



## Glass Bottle Forming Process Modeled in STAR-CCM+



The glass container production is generally not an easy process to operate and companies often need much time and money to obtain products of an acceptable quality. Glass is indeed a material having an extremely complex behavior to predict during manufacturing and, until now, the tuning of production parameters is completely bound to the operator's experience. To overcome this sticky situation, Bottero, a process-oriented company operating worldwide in the glass machinery field, has developed a simulation based methodology in cooperation with university laboratories and production experts. The aim of this activity is to provide the glass plants with support in machine set up and tools manufacturing, targeting the final result of a drastic time reduction when starting up new productions.

The glass forming process involves high temperatures, and is extremely sensitive to changes in machine timing, glass composition and environmental conditions. It is nearly impossible to show what really happens inside the molds during the different phases, so the numerical simulation is the only tool available in order to be able to understand the process physics and the influencing parameters. The results of the simulation can be validated during the working procedure by infrared temperature measurement (both on glass surface and equipment) and, on the final container, in terms of glass distribution, defects presence and shape.

During the process, the container is first formed to an intermediate shape, called "parison", and then blown to the final one. Depending on different ways of forming the parison, two glass processes exist: the "blow & blow", where the parison is formed using compressed air, or the "press & blow", where the parison is mechanically formed with the use of a plunger. In this presentation, the "press & blow" process has been simulated using STAR-CCM+. The model build up is completely physical and takes into account the glass (whose properties are strongly influenced by the temperature), the air, the mold and all the production equipments. The glass data has been experimentally measured in a specialized laboratory, and the machine timing is the real one.

The methodology, the obtained results and the experimental correlation will be discussed in our presentation.

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**Industries:**

[Chemical Process](#)<sup>[2]</sup>

**Products:**

[STAR-CCM+](#)<sup>[3]</sup>

**Conference:**

STAR Global Conference 2014<sup>[4]</sup>

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