

## RCPE

### Research Center Pharmaceutical Engineering

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: K1-Centres

COMET subproject, duration and type of project:

07/2012 – 06/2015, strategic/ multi-firm

## When seeing the big picture pays off

What do a research center in the pharmaceutical sector, a company that develops powertrain systems and a machine building firm have in common? At a first glance nothing, but at a closer look remarkable synergies become obvious. Company partners RCPE GmbH, AVL List GmbH and Gebrüder Lödige Maschinenbau GmbH have recognized these synergies and used them to create innovation.



### Simulation of interaction between the flow and the solid particles

Specifically, they launched a cross-industry project that aims at developing simulations of technological processes that are relevant for product and equipment optimization. Liquid and air flows are simulated using the AVL FIRE ® tool and the transport of solid particles is simulated via the XPS program developed at the competence center RCPE. The aim of the joint project is to couple the powerful particle simulation code XPS with AVL FIRE ® and simulate the interaction between the flow and the solid particles.

This coupling is of great interest to the German machine building company Loedige since it opens up completely new possibilities. Machines developed by Lödige often contain a so-called fluidized bed, which is created either mechanically by mixing elements or via an air stream. In this case, interaction of the particles with each other and with the air flow around them plays a crucial role in achieving the desired mixing result. While RCPE simulates the processes in

the mixer using XPS, Lödige builds the process equipment.



### Two strong partners AVL List and Gebrüder Lödige Maschinenbau

The software can be used by the manufacturer while the equipment building is underway. Through a versatile application of the coupled software to different devices and production processes, a wide range of simulation-based test runs can be performed for various substances and products, making a continuous product and device optimization possible. The software is currently available as a prototype. After the project's completion in 2015, AVL will begin its commercialization and the circle will be complete.

"The fact that two strong partners, such as AVL and Loedige, rely on us proves once again that we are on the right track and that seeing the big picture pays off!" said RCPE directors Johannes Khinast and Thomas Klein with regard to the successful innovation.

Apart from the two industrial partners AVL and Loedige, within this project RCPE works closely with the Institute for Process and Particle Engineering at Graz University of Technology and the Institute for Mathematics and Scientific Computing at Karl Franzens University of Graz. The two scientific partners make valuable human resource and in-kind contributions. Access to the infrastructure of the two Graz universities will make state-of-the-art research possible.



Fig. 1: Logo of the Simulation Software XPS (© RCPE)



### Impact and effects

Clearly, simulation has considerable advantages over conventional trial and error methods. Simulating a prototype eliminates the need to perform real experiments with hazardous materials. It can determine in advance the necessary amount of mixed particles or the required temperatures of the air and powder streams. In addition, the simulation is much more flexible than the pre-vailling process analysis. While existing process analysis programs only provide point-by-point

information, during the simulation queries can be created at any time for each particle and relevant parameter. This is a great advantage that saves both money and time.



Fig. 2: Strong Partnership (© Lichtmeister)

Another challenge is that experimentation on the laboratory scale had its limits. Although laboratory-scale tests may work flawlessly, difficulties may arise when switching to the full scale. For example, failure to completely remove substances from machines could create problems, particularly in the food industry. Using the simulation software can help to determine precisely where the residue is located or how it got there.

#### Contact and information

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#### Project partners

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Gebrüder Lödige Maschinenbau GmbH	Germany
Institut of Process and Particel Engineering Graz University of Technology	Austria
Institut of Mathematics and Scientific Computing Karl Franzens University of Graz	Austria

Further information on COMET – Competence Centers for Excellent Technologies: [www.ffg.at/comet](http://www.ffg.at/comet)

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