

Popular science summary
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Master's thesis title: KPIs for Asset Management: A Pump Case Study

Introducing Key Performance Indicators (KPIs) to the asset level is a promising concept.

A lot of data is measured on the assets of a plant and KPIs constitute a powerful tool to make sense of it.

The recently published ISO 22400 standard aims at providing industrial players with a standard model of KPIs for manufacturing operations management as well as with a list of the most common KPIs at the plant level. This standard is a milestone in operations management because it will allow manufacturing companies to use and exchange KPIs in a standard way, and operations technology suppliers to build software accordingly.

The idea is to introduce the concept of a standard set of KPIs for each type of asset. This has previously been taken care of at the plant level, however, in this project it should be done at the asset level instead. In the process industry, pumps have been found to be the most widely used assets on the plants in addition to being among the most energy-consuming, that's why pumps have been the topic of the case study. Actual operational data of several petrochemical plants will be used.

The first part of the work has been to define KPIs for pumps based on physical principles and on feedback from operators while another part has been to analyse the data available in the databases to assess which KPIs can actually be computed in an industrial environment. Once the algorithms to compute the KPIs from the process measurements have been tested in Matlab, the KPIs can be defined and implemented according to the KPI mark-up language defined in ISO 22400 in order to create what one could call a "pump KPI library".

The second major step of the project has been to test the integration of these KPIs in an industrial software. Since the project has been carried out at ABB's Corporate Research Centre in Germany, the software used for the test has been ABB's new Operation Management Software, Decathlon. First, the "pump KPI library" has been implemented to be available for the user in the KPI application of the software. Then, this library has been extended to develop a "pump monitoring application" in the software based on the data available. The user can thus assess at a glance the performance of any pump of the plant on any period of time.

In the end, all this work has been carried out in the perspective of extending the approach to any type of asset. Therefore, a reflexion on possible generalization of the work has been emphasized throughout the project, and although no definite proposition has been made, this thesis can be used as a ground layer to develop the concept of an "asset mark-up language".