

Netted

Mastering the Challenges in LSR Molding

Together with the partners Momentive and CVA Silicone, Sigma Engineering demonstrated at Fakuma 2015 how processors can prepare themselves to face the challenges in LSR processing. Besides the choice of the right material the process window definition has a major role to avoid problems in production. Sigmasoft Virtual Molding supports the molder with its improved material database, among other things, which includes from version v5.1 on a number of LSR data.



Products made of LSR (Liquid Silicone Rubber) confront the molder with special challenges. Due to its rheological properties and curing kinetics, the desired quality outcome can only be achieved through a narrow process window. However, LSR has good physiological properties and a high thermal stability and has therefore a growing demand, particularly in the medical, baby care and design sectors.

To face the challenging production well prepared, the narrow processing window can be set up upfront with the help of the Sigmasoft Virtual Molding technology. This way the processor increases his know-how for future projects, and also the process stability. The risks associated with costs and delivery dates are thus reduced.

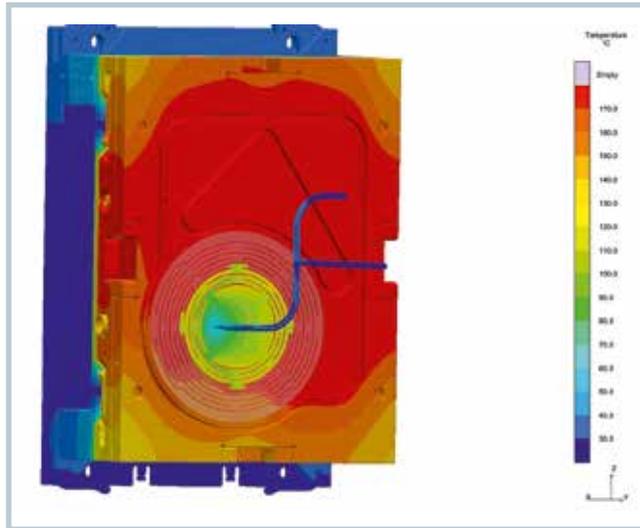
Labyrinthine Geometry of the Design Part

The advantages of a virtual injection molding process were demonstrated by Sigma Engineering GmbH, Aachen, Germany, at Fakuma 2015 in a joint project with Momentive Performance Materials Inc., Waterford, New York, USA, and the French injection molding and mold design specialist CVA Silicone. For this purpose, the design article "Ursula", a carry-mesh for bottles which received its name after the first Bond-girl in history

The carry-mesh "Ursula" emulates the movie scene in which actress Ursula Andress is carrying collected sea shells onto the beach in the first James-Bond-movie (figure: CVA Silicone)

Fig. 1. The “Virtual Molding” technology combines 3-D geometries of part and sprue with the whole mold and tempering system – here the temperature distribution on the mold during production

(figure: Sigma Engineering)



The Authoress

Vanessa Schwittay, B.Sc., works in engineering and marketing for Sigma Engineering GmbH, Aachen, Germany.

Project Partners

Sigma Engineering GmbH

» www.sigmasoft.de

Momentive Performance Materials Inc.

» www.momentive.com

CVA Silicone

» www.cva-silicone.com

Service

Digital Version

» A PDF file of the article can be found at www.kunststoffe-international.com/1257997

German Version

» Read the German version of the article in our magazine *Kunststoffe* or at www.kunststoffe.de

(Title figure), was evaluated with Sigmasoft Virtual Molding. The design article’s labyrinthine geometry with a maximum flow-length of 619 mm requires stable flow and curing properties to guarantee a robust process and good part quality.

To reach these goals, the manufacturing feasibility was virtually evaluated with Sigmasoft. Not only the part, but the complete mold was taken into account, including cold runner, over several molding cycles. Thus, the complete thermal mold behavior was considered (Fig. 1) – the thermal response of the mold has a decisive impact on the part properties – as well as the filling of the mold and the part curing behavior (Fig. 2). The comprehensive rheological and thermal analysis shows that the material chosen by Momentive (type: Silopren LSR 2670) meets the production requirements of this special injection molding process. At Faku-

ma, the results of the virtual production were demonstrated at the Sigma booth.

The visitors could experience a live demonstration of the production process at the booth of Momentive. There, “Ursula” was produced on an all-electric injection molding machine (type: e-mac 100, manufacturer: Engel Austria GmbH, Schwertberg, Austria) with integrated handling system (type: e-pic) in a CVA mold. During filling of the interlaced, flat cavity with over 70 cm³ of liquid silicone rubber the filling pressure rises above 50 bar. The curing degree stays below 2 % in this phase. After filling the curing starts at the outer rim of the part and then continues to the part center.

Accurate Material Data Is Paramount

The high quality of “Virtual Molding” becomes apparent in the good match of

molded “short shots” and the corresponding filling level in the simulation. Besides complete mold and process data, accurate material data is also crucial to accurately predict the filling and curing behavior. To make those easier accessible for Sigmasoft users, Momentive delivers the material data of a large number of its materials to Sigma. The new material data for several standard and special LSR grades are available for the user in the Sigmasoft v5.1 database. ■

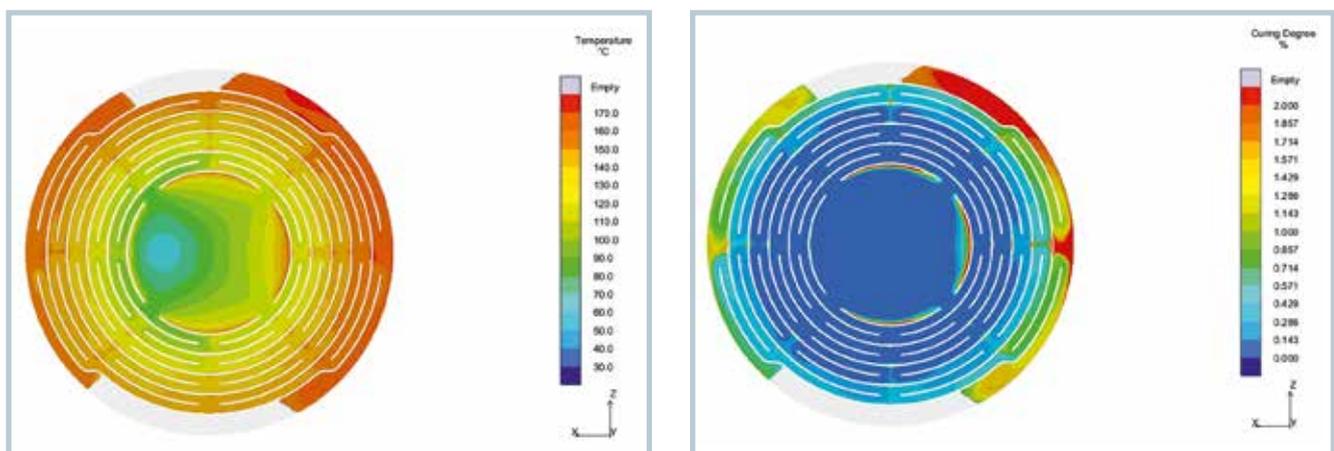


Fig. 2. Part filling of the LSR carry mesh: left the temperature distribution, on the right the curing degree both at around 93% filling level.

The curing moves from the outside to the center of the part (figures: Sigma Engineering)