

## **Olefin Plant Digitalization: Model-based monitoring, sensing of KPIs and optimisation for steam cracking furnaces**

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### **Abstract**

Thermal cracking of hydrocarbons is still the major process used to produce ethylene and propylene, two major starting blocks in the petrochemicals value chain. Due to the large-scale production capacity of this process, small improvements in efficiency can result in significant savings.

The steam cracking furnace is at the heart of the ethylene production process, and its optimal operation is key to maximizing profitability. Accurate information on key process indicators, such as conversion, product yields, tube metal temperatures, and coking rates are essential for the optimal operation and control of steam cracking furnaces. However, measuring these reliably in real time is often either impossible or problematic requiring model based digital applications to estimate them reliably in real time. As the furnace KPIs are affected by coking, it is also essential to have an accurate estimate of state of coking in order to predict them.

In addition, feedstock availability changes with time and it is necessary to identify and operate the furnaces at optimal operating conditions to maximize profitability and to ensure operation within the plant constraints. Such optimization calculations should take into account the current state of coke build up in the furnaces to get correct results.

In this webinar, we present three state-of-the-art Digital Applications for steam cracking furnaces to provide model-based coke buildup monitoring, real-time sensing of KPIs and optimisation of operating conditions. Built on PSE's gPROMS Digital Applications Platform, they use sophisticated numerical manipulations to combine rigorous first principles-based models of steam cracking furnaces with plant operating data. Experience with the deployment of these applications on full-scale industrial plants will be presented.

