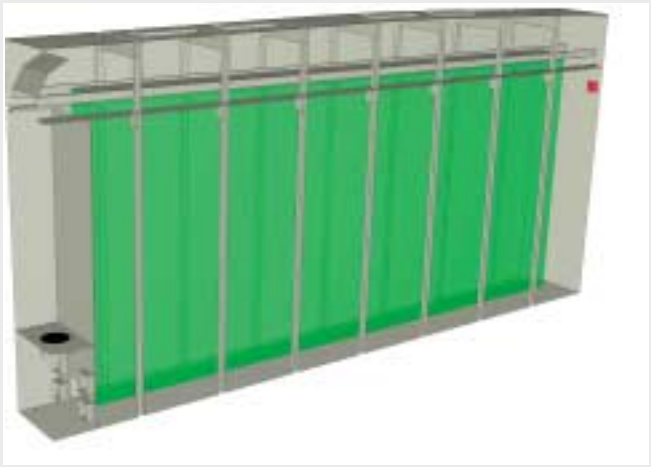
SIEMENS

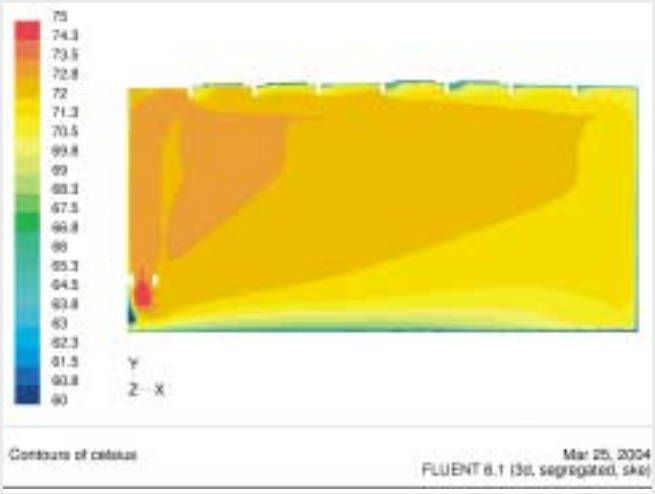
WALL-TO-WALL DRYING

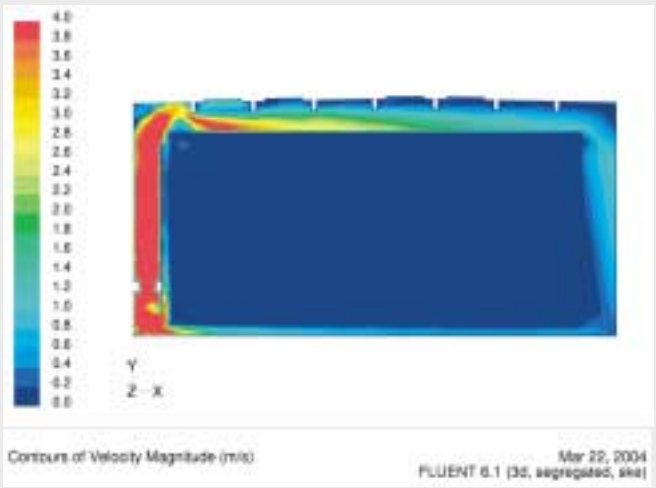
Forbo Flooring develops, produces and markets linoleum-made floor and wall coverings, and finishing material for (office) furniture.
Linoleum is made of a mixture of natural raw materials: linseed oil, resins, cork, wood dust, limestone and pigments. The mixture is applied onto a 2 meter wide jute porter which is hanged out in a drying chamber (length x height x width: 40x20x4 m) to cure for several weeks. During the curing period hot air is circulated in the drying chamber to absorb moisture and hydrocarbons from the linoleum. After the curing period the air is drawn off and burned.
As part of an extensive research project by Siemens Energy Services into energy savings for the manufacturing process of linoleum, the system of drying chambers has also been investigated. During this investigation attention was focussed on two issues: limitation of heat losses from the chamber and optimisation of the curing process. Heat losses occur because hot air escapes through gaps in the chamber structure or because heat flows through the structural elements. It has been attempted to limit heat losses by continuously drawing off a limited amount of air during the curing period. This was expected to reduce the static pressure in the drying chamber thus preventing any escape of hot air.

However, this also constitutes an energy loss: the drawn air has to be replaced by fresh air which has to be heated up. Besides energy consumption the required curing period is an extremely important issue for Forbo Flooring.

Given the available number of drying chambers it determines the total manufacturing capacity for linoleum. The curing period is shown to be highly affected by the air velocity and temperature in the drying chamber. For both issues the air flow in the chamber is recognised to be the deciding factor. Insight in the flow characteristics (velocity, pressure, temperature) is therefore indispensable to understanding the heat losses or the curing process. FlowMotion, a consultancy firm specialised in fluid dynamics, has been commissioned by Siemens Energy Services to analyse these flow characteristics using a computer model of the air flow in a drying chamber. This technique is also called Computational Fluid Dynamics (CFD). The analyses have shown that the air flow in the drying chamber can be modified to both improve the curing process and reduce the energy consumption.







Customer

in co-operation with

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