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Abstract

In the molding industry, temperature management of the tool temperature is of key importance for the stability of the manufacturing process and for the quality of the production. The molding industry covers many different applications and many different molding methods exist: injection molding, compression molding, blow molding, thermoforming, rotomolding... For each of these methods, the tool has a specific thermal requirement but main criteria are linked to the capability to provide fast heating, to reduce the production cost, and ensure an acceptable temperature homogeneity, to meet with the requirements of the material to be molded.

For some of these molding methods, the processing temperature can be high and this temperature needs to be maintained over a long time. For High Pressure Die Casting, mold temperature varies between 220°C and 350°C, for compression molding dedicated for high performance material processing temperature can reach up to 410°C and for glass forming applications target temperature can be over 550C°. At these high temperatures, in addition to conduction and convection, radiative heat transfer is also to be considered. Its importance varies upon the processing temperature, the geometry of the thermal system, its thermal inertia and different heat sources used to heat the mold. Most of the time, its real impact is overlooked and usually thought to be compensated by the use of standard insulation components which needs to be specifically chosen and designed in terms of temperature resistance and geometry.

A Comsol® APP has been developed to investigate a large number of cases that can be encountered in molding industry. It aims namely at:
• Quantifying the radiative heat losses of a given configuration.
• Identifying possible valid solutions to reduce the heat losses.
• Identifying new rules of design for complex systems.

Figures used in the abstract

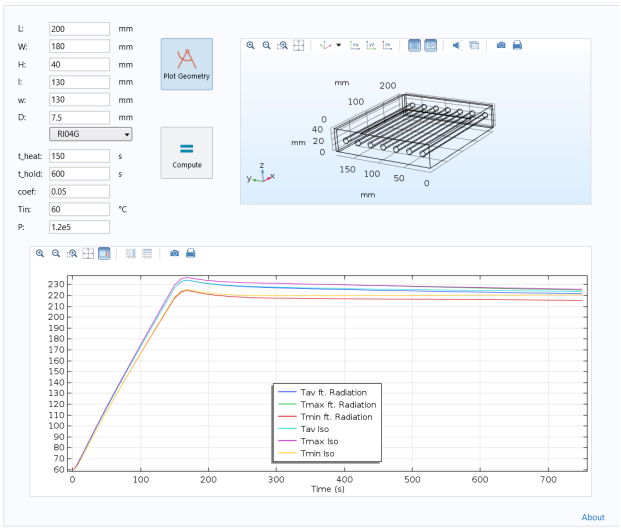

Figure 1: View of the Application demo