

## Events:

### CADMOULD® 3D-F

#### One day seminars:

- 16<sup>th</sup> March 2011 Stuttgart (D)
- 17<sup>th</sup> March 2011 Nürnberg (D)
- 29<sup>th</sup> March 2011 Rapperswil (CH)
- 13<sup>th</sup> April 2011 Würselen (D)
- 11<sup>th</sup> May 2011 Stuttgart (D)
- 12<sup>th</sup> May 2011 Nürnberg (D)
- 21<sup>st</sup> June 2011 Würselen (D)

21<sup>st</sup> March 2011

#### Plastics seminar „Key technology injection moulding - mould making“

Paper Dr. Filz: Simulation based layout of injection compression, cost reduction by simulation“

17<sup>th</sup> - 18<sup>th</sup> May 2011

#### kunststoffe + SIMULATION 2011

Paper Dr. Filz: „Frontloading of decisions— Optimization of the product development process“

20<sup>th</sup> September 2011

#### CADMOULD® 3D-F

User Meeting 2011

## Simcon on 2010

The 17th Euromold exhibition in Frankfurt last December can be seen as a positive indicator of improving economical times with 55.301 visitors from 86 countries.

Interestingly the number of foreign visitors did increase to 22.633 visitors; the majority of these were from Turkey, Italy and from Austria and the Switzerland. Furthermore visitors from Spain, China, Belgium, the Netherlands and Russia were well represented.

Simcon saw an increase of 20% of stand visitors over the previous exhibition, a significant increase once realized that the K2010 was only a month earlier. Hence



The Simcon booth on Euromold 2010

CADMOULD® 3D-F Version 5, available in spring 2011, generates a special image. With 3D glasses this gives a true 3D view. Visitors were thrilled to have the virtual mould within their grasps. By operating the track ball they could zoom into details of the ongoing filling.



Paper Dr. Paul F. Filz: „VARIMOS - virtual and real process and part optimization“, Euromold 2010

CADMOULD® VARIMOS did draw quite some interest after Dr. Filz had presented the benefits of the Varimos process and part optimization at the “Euromold Design and Engineering” forum. Visitors were shown how Varimos within split seconds shows how conflicting part qualities depend on certain injection moulding parameters. Furthermore the business unit “Technical Consultancy” and CADMOULD® CONVERSE 3.3, the interface between CADMOULD® and structural simulation were presented.

## Accurate shrinkage & warpage simulation for co-polymers and blends with the Renner pvT model



Injection moulding simulation

The simulation of shrinkage & warpage is based partly on the pressure, volume and temperature (pvT) correlation for the applied thermoplastic polymer. The required polymer data is measured by a pvT apparatus which returns point data, one volume for a given pressure for a given temperature. Subsequently these points are captured in a mathematical model in order for the simulation to be able to interpolate between the measured points. The most widely used pvT models in simulation are the two domain Tait model and the 13 coefficient IKV-Schmidt model.

However today more and more polymers, like co-polymers and blends show complex pvT relations which are not captured by either the Tait- or by the Schmidt model. These models have a simple linear relation coupled with a curved relationship from the solid area into the transition area. Fig. 1 shows how the solid lines do not follow the measured points. On top of this both models can invoke numerical instabilities during the pressure calculations of the shrinkage & warpage simulations.

These two models may lead to inaccurate shrinkage & warpage results for these specific groups of polymers.

The borders are continuously pushed in the plastic industry and a need exists to capture these new types of polymers and provide for accurate shrinkage & warpage simulations. This has led Simcon to develop an enhanced pvT model which is now known as the Renner model.

The Renner model improves on the modelling of the transition area into the solid area with a continuous step. In addition it describes the solid area with two relationships instead of one. Fig. 2 shows the Renner model depicted by the solid line, following closely the measured data point.

The Renner pvT model is to be seen as a necessary requirement towards reliable and accurate shrinkage warpage simulations with CADMOULD® 3D-F. The Renner approach will be available to the CADMOULD® users in the spring of 2011 with the release

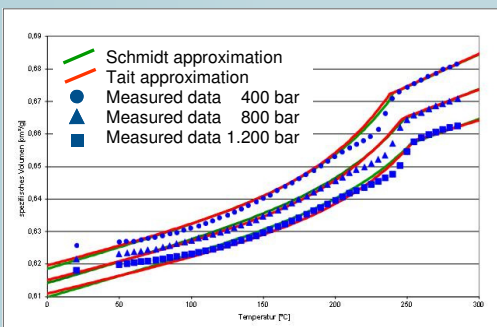


Fig. 1: Approximation of pvT properties using Schmidt and Tait

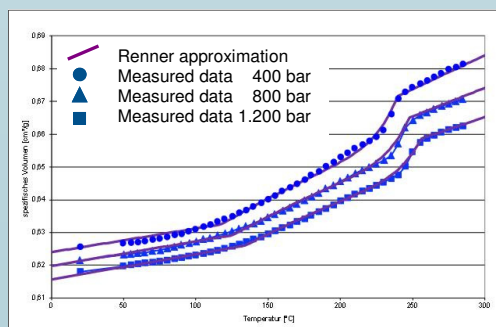


Fig. 2: Approximation of pvT properties using Renner

## Tips & Tricks

### Mould open time and two component moulding simulation

Shifting the mould halves on a turntable mould between the two polymer shots takes some time. In this time the first component is partially in the cavity and partially exposed to the air. This influences the temperature distribution through the part's wall thickness.

This can be modeled within CADMOULD® 3D-F by specifying a very small polymer flow for the second component during this mould open time between the first and second shot. Starting with the 2nd mould close time the normal polymer flow is to be specified.