing



A company shaped by extreme requirements

- Composite expertise built through high-performance maritime applications
- Strong presence in boat construction and demanding sea-environment solutions
- Expansion into multi-sector manufacturing, including, medical and automotive components
- Experience shaped by the need for lightweight design, structural robustness, and reliable performance
- Progressive transition from specialised constructions to scalable production capabilities

From sea-proven performance to multi-sector manufacturing excellence

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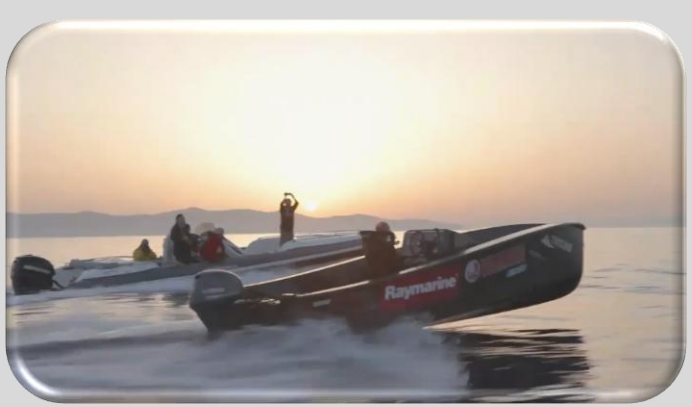
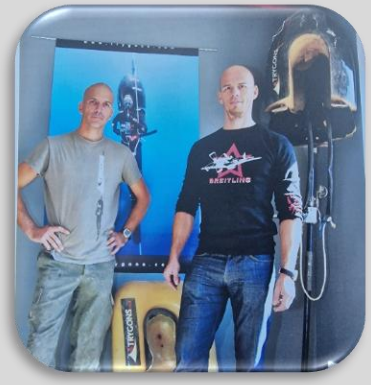
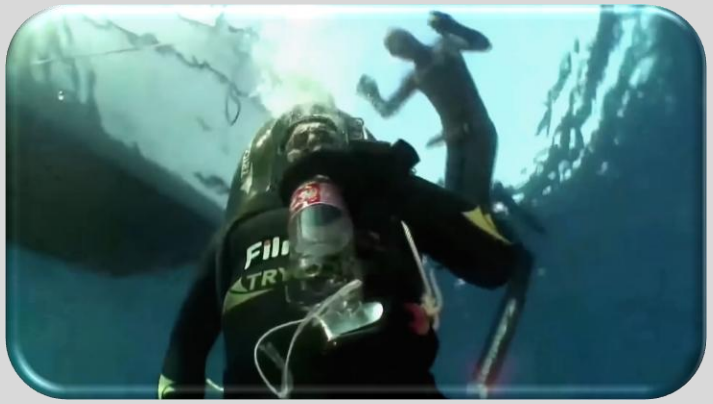
What PROSPECTS 5.0 adds to the journey







Two examples that shaped TRYGONS' engineering mindset

2007 Free Diving World Record

- Specialised carbon-fiber equipment designed for Herbert Nitsch's 214 m record dive
- Demonstrated reliability under extreme operational conditions

2013 Aegean EcoRunner 590 Fuel Economy Record

- 6 m carbon-fiber vessel, only 145 kg total weight
- Fuel consumption of 0.23 L/nm, far below conventional benchmarks
- Marked TRYGONS' first autonomous navigation project

Extreme performance, lightweight engineering, and efficiency have always been part of our DNA

2007 & 2013

Extreme engineering for extreme needs

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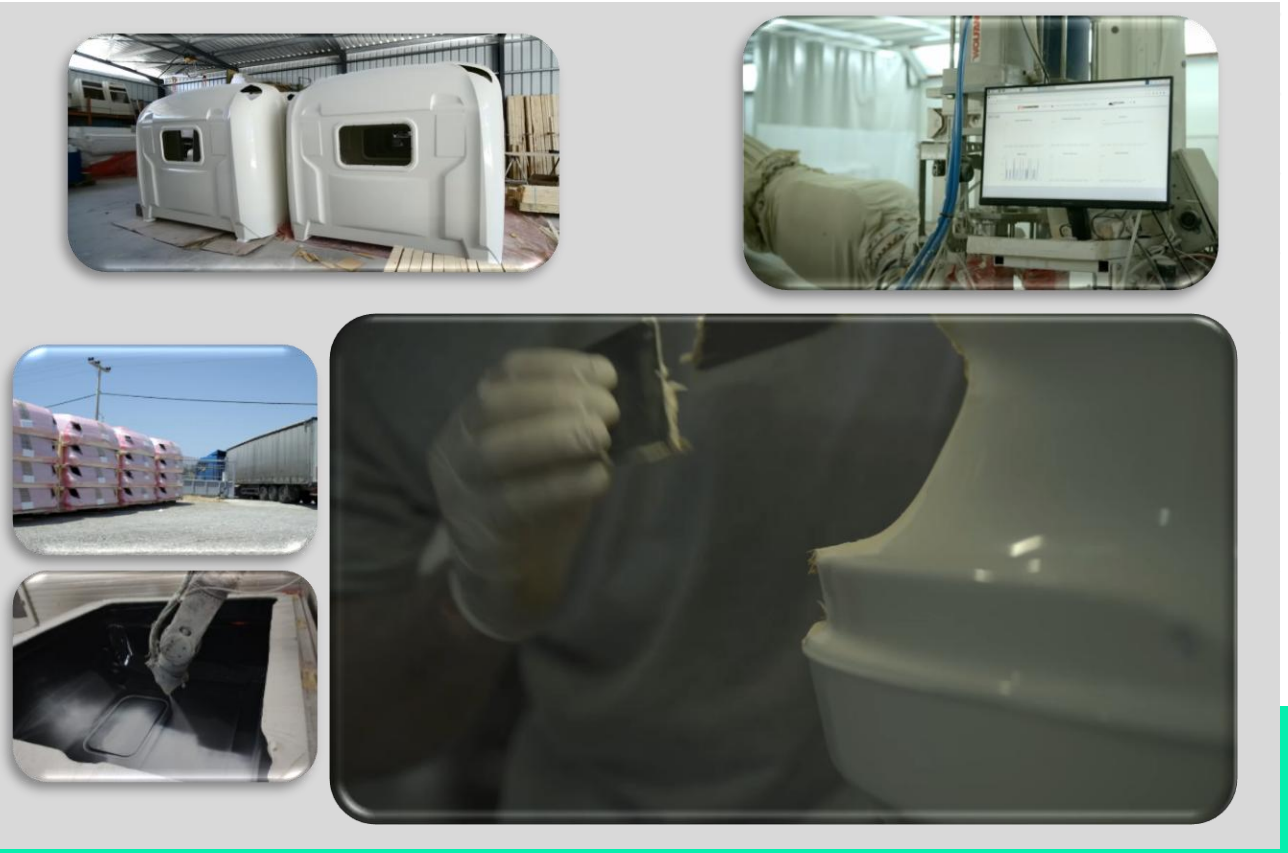
The Automotive Turning Point



The next landmark: from maritime excellence to automotive-grade production

- Collaboration with DAF Trucks introduced a new level of production discipline
- Large-volume composite components demanded stable, repeatable, and scalable manufacturing
- Automotive standards imposed strict quality control, documentation, and traceability requirements
- Production processes had to become more controlled, measurable, and easier to monitor
- The automotive line became a catalyst for production reorganisation and digitalisation

From craftsmanship and high performance to controlled, large-scale production

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Why Industry 5.0 Became the Natural Next Step

Production needs shaped the transformation journey

- Extreme quality standards required better process visibility and control
- Strict procedures demanded stronger tracking, documentation, and traceability
- Maritime applications continued to require robustness and reliability in challenging environments
- Production bottlenecks revealed the limits of manual monitoring and inspection
- Operators and technicians identified practical needs directly from the shopfloor
- Digital tools were developed to support people, improve decisions, and reduce waste

The journey from production need → digital response

Shopfloor Need

Challenges identified by the people closest to them

↓

Digital Response

Targeted tools: sensors, AI, digital twins, AR/XR

↓

Value Creation

Quality, resilience, sustainability, human-centricity

Our Industry 5.0 journey was not technology-driven — it was production-driven.

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Our approach: problem-first, not technology-first

1

Start from the shopfloor

Operators, technicians and production managers identify concrete pain points: defects, delays, unsafe tasks, energy losses or missing data.

2

Select the right digital response

Sensors, AI, digital twins, AR/XR or robotics are chosen only when they clearly address the production problem.

3

Scale what creates value

Successful pilots are connected into a broader transformation path: quality, traceability, sustainability and resilience.

Human-centricity is the design constraint: digital tools support judgement, reduce workload and preserve meaningful operator roles.

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A connected ecosystem of technologies

Technology focus	Shopfloor problem addressed	Added value
Digital twins & dashboards	Limited visibility of gelcoating, infusion and curing processes	Real-time monitoring, traceability and remote supervision
AI process optimisation	Variable resin mix, curing behaviour and ventilation demand	Higher repeatability, lower energy use and better control
AI vision & thermal QC	Defects, air inclusions and thickness deviations missed by manual inspection	Earlier detection and more consistent quality assurance
Predictive maintenance	Pump anomalies and spray blockages disrupting production	Earlier warnings, fewer stops and reduced troubleshooting
AR/XR & operator guidance	Training, assembly accuracy and robot teaching complexity	Human-centric support, faster onboarding and lower error risk

The projects became a portfolio of practical capabilities rather than a sequence of disconnected experiments.

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From observations to actionable decision support

01 Data capture

Sensors, cameras, robot signals, environmental data

02 AI / Digital Twin

Models, rules, dashboards and process context

03 Operator feedback

Alerts, recommendations, visual guidance

04 Action & learning

Corrective action, traceability and improvement

- Production data becomes a usable history, not only a record after the fact.
- Quality issues are detected earlier and linked to process evidence.
- Operators receive clearer information at the moment where action is still possible.
- Remote monitoring and dashboards reduce the need for continuous exposure to demanding areas.

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Benefits experienced by TRYGONS

Human-centricity

- Reduced repetitive monitoring through dashboards, alerts, and remote supervision
- Safer working conditions by limiting exposure to demanding shopfloor environments
- Better use of human expertise by shifting operators to higher-value decision-making
- Better decision support for operators through real-time process feedback
- Faster onboarding and training through AR/XR guidance and operator-friendly tools

Sustainability

- Less rework and scrap through earlier detection of defects and process deviations
- Optimised material use through better control of resin mix, curing, and gelcoating
- Lower avoidable energy demand through smarter ventilation and curing strategies
- Need-based maintenance, reducing unnecessary consumable replacement and downtime

Resilience

- Higher visibility of critical production processes and equipment behaviour
- Fewer disruptions through early anomaly detection and predictive maintenance
- More flexible production through modular automation and digital process support
- Faster response to quality issues, changing production needs, and customer demands

For TRYGONS, Industry 5.0 creates value when digitalisation improves production performance while also supporting people, reducing waste, and strengthening operational resilience.

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Key lessons for other companies

1

Start from bottlenecks

The best digital projects are born from concrete production needs.

2

Involve operators early

Adoption improves when workers recognise their own problems in the solution.

3

Keep pilots modular

Small, focused implementations are easier to validate and scale.

4

Treat data as a production asset

Traceability creates value only when data are structured and reusable.

5

Keep humans in the loop

Industry 5.0 succeeds when automation strengthens human expertise.

Industry 5.0 at TRYGONS is not a destination; it is a method for continuous shopfloor improvement.

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What PROSPECTS 5.0 adds to the journey

Connect initiatives

A structured way to connect existing initiatives under the Industry 5.0 pillars.

Reflect on KPIs

A framework to reflect on KPIs, benefits, barriers and enabling conditions.

Mutual learning

Mutual learning with other companies facing similar transformation challenges.

Stronger narrative

A stronger narrative for scaling digital tools from isolated pilots into a company roadmap.

SME validation

Validation that SMEs can progress through gradual, practical and use-case-driven steps.

The added value is not only new technology — it is better alignment between technology, people and strategy.

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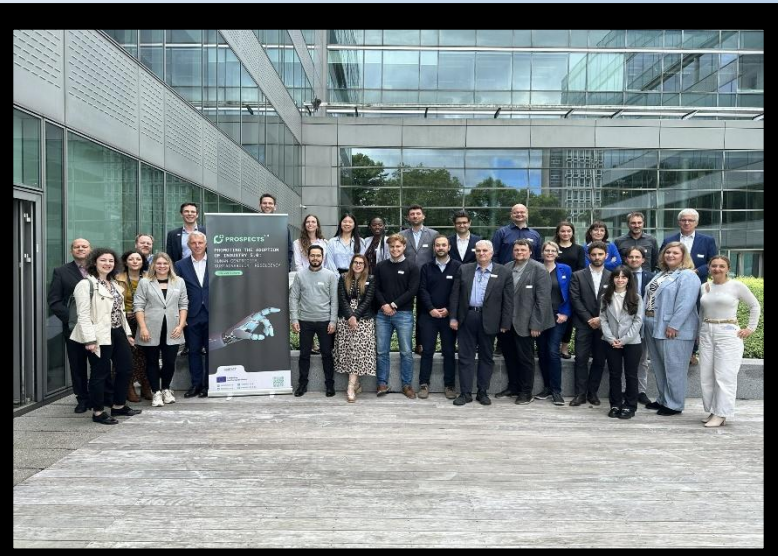

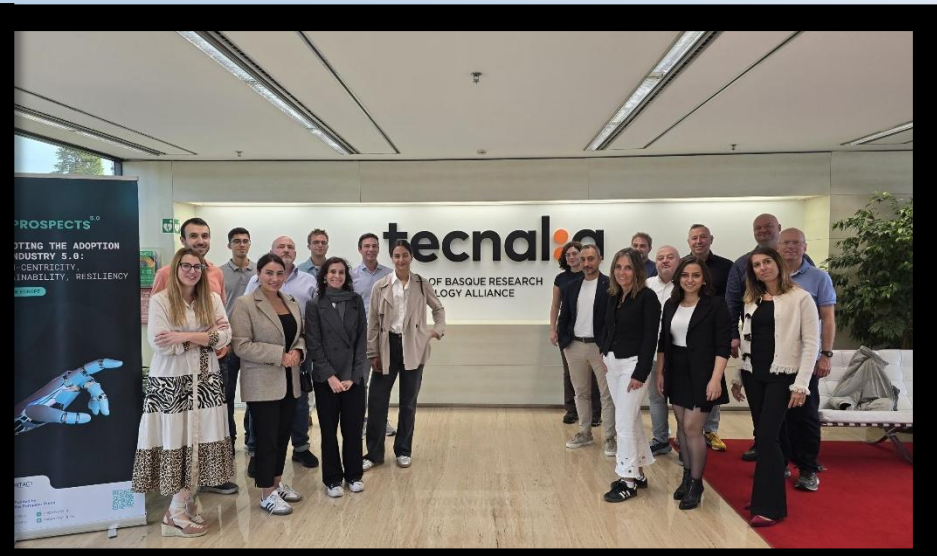

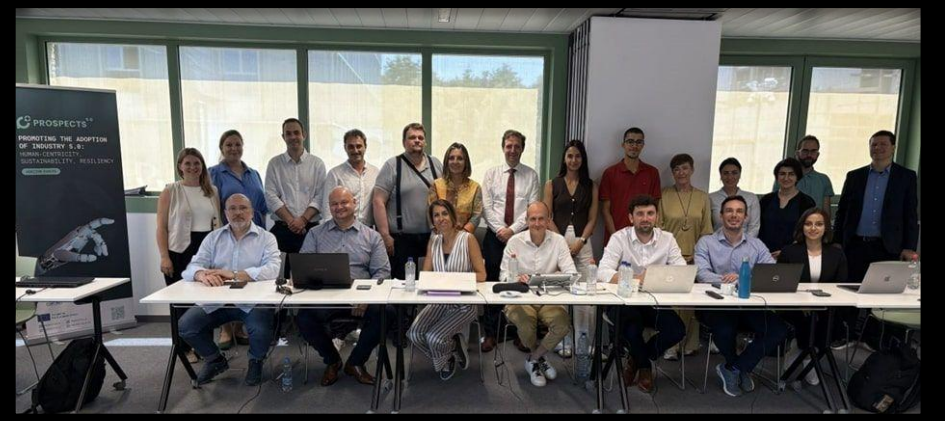

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THANK YOU

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