

Advanced Modelling & Simulation - AMS

CASE STUDY :

VENTILATION OF CARDBOARD & PAPER MACHINE HALLS

Industrial HVAC systems consume huge quantities of energy, and those used to control the heat and moisture in cardboard treatment halls belong to the worst category. 3D simulations can help save on the OPEX by proposing smart control solutions.

THE ISSUES

Smart optimization of the HVAC system of cardboard and paper machine-halls may save a lot of resources to the operators. The process is demanding since the distribution of the flow of hot and cold air and associated moisture in the hall is difficult to predict or even guess (Fig. 1).



FIG. 1. CARDBOARD MACHINE HALL

The number and placement of HVAC ports in a typical card-board hall may exceed the dozens, operating each at an energy cost of tens of thousands of EUR per year. The financial impact is clearly a legitimate incentive for conducting parametric studies including testing various flow conditions to reduce operational costs.

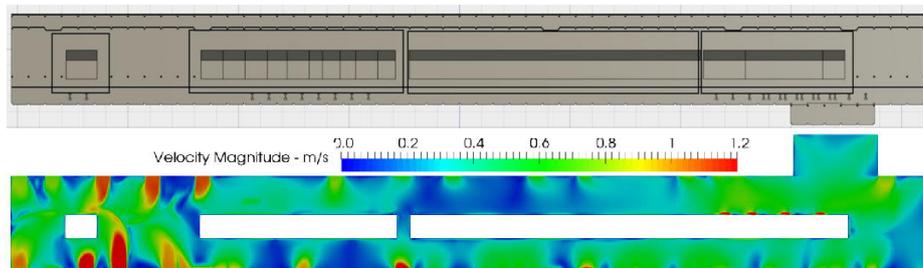


FIG. 2. FLOW SIMULATION IN CARDBOARD HALL USING TRANSAT

THE CHALLENGE

The thermal-flow in such large-scale halls pose certain technical challenges. Buoyancy effects can be important to drive the flow of air and heat, under turbulent flow conditions that are not easy to model (Fig. 2). Secondly, the scale and complexity of the geometries are also issues. Finally, the heat transfer and associated humidity formation-elimination is key, as shown in Fig. 3.

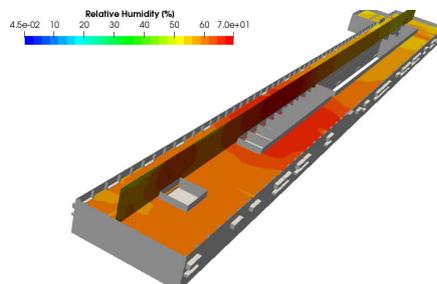


FIG. 3. HUMIDITY IN THE HALL

OUR SOLUTION

Understanding the air flow and heat and humidity distribution in the machine hall is the

most important aspect of the problem. The models built in TransAT are shown in this example to predict the global process, including humidity concentration and potential condensation on the walls of the hall.

YOUR BENEFITS

CFD thermal-flow simulation can be used to assess the humidity concentration in various types of machine halls and operational conditions and predict the regions where and potential condensation is likely to occur and offer technical support during design phases

PÖYRY'S AMS.

Pöyry's Advanced Modelling & Simulation (AMS) group provides consulting services in a broad range of industrial areas. The activities are centered on detailed simulation of fluid flow and heat & mass transfer processes pertinent to energy, industry and infrastructure.

AMS service is enabled by the CFD/CMFD product TransAT.

TRANSAT CFD/CMFD PLATFORM

TransAT is a versatile fluid-flow simulation platform (CFD) using the Immersed Surfaces Technology for multi-dimensional meshing. The platform is best suitable for multiphase flows using tailored predictive techniques and models for complex physics. TransAT can be used in the energy, industry and infrastructure sectors.

TransAT Website: www.transat-cfd.com