

Work Package 2

Self Adaptation and Self-Optimization

Deliverable D2.2

**Implementation of adaptive control
algorithms and self-optimization mechanisms
at local level**

Document type	: Deliverable Summary
Document version	: Final
Document Preparation Date	: 31/01/2012
Classification	: Public
Author(s)	: SINTEF, Whirlpool, UNIVPM
File Name	: Deliverable_D2.2_summary.pdf

Project Ref. Number	: 246203
Project Start Date	: 01/07/2010
Project Duration	: 36 months
Website	: www.grace-project.org





1. Deliverable Summary

An important objective of the GRACE project is to analyse, develop and implement self-adaptation and self-optimisation in manufacturing systems and assembly processes, both at a local and global level. The main motivation for this is to increase process flexibility and improve the handling of unpredictable changes in the production process.

In this report the focus is on implementation of such functionalities at a local level and by local level is meant the cell level as shown in Figure 1. Moreover, the functionalities are applied to several processes in the Whirlpool production line for washing machines. The production line is illustrated in Figure 2.

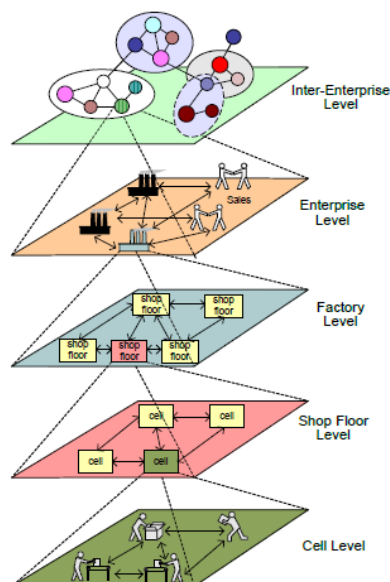


Figure 1 The layer approach to distributed manufacturing Error! Reference source not found.

At the local level or cell level the project has considered adaptation and optimisation of the operation of manufacturing and assembly resources. By resources is meant machines operating along the production line. Each machine is controlled by local controllers which very often are based on simple control functions handled by standard controllers like for instance PID controllers. These controllers are often delivered as part of the total system by the system supplier.

Also, adaptation and optimisation of the final product operation has commenced. The focus will be on the on-board controller of a washing machine (WM) and the functionalities will be achieved by adjusting a set of parameters to be stored on-board the final product. In

Deliverable D2.2 Summary

Implementation of adaptive control algorithms and self-optimization mechanisms at local level



this way each on-board product controller will be set and calibrated for its specific characteristics, based on the production history, this in order to increase machine efficiency and robustness. The possibility to program the control board embedded in the WM for the adaptation of the product to the actual outcome of the assembly process will be discussed in this report.

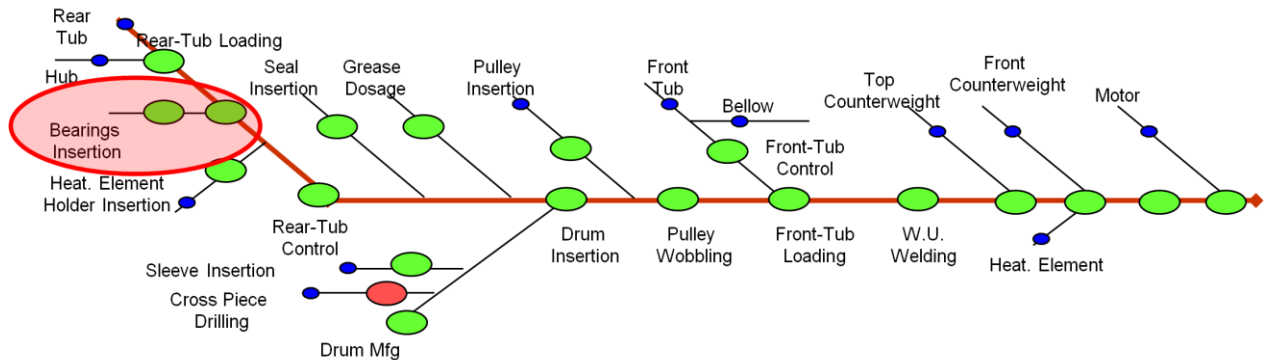


Figure 2 The washing machine production line

Deliverables 2.2 contains the outcome of GRACE WP 2, Task 2.2 *“Implementation of adaptive control algorithms and self-optimization mechanisms at local level”*. The document is organized as follows. Section 2 gives a short introduction to some of the control challenges addressed in WP2. Screwing process is addressed in Section 3. Section 4 presents the implementation of a bearing insertion model. Modeling of the on-board controller is presented in Section 5 and Section 6 holds the overall conclusions.