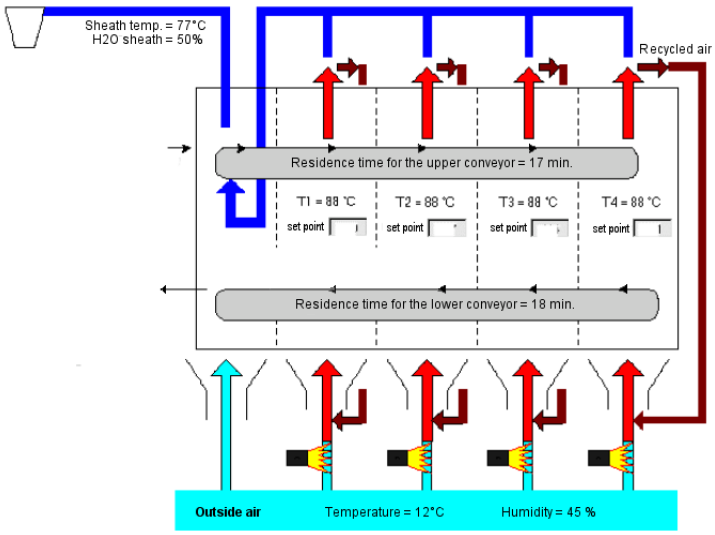
PCR

Model-based predictive control for a better handling of a dryer in food industry

Tight dynamic control of the humidity of the product is necessary in order to prevent the product from getting mouldy and to optimise the product value.



The product is dried as it is pulled forward on the conveyor.

The complexity of the control comes from several factors:

- large time delays
- coupling (cross effects)
- different product families
- few sensors

The humidity control is performed by PCR which yields the prediction of the humidity and computes the temperature set points to be applied.

The global control structure is performed by cascaded controllers.

The control design was performed on a simulated process built from the identified process model. The control structure has been directly embedded into the Schneider Electric PLC since the PCR CAD uses the same modules as the ones in the PLC.

The fluctuations of the humidity are reduced by a ratio higher than 2.

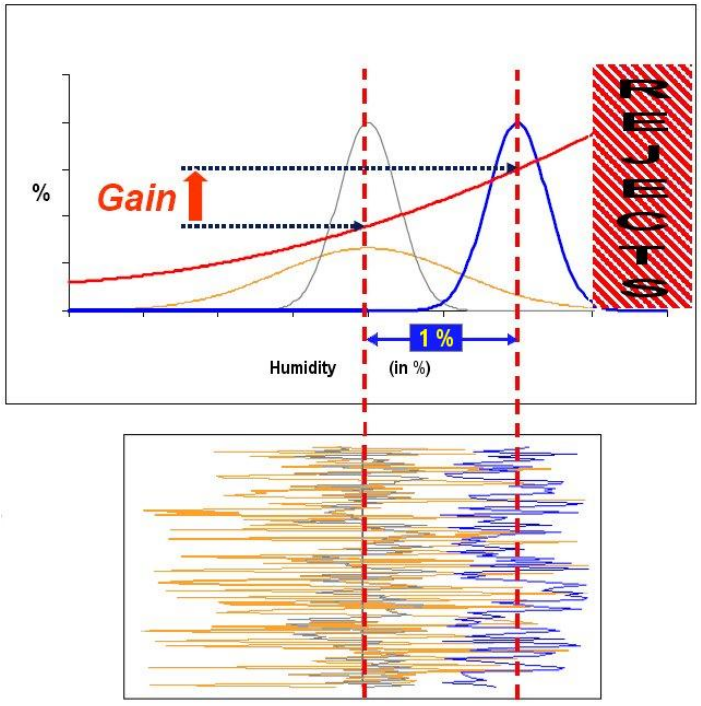
The previous situation plotted in orange color required to set the humidity target far from the specified value in such a way the product is always at least as dry as necessary.

Drying the product more than specified had two costs:

- that consumes extra energy
- it extracts water that could have been sold at product price

The reduction of the fluctuations of humidity allows moving its set point toward the specification without increasing the rejects (blue curves).

The increase by 1% corresponds to 100 € benefit per ton in the factory which produces 2000 tons per year.



Improvement of the humidity control

Another advantage is the increased availability of the operators who have less time spent to manage the disturbances.

SHERPA ENGINEERING
12 avenue de Verdun
F- 92250 La Garenne-Colombes
Tel : 33 1 47 82 08 23
Fax : 33 1 47 82 00 96

MODELLING and CONTROL DESIGN
Email : info@sherpa-eng.com
Web : www.sherpa-eng.com