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Methodology for the Integration of Object Identification Processes in Handling and Logistic Systems

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Abstract : The uprising complexity in production systems due to an increasing amount of variants up to customer innovated products leads to requirements that hierarchical control systems are not able to fulfil. Therefore, factory planners can install autonomous manufacturing systems. The fundamental requirement for an autonomous control is the identification of objects within production systems. In this approach an attribute-based identification is focused for avoiding dose-dependent identification costs. Instead of using an identification mark (ID) like a radio frequency identification (RFID)-Tag, an object type is directly identified by its attributes. To facilitate that it's recommended to include the identification and the corresponding sensors within handling processes, which connect all manufacturing processes and therefore ensure a high identification rate and reduce blind spots. The presented methodology reduces the individual effort to integrate identification processes in handling systems. First, suitable object attributes and sensor systems for object identification in a production environment are defined. By categorising these sensor systems as well as handling systems, it is possible to match them universal within a compatibility matrix. Based on that compatibility further requirements like identification time are analysed, which decide whether the combination of handling and sensor system is well suited for parallel handling and identification within an autonomous control. By analysing a list of more than thousand possible attributes, first investigations have shown, that five main characteristics (weight, form, colour, amount, and position of subattributes as drillings) are sufficient for an integrable identification. This knowledge limits the variety of identification systems and leads to a manageable complexity within the selection process. Besides the procedure, several tools, as an example a sensor pool are presented. These tools include the generated specific expert knowledge and simplify the selection. The primary tool is a pool of preconfigured identification processes depending on the chosen combination of sensor and handling device. By following the defined procedure and using the created tools, even laypeople out of other scientific fields can choose an appropriate combination of handling devices and sensors which enable parallel handling and identification.

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