DECISION & CONTROL

IMPLEMENTATION OF MODEL-BASED DATA ANALYTICS

Obtaining actionable insights is difficult for complex manufacturing systems consisting of highly dynamic machinery, integrated robotics and automated processing equipment. Getting a step closer to offering decision support for monitoring, controlling and maintaining these applications requires good models of the physical phenomena that occur. Unfortunately, these models are often incomplete or insufficient. With our model-based data analytics (MODA) approach, we can improve these models by combining physics-based insights with data-driven technology such as machine learning (ML) and artificial intelligence (AI). This unique hybrid approach allows us to create and improve models of physical phenomena, such as energy consumption, product quality and production efficiency.

We help companies to:

- gain a better understanding of the behaviour of their product or production process by implementing model-based data analytics;
- set up a decision support strategy through model-based data analytics;
- adopt our toolchain and integrate it into their software routines.

Data are key to a better understanding of machines and processes, but current data analytics do not inherently incorporate existing expert knowledge of such machines or processes. MODA improves physical, empiric models (white box models) with data-driven information (black box models) of non-modelled components or difficult-to-model physical quantities. The combined information enables new insights into the systems. These insights are subsequently used to update the model in an iterative manner.

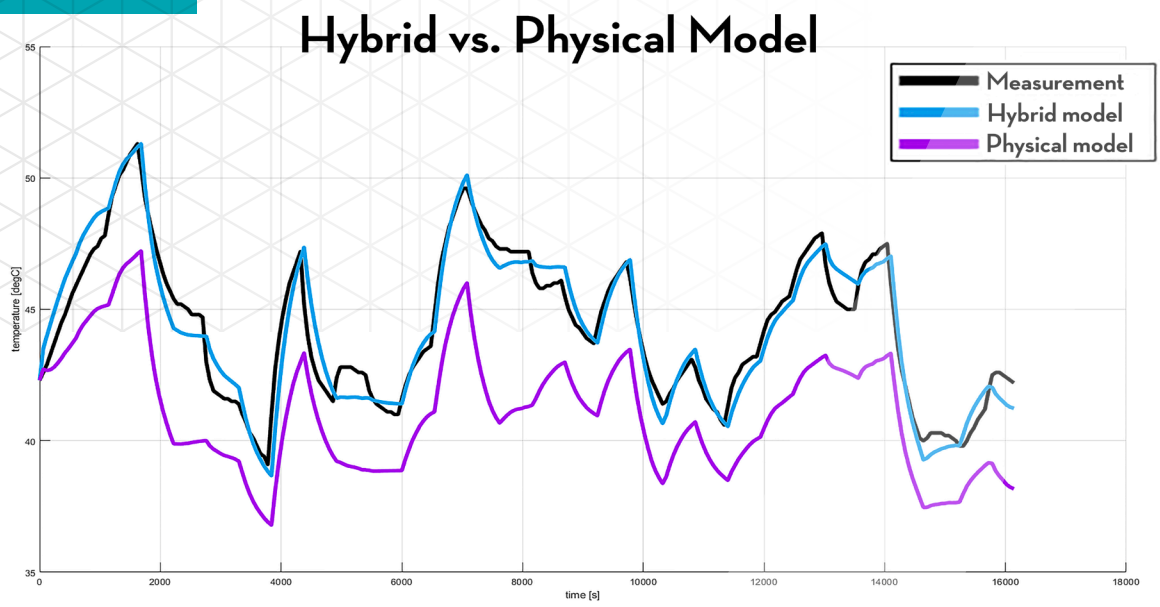
We use various unique software and hardware tools in this process:

- Hybrid modelling toolbox
- Deep-hidden physics modelling toolbox
- Lifetime estimation toolset

www.flandersmake.be

For more information, please contact
services@flandersmake.be

FLANDERS MAKE



SUCCESS STORY

Improved white box model

PROBLEM

The customer had a product for which it wanted to install a temperature-based condition monitoring system. To accurately predict this temperature (<1°C tolerance), a white box model had been set-up in the past. However, this model was not sufficiently accurate as it did not include the impact of friction.

SOLUTION

The white box model was extended with a state- and input-dependent dynamic friction term, which was captured using AI according to the above-described hybrid modelling principles.

CUSTOMER VALUE

The resulting model had a remaining error of <1°C, making it suitable for condition monitoring; and, equally important, a closed formula for calculating the impact as a function of measurable parameters was extracted to further improve the existing white box model.