Case Study

Reference

- Italy – Buzzi Unicem's Guidonia plant.

Product

- Expert Optimizer 5.0

Summary

Buzzi Unicem wanted a solution for its Guidonia plant that would increase the productivity of its cement grinding system, consisting of three mills. ABB installed their MPC based Expert Optimizer version 5.0 on the mills at the Guidonia plant between December 2006 and January 2007.

The EO team successfully overcame the challenges at the Guidonia plant by applying the Model Predictive Control approach together with a tailored made parameter adaptation and process supervision procedure. The benefits are better grinding process parameters and operation closer to the process constraints: The specific energy consumption has been reduced by as much as 5%.

Project Description

Buzzi Unicem wanted a solution for its Guidonia plant that would increase the productivity of its 3 cement mills, in particular with respect to product quality, startup time and specific energy consumption.

Long startup times and multiple process bottlenecks like elevator power, mill pressure, mill exit temperature and sound make the problem even more difficult. Additionally, signals are noisy and occasionally unreliable and no direct measurement of the returns was available. Five to six cement types per mill were to be taken into account.

Solution

ABB installed their MPC based Expert Optimizer (EO) version 5.0 on the three mills at the Guidonia plant in December 2006. The aim of the controllers was to vary the fresh feed and separator speed in order to stabilize the system at maximum production within the process bottlenecks. The setpoints are chosen automatically in a way that the product quality constraints are met at the maximum production rate. These setpoints are product dependent and can be modified as quality results are made available by the laboratory.

The model comprises models for mill load, elevator function, separator and returns dynamics. Time delays and lags are explicitly taken into account, while a combination of hard and soft constraints on these variables is imposed to achieve robustness and optimality. The model is self adaptive, i.e. the parameters of the model are automatically updated as to minimize model versus process mismatch. Here process knowledge is used explicitly to better exploit the information available.

Benefits

Despite of the large number of mills and cement types, the whole project was carried out in a record time of less than 2 months. The results were better grinding process parameters, operating more closely to the process constraints but never violating process bottlenecks, shorter startup times and the relief of operators for more demanding tasks. Analysis of the base line data show that despite the demanding conditions the specific energy consumption has been reduced by 5% while meeting the constraints on product quality. EO run times are near 100%.