

Using Experiments and Simulations to Conquer Industrial Solids Flow Problems

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We joined DSM in a time when we operated more than 50 plants on the Geleen site (Netherlands), most of them producing solid materials. To service those plants, the solids related R&D of Crystallization, Solid-Liquid separation, Solids Processing and Solids Handling was centralized in a single group of about 25 people. Over time, most plants on site were sold and the solids group diminished, while also losing most of the piloting facilities.

During this time, we dealt with many solids flow related problems. Together, we tackled most of them, learned from them, and often wished we had better, faster, more reliable modeling tools. Today, lacking many of the pilot-scale facilities we had before, the need for accurate simulations on a relevant industrial scale has become even more important.

Examples that we present relate to a large moving bed reactor with serious flow problems, poor pneumatic transport design causing caking and an freak accident with a collapsing silo; other examples as time permits. They demonstrate how important experimentation is in finding solutions for solids flow problems, be it physical or in-silico.

Our journey into understanding solids processes took off 26 years ago and has led from models for crystallization to granulation and from CFD to DEM modeling. It was always accompanied by lab and/or pilot-scale experimentation or depended on existing data from a running plant. We will show our most important developments in solids flow modeling, and the needs of our industry in this area for the coming years.