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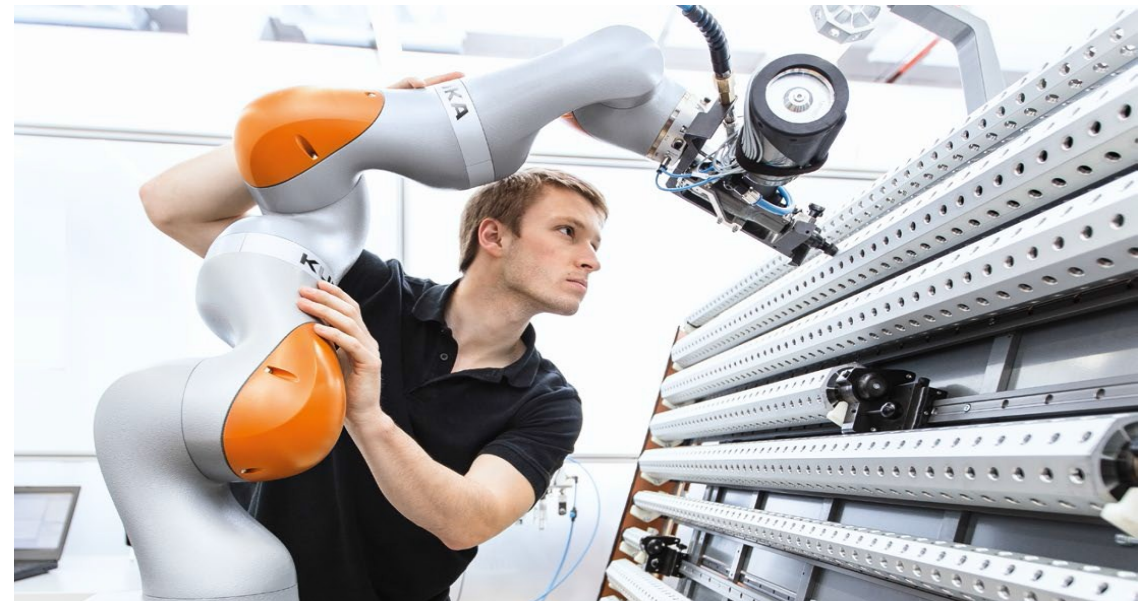
@H2020_HORSE



HORSE project Group



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Smart Integrated Robotics System for SMEs
controlled by Internet of Things
based on Dynamic Manufacturing Processes

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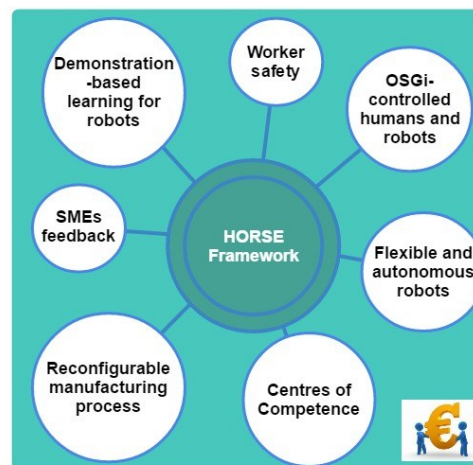
HORSE aims to bring a leap forward in the manufacturing industry proposing a new flexible model of smart factory involving collaboration of humans, robots, AGV's (Autonomous Guided Vehicles) and machinery to realize industrial tasks in an efficient manner. **HORSE** proposes to foster technology deployment towards SMEs by developing a methodological and technical framework for easy adaptation of robotic solutions and by setting up infrastructures and environments that will act as clustering points for selected application areas in manufacturing and for product life cycle management (production and/or maintenance and/or product end of life). The main strategy builds on existing technology and research results in robotics and smart factories and integrates them in a coherent framework.

The suitability of the resulting framework is not only driven by but will be validated with end-users - manufacturing companies- in two steps: In the first, the joint iterative development of the framework together with selected end-users will take place (Pilot Experiments). In the second, its suitability and transferability to further applications will be validated with new end-users, which are recruited by an Open Call mechanism.

HORSE aims to foster advanced manufacturing technology deployment by industries and especially SMEs that will stimulate their interest. Therefore, **HORSE** Centres of Competence (CoCs) will be established in four locations across Europe, in order to simplify usage and facilitate access to robotics by European industry and especially first users SME. In line with the EC initiative to support the European leadership in manufacturing through the adoption of ICT technologies, **HORSE** is an **implementation of the second phase of I4MS**, focusing on **Advanced Robotics** for manufacturing.

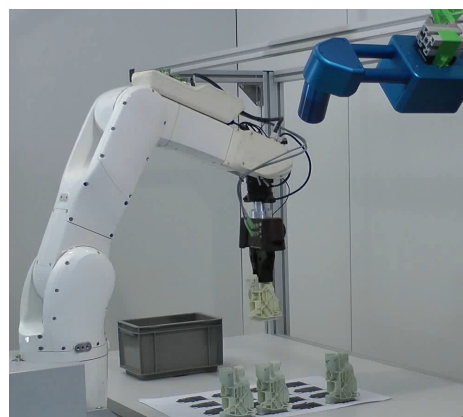
The novel approaches of **HORSE** are the integration of concepts such as physical human-robot interaction, intuitive human-machine interfaces and interaction between different robots and machines into an integrated environment with pre-existing machines and workflows. Safety of the human worker as well as reduction of health risks through physical support by the robotized equipment will contribute to better overall manufacturing processes. In these, pre-defined workflows to be customized, are the basis for servitisation, for the entire value chain that allow rapid reconfiguration of the robots based collaborative production processes.

HORSE proposes a comprehensive set of activities to speed up adoption of emerging advanced manufacturing technologies of highly flexible and near-autonomous robotics systems. Auto-Guided Vehicles (AGV) and static robot will be used to enable flexible and versatile production lines. These activities serve



HORSE project will make use of innovative technologies in order to develop a robust technological framework. More specifically it will use:

- Integrated, process-oriented management model for the high-level control of the production line process online, automatic resource allocation and dynamic reallocation (BPM) as necessary.
- The IoT paradigm and OSGi-based architecture for



the entire value chain and propose new concepts and business models for **robotics systems servitisation and for product operation**: **HORSE** defines and implements a **technological framework** that adopts novel ICT approaches and standards (OSGi) that enable the robots to be considered as centrally and remotely scheduled resources, dynamically allocated to new and varying production tasks in collaboration with humans in working cells without fences. This provides **flexibility** for fast configuration and take-up, improvement of **quality** (process control) and **safety** of the operator.

The **HORSE** framework covers a large variety of applications, as it is a generic model, to be customized with intuitive interfaces for the needs of the different end-users. Apart from the entire robotic framework, scientific research and lessons learned will result from **HORSE**. The value of the **HORSE** project consists of building centres of competence and open calls for trials in the field of robotics in such a way that a huge number of European manufacturing SMEs operating in different industries will be able to test and evaluate the benefits.

remote control of production resources (humans, robots) (all resources/actors are accessible in the same manner).

- Technologies to enable autonomous and effective cooperation between robots and humans with no barriers including:

⇒ Multi-modal supervision and control modes for a variety of existing and novel **robotic co-workers: cooperative robots (cobots) and "third hand" robots** for diverse manufacturing applications.

⇒ Innovative **hybrid position/force control** for **intrinsically safe flexible robots**

⇒ **Demonstration based robot programming techniques** for an intuitive programming of robots tasks by non-robotics experts.

- A Multilayer safety approach that incorporates both Robot level safety as well as System level safety including innovative AR technologies and Situation Awareness software.

- Easy and flexible teaching of new tasks to robots.