ODIN

Open-Digital-Industrial and **Networking** pilot lines using modular components for scalable production

The Challenge

While robots have proven their flexibility and efficiency in mass production and are recognized as the future production resource, their adoption in lower volume production environments is heavily constrained. The main reason for this is the high integration and deployment complexity that overshadows the performance benefits of this technology.

If robots are to become well accepted across the whole spectra of production industries, real evidence is needed that they can operate in an open, modular and scalable way.

Such an approach needs to demonstrate:

- Easy customization and deployability: allowing multiple core technologies (from additional robotic units to individual sensing/ perception/ networking systems) to be easily integrated.
- Autonomy through the real collaboration of robots, allowing them to perform tasks in a non-sequential, non-preprogrammed and non-separated (fenceless) way of operation.
- Appropriateness of robotic technology for different production tasks through the support of different robot types and tooling that can be reconfigured for the particular production process.
- Compatibility with existing production processes and already installed production systems.
- Robustness through autonomy: the ability to operate with a very low degree of supervision.

ODIN project aims to strengthen the EU production companies' trust in utilizing advanced robotics

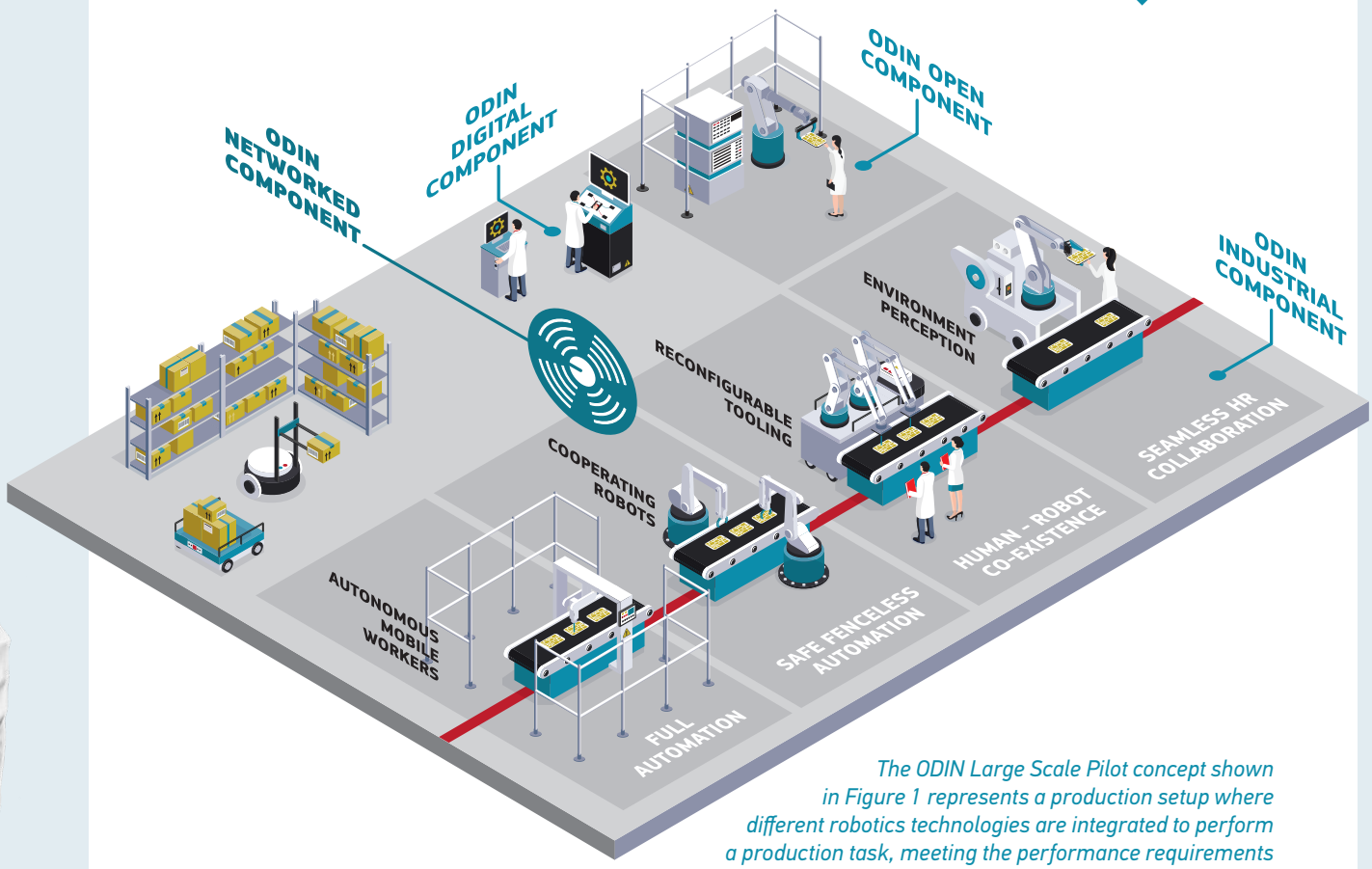
Discover ODIN

ODIN will bring technology from the latest groundbreaking research in the fields of:

- Collaborating robots and human-robot collaborative workplaces
- Autonomous robotics and AI-based task planning
- Mobile robots and reconfigurable tooling
- Digital Twins and Virtual Commissioning
- Service-Oriented Robotics Integration and Communication Architectures

To strengthen the EU production companies' trust in utilizing advanced robotics, the vision of ODIN is:

> *to demonstrate that novel robot-based production systems are not only technically feasible but also efficient and sustainable for immediate introduction at the shopfloor*



The ODIN Large Scale Pilot concept shown in Figure 1 represents a production setup where different robotics technologies are integrated to perform a production task, meeting the performance requirements of the industrial sector where the line operates.

Use Cases

The project targets three different production domains, each one manifesting a diversified set of performance requirements:

White Goods

Ability to reprogram/reconfigure a robot for a new product variant:
- integrating new processes
- teaching new interaction schemes with humans and
- replicating the solution to similar cases with minimum cost/effort.

Aeronautics

Ability to easily reprogram/reconfigure a robot for new tasks that may combine autonomous mobility, manipulation, or a combination of both.

Automotive

Mobility of robots – being able to move between stations and perform different types of processes. Assisting humans in high payload manipulation.

Benefits to the End Users

a Automation of the manual production process, leading to reduction of non-operator friendly tasks

b Robustness in performance and increased reliability/ availability of the production systems, as the result of the mobility of resources

c Higher product quality due to the exploitation of the robot accuracy and the assignment of non-value adding activities to robots

d Multiple products assemblies on the same system and handling different types of products

e Adaptability to varying environments and constraints by advanced vision and sensing systems that are optimized for mobile applications (navigation as well as process sensing)

f Enhanced production monitoring through the novel logging capabilities of the latest ICT enablers

g Reduced systems cost enabled by the open control and synchronization architecture

The Impact

Contribution to White Goods

a Enhance and adjust the overall system to changes in the work cycle, reducing the time required for cobot programming, fine tuning and commissioning,

b Improve collaborative operations, eliminating completely the area separation between human and cobot arm and allowing cobot installation in workplaces,

c Cost of launching a new product is reduced due to the reuse of robots and software technology,

d Empower preventive/predictive maintenance actions through AR visualization functionality,

e Time to launch a new product will be shortened since the robot will simply need to be reprogrammed. In comparison to hard automation where new HW needs to be designed for managing the process, employing robotic based solutions offer a significant flexibility improvement.

Contribution to Aeronautics

a Improving the flexibility, production rate and cost efficiency of drilling, handling, transportation and inspection process, to ramp-up production rate and meet the delivery objectives,

b Decreasing the defect rate,

c Freeing up floor space and improving logistics,

d Reduction of tooling,

e The safety of the operators will be dramatically improved, as the result of not having to perform manual tasks that involve the interaction with tool devices, hard visual checking activities and working in non-ergonomic positions.

Contribution to the Automotive

a Robotization of manual applications using novel robot solutions to compete with lower wages market,

b Enablement of fast reconfiguration by exploiting the mobility and ICT interconnection of products and resources,

c Involve new young engineers, students and research institutes in the problems that the automotive sector faces and provide innovative solutions,

d Improve the working conditions of operators who can be assigned with nonphysical demanding tasks, designed to be intrinsically safe and pave the way to a more educated and highly skilled work content.

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This project has received funding from the European Union's Horizon 2020 research and Innovation Programme under Grant Agreement No. 101017141