Scope

The new industrial revolution is driven by new-generation information and sensor technologies such as cloud computing, big data and data analytics, robotics and additive manufacturing. These technologies create the Internet of Things (IoT) in which objects (products, machines, factories, warehouses, customers) are all connected. The increased availability of massive amounts of sensor and manufacturing data that can be shared among the whole supply chain will enable integrated planning in industry to improve manufacturing and maintenance processes and to develop innovative products and services.

Vision

The digitizing industry bears the promise to improve and integrate manufacturing and maintenance planning, thus facilitating the optimization of a factory as a whole, instead of sub-optimizing business units and processes separately. Integrated planning will lead to higher and more flexible production capacity, more efficient maintenance, more reliable production lead times, and lower stock levels. To make this promise come true, the current way of making separate plans for manufacturing and maintenance based on ad-hoc collected data must change.

Research challenges

a) Development of data-collection and data-aggregation techniques to parametrize production, estimation, prediction and maintenance models.

b) Implementation of advanced prediction and estimation techniques (e.g. failures, wear out, demand).

c) Implementation of simulation-based optimization techniques.

d) Creation of data-driven integrated prediction and optimization models.

e) Development of a data-driven decision-making framework at operational and tactical level to support integrated production planning and predictive maintenance.

f) Analysis of the value of integrated planning for the whole factory.

Scientific staff involved

Core team:

Prof. Geert-Jan van Houtum (OPAC – IE&IS) RP leader
Smart maintenance

Prof. Ivo Adan (OPAC – IE&IS)
Smart manufacturing

Dr. Alp Akcay (OPAC – IE&IS)
Data-driven operations management

Dr. Mike Holenderski (SENS – M&CS)
Machine learning for failure prediction

Dr. Stella Kapodistria (STO – M&CS)
Data-Driven stochastic processes and optimization

Project examples

Dynamerge NWO, with e.g. Philips, Brandweer Amsterdam, CWI
Emergency service logistics, dynamic planning at operational level, network design

MANTIS EU project, 60 partners
Predictive maintenance, maintenance service platform architecture

Philips Data Science Flagship Philips & TU/e
Predictive maintenance for healthcare systems

ProSeLo Next TKI Dinalog, with e.g. Marel, Orcé, ASML, Vanderlande
Predictive maintenance, control towers, new business models