

The advantages of simulating air blowing in continuous lamination

PNR takes the first step towards a simulation tool for air blowing on sheet metal in continuous rolling processes



INDUSTRY

Metallurgical industry



APPLICATION OF PNR PRODUCTS

Water drying in continuous lamination by blowing



PROBLEM

Difficulty in simulating air blowing



SOLUZIONE PROPOSTA DA PNR

Development of a CFD simulation tool for blowing air



SCENARIO FOR THE SECTOR

The continuous rolling process in steel mills

Most steel products undergo rolling treatment during the process.

Rolling is a process of plastic deformation in which the cross section of a piece is reduced by forcing it to pass between two smooth or suitably shaped cylinders.

The piece to be rolled is forced by the cylinders themselves that rotate in the opposite direction, are connected to an engine and by friction provide the power to the mill. Each pair of cylinders is mounted in a cage that allows it to rotate, the set of several cages constitutes a rolling train.

Continuous rolling is used for large sheet metal productions: the strip is passed through an oven that extends in length with a path of 2-3 minutes and then wound into coils. To achieve the continuity of the power supply, welding is provided between the tail of one roll and the head of the next and the subsequent separation before winding.

In continuous rolling processes, the product does not have motion reversals, it is subsequently deformed in several stands and passes only once through the individual stands that make up the train.

THE PROBLEM OF OUR CLIENT

Rolling has a final phase in which the sheet metal, before being wound to form coils, **must be dried by the water remaining there** following the previous cooling phase.

The sheet is in fact first cooled by spraying water with spray nozzles. Part of this water falls, part evaporates, but it partially remains on the sheet. **It is essential to remove the water before wrapping the sheet in coils because, if not properly dried, the material oxidizes and degrades, compromising the final product.**

Generally it is very problematic to simulate the blowing and then to size and position the blowing nozzles before the assembly phase.

PNR SOLUTION

Our technical department made a first prototype of a **simulation tool for blowing air on sheets in continuous rolling processes** by appropriately manipulating the virtual simulation tools in the software package available to PNR Italia.

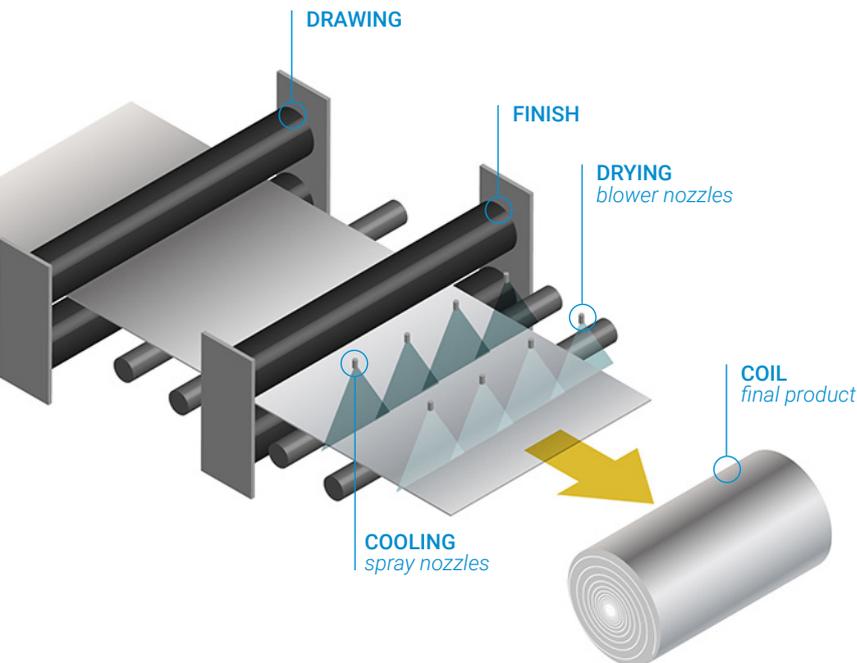
The first version of a targeted and efficient simulation tool has been developed for this type of application, which **allows us to respond promptly and quickly to the simulation requests made by our customers in the metallurgical industry.**

Until now, air blowing simulations had never been done due to their complexity, the absence of dedicated models and the consequent high cost in engineering hours for fine-tuning. The problem was then solved by empirically sizing the nozzles.

ADVANTAGES FOR OUR CLIENT

Our software allows us to simulate a uniform layer of water that is blown away from the sheet, thus managing to size the nozzles with even more precision than before and having the guarantee of covering the entire surface to be dried.

We can define more precisely the operating pressures, the size and the number of the nozzles as well, saving compressed air with a significant economic advantage for the manufacturer.



CONTINUOUS ROLLING TRAIN SCHEME
PROCESS WITH MOVING SHEET

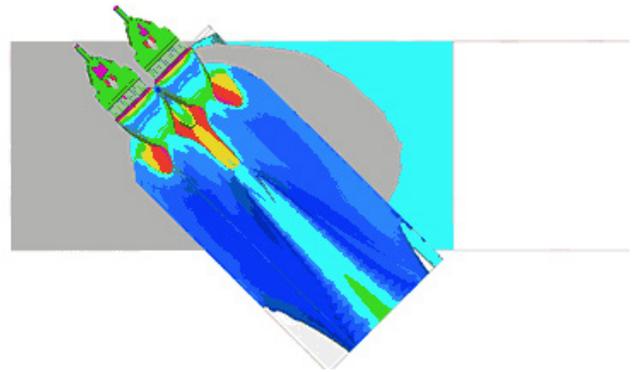
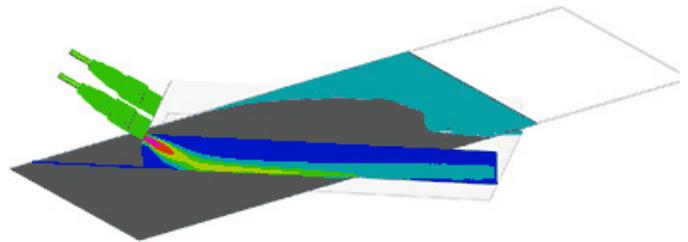
FOCUS ON THE PRODUCT



UEA
AIR BLOWER, FLAT FAN

UEA series compressed air blowers are the best choice for operating environments requiring strong impact laminar sprays.

The compressed air flow is blown through 16 orifices producing a strong impact jet, limited noise level and uniform spray. They are suitable to be installed on moving conveyors.



CFD VISUALIZATION
A PAIR OF AIR BLOWERS REMOVES WATER FROM THE MOVING SHEET