



It's hip to be round

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consider how a rounder granule shape can be achieved using a compaction-granulation machine, and examine how this can help improve the range of fertilizer spreading.

As a company specialising in the manufacture of mineral fertilizers, Lance Fertilisants has recently partnered with manufacturer and distributor of briquetting and granulation presses, Euragglo, on projects involving the compaction-granulation of different fertilizer formulations. Recently, Euragglo has launched a new technology, the Granupaktor, which creates regular granules in a rounder shape. This new process has been adopted by Lance Fertilisants, who see it as an opportunity to improve the range of fertilizer spreading.

The first step: Implementation of a standard compaction-granulation process

It is now a very frequent practice to substitute standard chemical raw materials for by-products from the industry.

This is the case for materials such as:

- Potassium sulfate from sugar production.

- Organic components used in limited quantity in mixes, such as cocoa shells, blood, feathers, bat or chicken manure. These components can be raw but most of the time are calcined (burned) before use.
- By-products from the production of lysine (amino-acids).

Further developments are also focusing on the addition of bacteria in the granules to be able to optimise the use of the ingredients in the soil. Limited generation of heat during compaction, considered with an absence of a drying step (unlike in conventional processes or in pelleting units), avoids the deterioration of living organisms in the granules.

At the beginning of the 1990s, following the decline of the slag market, Lance Fertilisants decided to invest in two KOMAREK DH400 compactors to manufacture specialty mineral fertilizer formulae.

The company yearly manufactures about 25 000 t of NP and NPK mineral fertilizers and it also serves as a logistics



platform for fertilizers manufactured by partners for roughly 6000 t.

The materials used on site are mainly binary salts from the sugar industry, diammonium phosphate (DAP), potassium chloride, potassium sulfate, calcium sulfate, calcium and magnesium carbonates. The finished products are sold to the farmers via partners of the agricultural distribution, traders or cooperatives.

Traditionally, the compaction-granulation process is used:

- For simple fertilizer components: Potassium chloride, potassium sulfate and ammonium sulfate represent the largest use of the technology worldwide.
- For specialty fertilizers and soil conditioners: PK, NPK, NP, and calcium carbonate brand formulations are compacted mostly for specific applications (crops and soils) away from standard formulation like 15-15-15 or others even if these standard recipes can be good candidates for the compaction process. They are mostly produced using a standard hot granulation process.

The importance of collaboration

Today, the mineral fertilizers manufactured by the DH400 compactors purchased by Lance Fertilisants in the 1990s, are compacted and granulated in a 2 – 5.5 mm size-range. These granules are angular like those produced from muriate of potash (MOP), sulfate of potash (SOP), and ammonium sulfate, which are manufactured for bulk stations. The main advantages of compaction-granulation units include the lower CAPEX associated with flexibility in plant size (from 200/300 kg/h for micro additives to more than 100 t/h for potash/MOP-type raw materials), and a rapid switch between formulae allowing production campaigns in smaller batches.

This allows the orientation of compaction units towards the production of specialty fertilizers with greater added value, meeting specific soil and crop needs.

The Granupaktor solution was proposed based on tests carried out at Euragglo to bring the shape and hardness of the granules produced by compaction closer



Figure 1. Angular fertilizer granules.



Figure 2. Fertilizer granules produced with the Granupaktor.



Figure 3. Spreading trials with Granupaktor granules at Lance Fertilisants.



Figure 4. The Granupaktor.

to those produced by the large operators in the sector in wet granulation. This was deemed a necessary change as fertilizer spreaders used by farmers have become more and more efficient and require a good flow to reach spreading widths of up to 42 m. A technical solution to produce more spherical-shaped granules was key.

Looking to the future

Euragglo carried out tests on different raw materials from Lance Fertilisants in their pilot plant located in Quiévrechain, France. These tests demonstrated the ability of the Granupaktor to produce more spherical granules for fertilizers and other raw materials suitable for the process.

The tests carried out were focused on simple raw materials (AS, MOP), mixed formulations (NPK, PK) and specific soil conditioners, such as calcium carbonate. Tests incorporated variations of feed properties (size range) and the addition of binders or additives with the aim to reinforce the mechanical properties of the final granules. The characteristics of the final granules produced were measured; particularly their bulk and packing densities and their mechanical strength.

Compared to standard compacted-granulated material, the AS granules showed an extended level of strength. Lance Fertilisants therefore invested in a Euragglo Granupaktor which is installed in parallel with the current production line using the Komarek compactor. This installation will enable the company to propose these qualities of granules to their customers and to easily switch from one granule shape to the other within a reasonably sized plant. The goal of Lance Fertilisants is to operate industrially with the Granupaktor in the spring of 2022. Euragglo will be present during this period to assist and ensure the success of the project.

If the industrial tests are validated, Lance Fertilisants will consider the creation of a second production line on the site using two Granupaktors which will enable it to produce some of its formulae adapted to this new tool, thus doubling the production capacity in the existing factory. The Komarek press would be kept for the production of NPK ranges that are less sensitive in terms of spreading.

Aside from the production of compacted fertilizers, Lance Fertilisants are also involved in helping their customers calculate and optimise their carbon balance through the use of specific raw materials, which the compaction process makes possible to use.

The future of fertilizer granules will be based on flexible granulation processes using reliable and low energy mechanical equipment installed within a performing process. Dry granulation has an important role to play due to the relative simplicity and reliability of the process in comparison to large wet granulation systems. The low requirement of energy due to the absence, in most cases, of a drying step is a key performance point together with the flexibility to produce dedicated formulations with alternative raw materials (bio components or not) which can be sourced differently from one continent to another. The Granupaktor could be a viable solution for small or medium-sized granulation plants with limited CAPEX and OPEX levels and without requirements for a heavy industrial surrounding environment. **WF**