

## SOLIDS PROCESSING TECHNOLOGY

# Is One More Batch Possible?

Many products in the chemical industry are solids – and therefore often not easy to handle. Bayer Technology Services has its own team to provide expertise on all aspects of solids processing. With their help a Bayer plant in India was able to increase productivity by 25 percent.

**W**hat do you actually do in your job?” When Dr. Lars Frye is asked this question in casual conversation, he sometimes begins his explanation with the example of a sand box. Everyone who has played in a sand box will remember some aspects that are equally important in Frye’s work. The sand should be damp enough to build stable figures, but dry enough so that it can easily trickle through a funnel. “In simplified terms, I deal with similar issues, but in an industrial context,” says Frye.

Frye is a solids processing engineer, and although his work does not involve sand, certain principles are indeed the same. For instance, how can powder be stored in silos so that it doesn’t cake or cause discharge problems? How should dust-forming substances be handled in production? How do you best remove any residual moisture from a certain product? These are the typical questions that customers ask Frye and his team. And Solids Processing is the name of the group that he heads at Bayer Technology Services.

For example, at the beginning of 2012 Bayer CropScience had a very specific request. “Can you help us improve the efficiency of our facility in Himatnagar in India?” asked Wolfgang Korzeniewski, who at the time provided technical services to six of Bayer CropScience’s formulation plants in Asia. In this case, formulating means converting pure active ingredients into a form suitable for application. This can be a liquid concentrate – or also a granular formulation.

Besides the actual active ingredients, these formulations usually also contain several different auxiliary materials. In the case of products for agricultural applications, for example, these can be substances that ensure a good distribution of the active ingredient in a spray mixture. Or additives that provide for an even distribution of the crop protection agent on plant leaves after spraying.

**In the town of Himatnagar in India Bayer CropScience** formulates granules used to protect crops against insect pests. Since the demand for such products has recently increased significantly, especially on coffee and sugar cane plantations, Bayer wanted to expand its production in India. So, Frye and Korzeniewski flew together to India for the first time in February 2012. Over the period of a week,



Frye was shown all the details in order to develop the leverage required for an increase in production based on this information. He spoke to many employees, listened to their experience and made a number of his own observations.

The core element of the facility is a fluidized bed granulator, a round stainless steel hopper that tapers towards the bottom and has various connections. An aqueous suspension of all the ingredients is sprayed into the granulator. The contents are continuously atomized and then dried in a hot stream of air. When the moisture eventually evaporates, fine granules form in the lower part of the hopper, known as the fluidized bed. After this drying process the powder is transferred to a sifter to

separate out all the undesirable particle sizes. After this procedure, the next batch begins.

When Lars Frye inspected the granulator for the first time, it had a capacity of about four batches per day. “We wanted to increase this to five batches,” says Wolfgang Korzeniewski. This translates to an ambitious increase of 25 percent. Every evening, when Korzeniewski and Frye drove back to their hotel in Ahmedabad, maneuvering through the dense traffic on India’s highway 8, they shared their observations and possible approaches to the task.

“At first the colleagues in India believed there should be room for speeding up production mainly in the drying process,” Frye recalls. However, he himself thought that the downstream process could also be optimized – in other words, in the transferring of the granules to the sifting unit. Normally, the transfer took place through a thick tube to which vacuum created by a corresponding conveying system is applied.

Sugar cane crops have many enemies. Due to the growing demand for protection against pests, Bayer has increased its insecticide production.





**“Every kilogram of product counts, and for this an optimal use of the plant is essential. Bayer Technology Services is our partner for such process optimization.”**

Bernd Nowack, Head of Plant Technology, Bayer CropScience



Dr. Lars Frye (left) and Wolfgang Korzeniewski are pleased about the good cooperation and the successful implementation of the joint project.

For time reasons, however, the colleagues in Himatnagar preferred the mechanical discharging of the granulator. The lower part of the granulator is simply dismantled and the product is manually filled into the sifting unit. The advantage is that the production of the next batch can begin in the granulator while the preceding batch is sifted, by simply installing a second bottom bin. However, this procedure has to be conducted very carefully because of the extreme safety precautions necessary due to the open handling of the highly concentrated formulation and is therefore quite complicated. So, Frye wondered whether the non-time dependent sifting process could perhaps be combined with an accelerated discharge of the particles.

**Frye had noticed that the tube leading to the vacuum conveying system ascended several meters high.** What would happen if the entire processing steps were moved to the floor below? The existing lower part of the granulator could be used as an intermediate hopper so that the next batch can then immediately begin. But above all, the tube could run on a slope. The benefit of this concept can once again be illustrated using a sand box. Sucking the grains of sand upwards through a straw requires far more power than sucking in a horizontal direction.

When Frye returned to Himatnagar in June, the Indian colleagues under the leadership of Atul Sawant had already converted everything, and it had made quite an impact. The new process required 25 percent less time, and the product did not need to be handled openly.

**During his second visit** Frye, together with Sawant, also gave some thought to the drying process. Important parameters in this connection are the temperature and the flow rate at which the drying air is blown into the granulator from below. “If you start the granulator, with too high an air flow and at too high a temperature, lots of tiny particles form immediately,” Frye explains. “They are so light that they plug up the filter through which the air is sucked off from the granulator. This reduces the vacuum power, thus delaying the drying process.” Frye then conducted experiments at different temperature gradients and different flow rates. A formula was eventually worked out that shortened the entire process significantly. All these measures taken together ultimately led to the desired increase in productivity to five batches per day, which makes Sawant and his team particularly proud.

Frye especially praised how helpful the committed and qualified work of his Indian colleagues has been. Frye was not the only one to be pleased about the comparably low investment costs necessary to achieve this improvement. Wolfgang Korzeniewski was equally enthusiastic. “I liked the way Lars approached this challenge with such an open mind and without preconceived ideas,” says Korzeniewski. “Every kilo of product counts, and for this an optimal use of the plant is essential,” says Bernd Nowack, Head of Plant Technology at Bayer CropScience. “Bayer Technology Services is our partner, for such process optimization.”

As part of the process optimization, Bayer CropScience invested in a second granulator to further increase the capacity in Himatnagar. Frye’s findings and observations had an impact on this investment too so that modifications to some of the components could be arranged directly with the producer.

When the new granulator was commissioned in October 2012, Frye was once again in Himatnagar. Everything went according to plan. With the commissioning, the project was completed for him – and yet he still receives news from India. At the end of April Korzeniewski reported that the new and the revamped granulators are still producing five batches a day. 