



D6.1

**SMARTHANDLE technologies for
intelligent workpiece handling and
line reconfiguration**



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Acronyms and definitions

Acronym	Meaning
ODM	Overhead Dual Arm Manipulator
PLO	Pallet Loading Optimization
DSE	Dynamic Scheduling Engine
PLC	Production Line Controller
TCP	Tool Center Point
IK	Inverse Kinematics
OMPL	Open Motion Planning Library
RRT	Rapidly-exploring Random Trees
MDS	Manufacturing Data System



Abstract

This deliverable summarizes the integration and testing activities carried out under the SMARTHANDLE project, which focuses on the intelligent handling of workpieces and reconfigurable lines. The report consists of two main parts: a) early piloting activities and the adaptation of technologies for integrating enabling technology prototypes, and b) human-centric design activities aimed at ensuring technology usability. Testing and integration activities were performed across three industrial use cases: a) Packaging of variform aluminum profiles, b) Human-aware assistive contact lens manufacturing, and c) Electric vehicle battery disassembly.

Prototypes of dexterity, reasoning, and reconfiguration enabling technologies were integrated into pilot demonstrators. Concurrently, an extensive study evaluated the human-centricity of these integrated technologies, assessing their ease of use, overall usability, and trustworthiness. Testing validated the working principles of each block, and the resulting remarks established a clear integration roadmap for the final phase of the project.

Executive summary

This document reports the activities performed so far in T6.1 while taking into account the results of the technical WPs. It documents the design and integration activities of the SMARTHANDLE technologies on the three pilot cases, namely:

- Variform large part packaging - Metal production pilot case: This case deals with the packaging of aluminum profiles on pallets based on personalized customer orders. Details will be provided in section **iError! No se encuentra el origen de la referencia..**
- Delicate and deformable part handling and inline logistics - Consumer goods production pilot case: This case deals with the manufacturing and handling of highly customizable contact lenses. Details will be provided in section **iError! No se encuentra el origen de la referencia..**
- Battery disassembly pilot case: This case deals with the recycling of EV batteries. Details will be provided in section **iError! No se encuentra el origen de la referencia..**

The document is organized around the distinct integration activities that are described in section **iError! No se encuentra el origen de la referencia.:** for each pilot case a description of the scenario and the pilot setup is reported, followed by the integration of the SMARTHANDLE technological modules. Section **iError! No se encuentra el origen de la referencia.** is oriented towards the evaluation of the human-centeredness of the integrated system. The complete integrated system will be provided in D6.2 (M36).

