

INTELLIGEN AGENTS ECOSYSTEM



TECNALIA is developing **omnia**

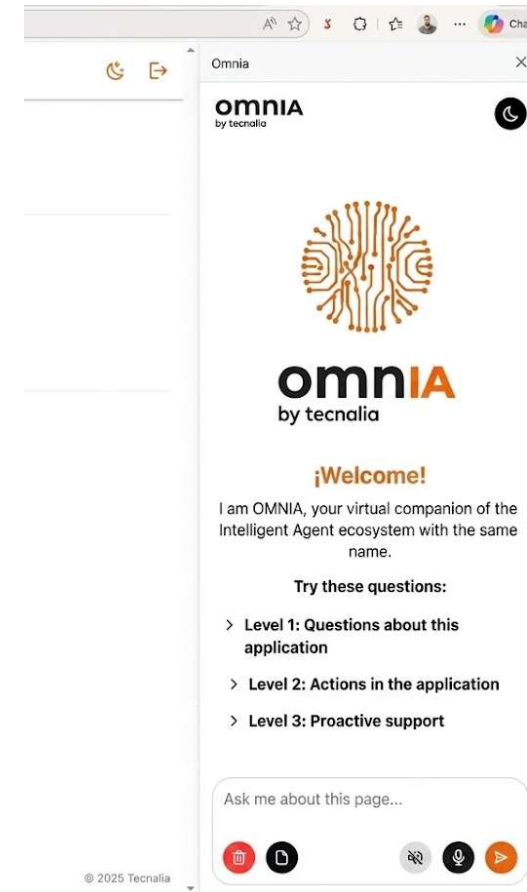
A distributed Artificial Intelligence that understands context, anticipates needs, and amplifies human capabilities.

HUMAN-OMNIA-HUMAN INTERACTION

LEVEL 1: Conversational assistant

LEVEL 2: Interface with other intelligent agents

LEVEL 3: Proactive Artificial Intelligence



USE CASE IN ADVANCE MANUFACTURING

tecnal:a
MEMBER OF BASQUE RESEARCH
& TECHNOLOGY ALLIANCE

EFFRA
EUROPEAN FACTORIES OF THE FUTURE
RESEARCH ASSOCIATION

**MADE
IN EUROPE**



for adaptive optimization
of machining and deviation
detection

01 Real-Time Comparison: continuous analysis and benchmarking of the actual operation status against the expected baseline fingerprint.

02 Deviation Detection: early identification of anomalies such as the risk of incipient chatter in critical phases.

03 Digital Assistant: automated recommendation of actions. The operator retains control and makes the final decision.



MAIN TOPICS FOR OMNIA AS USE CASE



HORIZON-CL4-2027-02-DIGITAL-EMERGING-52- two-stage: New approaches for Human/AI collaboration for the workforce of the future (RIA) (Made in Europe and AI, Data and Robotics partnerships)

Proposals should produce dedicated innovative AI approaches for human-machine collaboration in advanced manufacturing to be applied in at least two of following fields:

Human-AI Co-Learning and knowledge capture to share competences, capture expert knowledge, provide interactive mentoring to up-skill the workforce, and support re-qualification and continuous training – leading to increased knowledge at factory level and avoiding loss of know-how.

Human-AI teamwork thanks to innovative natural interaction models (considering the e.g. related hardware interfaces and/or collaborative machine tools), enabling to control complexity in cognitive cooperating production systems, including planning activities at shop floor level.

Interfaces with automation which automatically adapt to the need of the humans including different abilities and different cultural needs.

Our contribution

Intelligent Agent Ecosystem (OMNIA):

- for interaction with machines at shopfloor level
- for capturing expert knowledge

HORIZON-CL4-2027-04-DIGITAL-EMERGING-04: Apply AI: Challenge-Driven AI Innovation Booster in Apply AI prioritised sectors (RIA) (Partnership in AI, Data and Robotics)

Project results are expected to contribute to all of the following expected outcomes:

Increase competitiveness and visibility of the relevant AI community within key application domains, and promote collaborative approaches for AI development in these domains, fostering the ecosystem.

Increase adoption of AI technologies across the following three key application domains: healthcare, advanced manufacturing (including AI-powered robotics) and in-vehicle autonomous driving.

In advanced manufacturing - advanced AI will optimize production processes, improve quality control and product design, or enable predictive maintenance.

Our contribution

Intelligent Agent Ecosystem (OMNIA):

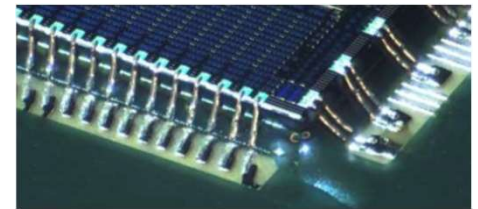
- to enable predictive maintenance: condition monitoring expertise + advanced AI
- to optimize production based on process parameters suggestions

FUNCTIONAL PRINTING



Electronic additive manufacturing through localized deposition of functional inks using advanced printing techniques.

- **Aerosol Jet Printing in clean room**
 - **Advanced microelectronics:** high-density routing and advanced packaging.
 - **Conformal 3D printing:** High-resolution non-contact deposition over complex geometries.
 - **Maskless digital rework:** Localized precise repair of high-value modules for remanufacturing.
 - **Integrated photonics:** polymeric waveguides and Photonic Wire Bonds for co-packaged optics.
- **Patented electronics integration within composites**
 - **Zero structural loss:** Proprietary method to embed fine sensors with no mechanical degradation.
 - **Process monitoring & SHM:** In-situ tracking of curing/infusion and real-time structural health.



MAIN TOPICS FOR FUNCTIONAL PRINTING



HORIZON-CL4-2027-01-

MATERIALS-PRODUCTION-22

Innovative advanced materials and new production processes – reducing dependencies on Critical and Strategic

HORIZON-CL4-2027-01- MATERIALS-PRODUCTION-02

Advanced manufacturing for key products

*This topic addresses technologies and machinery for advanced manufacturing, focusing on manufacturing excellence and on increasing circularity, including through the better use of innovative advanced materials and secondary raw materials... Proposals should develop technologies and machinery to enable the manufacturing of these components with a **minimal use of critical raw materials** [reference to overall targets] or imported materials...*

- **Advanced manufacturing** technology and machinery becomes available in Europe for the manufacturing of **key and high-performance products**;
- Resource efficiency in terms of materials and energy is increased significantly;

Raw Materials

*"The focus of this topic is on alternatives for the substitution or **more efficient use of critical and strategic raw materials**... Proposals should develop IAMs or process technologies to replace or reduce the use of critical and strategic raw materials in strategic areas and sectors such as energy, mobility, construction, electronics, medical devices or chemical industries..."*

- Reducing dependencies of critical and strategic raw materials through partial or total substitution by safe and sustainable **innovative advanced materials and/or via more efficient use of critical and strategic raw materials** in production processes;
- **New or improved production processes**, innovative advanced materials and products that are safer and more sustainable, supporting a clean and autonomous economy

HORIZON-CL4-2027-01-

MATERIALS-PRODUCTION-03

Factory processes and automation for de- and re-manufacturing

"Proposals should focus on developing de-manufacturing and re-manufacturing technologies at the factory level,"

- **Functions of products** are retained, reused, upgraded or adapted through de-manufacturing and re-manufacturing;
- **Skills, standards and safety measures** relevant to remanufacturing are developed
- Solutions allowing local (on-site) repair or re-manufacturing of high-added value components (applied to e.g. **wind turbines, aircraft and vessels**); Solutions to plan the sequence of operations based on the characteristics of the incoming products to be re-manufactured.

HORIZON-CL4-2027-05-DIGITAL- EMERGING-03

Advanced integrated photonic devices for extended features and ultra-low power consumption

R&I should enhance the functionality, efficiency, and integration of photonic devices and circuits with a focus extended system performance ..."

- **Advanced integrated photonic devices** and circuits with enhanced functionality and performance enabling wider application across multiple sectors including digital, automotive, industrial, health and security
- **Low power consumption sensors** with increased performance in application domains
- Miniaturised, high-complexity photonic circuits (e.g. multilayer photonics, chiplets, multiple integrated functional elements), **scalable interconnects and electronics-photonics integration** (co-packaged, heterogeneous, or monolithic) to improve performance, reliability, and cost-efficiency.