

Main Benefits

According to a recent survey among manufacturing industry (Ref. ReBorn – External industrial requirements description, ©ReBorn consortium) the current level of equipment reuse is smaller than 25% in almost 9 of 10 factories, while the potential of equipment re-use within a factory is generally rated in the middle range of total factory equipment.

The developments in the 3 focus areas together accumulate manufacturing knowledge for a 360° factory equipment life-cycle. These developments will give rise to self-aware and knowledge-based equipment with functionalities to collect and manage information regarding their capabilities. Benefits are expected in several aspects:

- ↳ Incorporation of condition monitoring and self-description intelligence in components
- ↳ Lifetime extension of production components and manufacturing systems towards 100% re-use
- ↳ Rapid reaction on changing production demands and consequently time reductions
- ↳ Investment risk reduction and operational cost reductions (CAPEX and OPEX)
- ↳ Support human expert during the factory layout design process
- ↳ Plug&Produce, easily and modularly integrable devices for smart factories
- ↳ Latest ICT technology implemented in existing manufacturing processes
- ↳ Flexible collaboration among component suppliers, system integrators and end users including new business models

Main Impacts

Through its approach and planned activities ReBorn will address industrial needs hitherto neglected and will contribute to unleash the full potential of sustainable, green and smart factories. Empowering the industry to produce components and assembly systems, which can address fast changing requirements, is expected to bring forth the following impacts:

- ↳ Strengthening the competitiveness of European SMEs through high-end technology and new opportunities for business models
- ↳ Enabling full economic sustainability of the production systems through innovative re-use of modular equipment
- ↳ Foster whole value and supply chains on European level by use and contribution to international standards and norms
- ↳ Holistic and inclusive deployment of resources, materials, tools and machines independent of the equipment's history of use
- ↳ Contribute to the increasing societal consciousness about the efficient and ecologically sustainable use of resources to meet the present challenges of global climate change and resource scarceness

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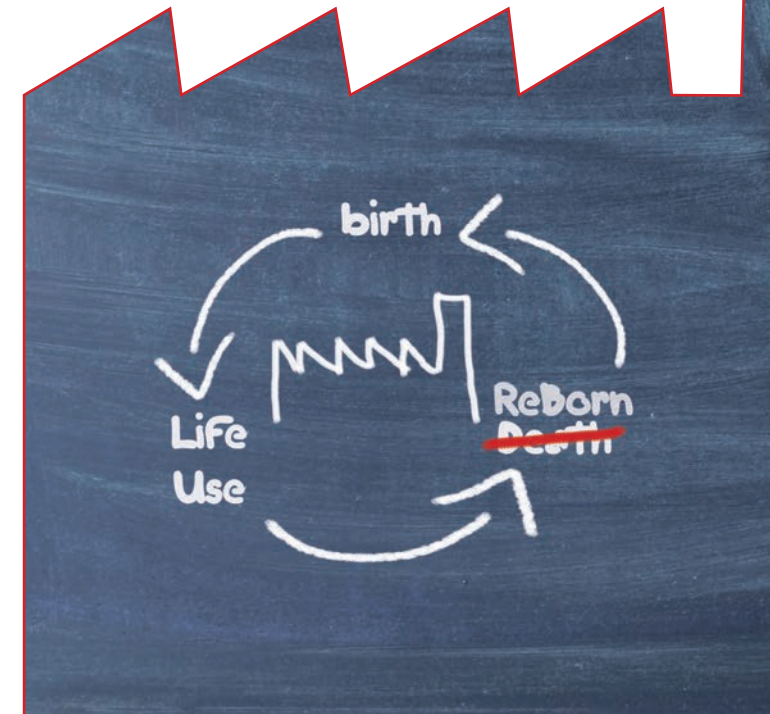
Further Information

www.reborn-eu-project.org

Website



Innovative Re-use of modular knowledge-based devices and technologies for Old, Renewed and New factories

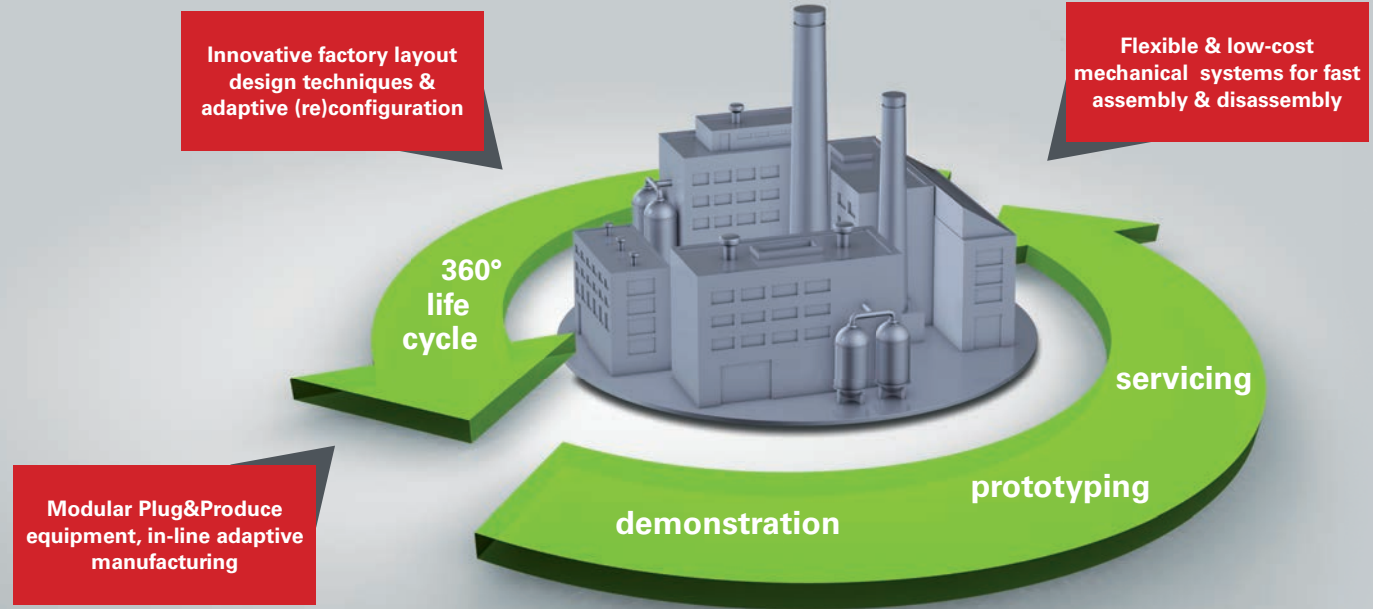


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ReBorn Vision

During its lifetime manufacturing equipment passes several stages starting at initial incorporation into the production line, operation, maintenance to end-of-use and disassembly. Throughout these stages there are a number of critical intersections, which can potentially cause costly machine downtime or even downtime in the entire production system.

The vision of ReBorn is to **demonstrate strategies and technologies** that support a new paradigm for the re-use of production equipment in factories. This re-use will give new life to decommissioned production systems and equipment, helping them to be “reborn” in new production lines. Such new strategies will contribute to **sustainable, resource-friendly and green manufacturing** and, at the same time, deliver economic and competitive advantages for the manufacturing sector. As a **demonstration** oriented project, ReBorn aims at delivering **industrial environment proven prototypes**. A special feature is the versatility of these prototypes which can be integrated either modularly or within inclusive factory layouts. Furthermore, and in the light of ever increasing importance of knowledge based economy, the re-use and refurbishment approach will give rise to new business model opportunities in particular related to **servitization**.



ReBorn – From Vision to Reality

ReBorn will make significant step towards 100% re-use of equipment focusing its approach on 3 main areas

1. Modular Plug&Produce equipment, in-line adaptive manufacturing

Imagine that equipment of a production line not only fulfils one isolated task, but rather acts as a dynamic, multipurpose yet highly specialized part of an orchestra of intelligent cells. Imagine that decisions on the usage of the equipment for a given task can be taken in-line based on the equipment’s capabilities, current performance status and occupancy. Such flexible (Plug&Produce) production systems are enabled by intelligent components capable of communicating with each other in a network. These components are self-aware of their state and performance as well as their evolution over time. In ReBorn, these intelligent components will be developed as logically encapsulated entities – the so-called VERNONS – that gather, store and analyze process data. The obtained information will be converted into knowledge about the equipment piece within the system and can be used for e.g. dynamic scheduling of task operation, possible maintenance and refurbishment and for prognostic analytics on the equipment’s remaining lifetime performance. Importantly, the intelligent components will be designed as modules in order to allow for reconfiguration, e.g. in case of changing demands of the products to be produced. The modular structure also allows for easy integration (Plug&Produce) into both new and existing hardware. These developments will be the basis for flexible and adaptable production relying on machines and devices with built-in intelligence for self- and condition monitoring.

2. Innovative factory layout design techniques and adaptive (re)configuration

Building on the self-aware and knowledge-based equipment, novel concepts for the entire production design process can be derived allowing for the re-use and reconfiguration of existing factory layouts according to conditions required for rapidly changing customers’ demands. The re-use considers both a local, product-oriented re-use as well as the re-use after de-manufacturing and dismantling of a device at different locations. ReBorn will elaborate a collaborative environment, through which an optimum choice on the resource allocation, task distribution and task sequence according to the capability status of the equipment at planning level can be made. The required information comes from the collected data by the intelligent devices themselves, which here, although autonomous, are embedded in the larger context of the production system layout design. Taking into account the usage of used and renovated equipment implies also the maximum extension of equipment life-time. The deployment of the knowledge at production life-cycle planning and design level marks important steps towards the knowledge-based and agile manufacturing enterprise of the future with innovative flexible and fast reconfigurable manufacturing solutions. It is expected that the proposed strategies will allow to decrease the ramp-up time of assembly lines to reduce investment costs for new equipment and to respond to rapidly changing consumer needs while saving costs.

3. Flexible and low-cost mechanical systems for fast and easy assembly and disassembly

Nowadays mechanical systems such as grippers or fixtures rely on specific, product-tailored hardware solutions. In case of product changes, time-intensive manual adaptations of the systems are required. Future solutions target on flexible, modular systems which are composed of standard components and allow for easy (mechanical) re-configuration and extension. A further strategy for flexible and resource economical manufacturing is based on Additive Manufacturing (AM) technologies. AM enables direct manufacturing from designs (CAD files) by 3-dimensional printing of the desired product. In ReBorn, the team aims at developing a flexible, multipurpose and low-cost handling cell for producing a light-weight gripping device. The design and production process will be just-in-time and fully automated thereby eliminating intermediate manual steps and reducing the adaption of handling devices during change-over towards zero. Optionally, integrated sensors can gather and provide data to further enhance the components capabilities and self-analysis baseline. This development will allow for highly flexible processing of parts with small lot sizes and an increasing variety.

