

# VENTURING INTO VIETNAM

**Pierre Siquet, Baconco, Vietnam,**  
**and Pascal Hervieu, Euragglo,**  
**France,** highlight how auditing  
and upgrading compaction and  
granulation plants helps create a  
better granule quality.



**B**uilt adjacent to the deep-sea port in Phu My town, Ba Ria-Vung Tau Province, Vietnam, Bancono's fertilizer factory has a competitive logistic location, which facilitates the importation and storage of raw material as well as the delivery of finished products by vessels to customers.

### A versatile fertilizer plant

The Phu My plant includes a wide range of granulation processes, including:

- A compaction-granulation plant.
- A steam granulation unit.
- A urea melting granulation unit.
- A urea superphosphate plant.
- A bulk-blending unit.
- A bio-coating unit.

As the compaction-granulation plant was opened back in 1998, it has been continually adjusted over time in order to develop fertilizer formulations that have been adapted to the local crops and soils. Its capacity can reach up to 80 million tpy of granules within a 2 – 5 mm size-range.

Typical raw materials used in the compaction line are:

- Nitrogen (N): ammonium sulfate, ammonium chloride, diammonium phosphate (DAP), monoammonium phosphate (MAP).

- Phosphate (P): rock phosphate (RP), thermo-phosphate, DAP, MAP, single superphosphate (SSP).
- Potassium (K): muriate of potash (MOP), sulfate of potash (SOP).
- Micronutrients: kieserite, zinc (Zn), and bore compounds.

In particular, the compaction unit incorporates:

- A mixer to homogenise the feed materials and the eventual binder/additives.
- An E72 type compactor with 800 mm roll-dia.
- Two hammer mills with floating hammers.
- A two-deck vibrating screen.

### Auditing and upgrading the compaction unit

One of the key activities of Euragglo is to audit and upgrade existing fertilizer compaction-granulation plants to improve the quantity and quality of granules produced and to solve process or maintenance problems.

This form of consulting is based on the experience of the team, particularly in observing plants in operation and installing compaction-granulation units worldwide in both complex mixed and single fertilizers.

In the South-East Asian region, the company has installed more than 10 units in the fertilizer area to produce:

- Agricultural type granules.



- Briquettes or doses adapted to crops, such as palm oil trees, pineapple trees, etc.

In Vietnam, the company had previously worked on the design and installation of a compaction-granulation unit dedicated to compact-granulate MOP fines in Laos, as well as with complex fertilizers in a privately-owned plant located in the vicinity of Ha Noi in the North.

After the successful start-up of this plant, Euragglo was asked by Baconco to optimise their process by increasing the urea production to 17% and reducing/mitigating the caking risk with higher hardness and lower dust content.

Due to the variety of different reasons that may cause caking issues, it was decided to proceed with a complete audit of the compaction plant to investigate all these different issues (technical or chemical).

The audit was conducted in two steps, the second one 6 months after the recommendations of the first one had been applied (optimisation of the operating parameters, in particular).

### First step

During the first step of the audit of the compaction plant, it appeared that the overall yield of the facility was lower than



**Figure 1.** View of the compactor E72.



**Figure 2.** New dedusting system within a compaction-granulation unit.

what is typically experienced at this type of facility and the level of recycled material (fines from the process) in the loop was too high.

The audit resulted in a series of findings, including:

- Material issues: physical instability of raw materials (physical or chemical characteristics), absence/lack of binders/additives for some formulations.
- Process issues: fines generation at the compaction stage, too limited specific forces for some particular raw materials, absence of speed variation at the crushing stage.

These considerations led to a first series of revamping or changes in the plant with positive results in terms of granule throughput: the overall plant yield was increased up to 15% and the granules capacity could reach 10 000 tph.

### Second step

The second audit step was carried out approximately 6 months after the first.

After checking the benefits of the changes introduced after step one, this step consisted of implementing different ways to reduce caking problems once the general operation of the facility was optimised.

The key issues raised during the observation of caking problems upon storage were:

- Composition of the formulae.
- pH of the mixtures.
- Moisture content of the material before compaction.
- Amount of fines in the final granules.
- Use of coating and choice of coating agents.
- Temperature of granules going to storage.
- Storage in pile before bagging.

Each of these points were investigated to improve the caking trends of the different formulations produced by the plant.

Overall, the recommended actions were designed to:

- Improve the control of the physical characteristics of the raw materials when delivered to the plant: this quality control is necessary to make sure that, in particular, the moisture content and the size range of the feed materials are adapted to the compactions process and do not vary between received shipments. In complex fertilizers, single components should be checked to be sure that they do not bring unnecessary water before the compaction step.
- Improve process points likely to influence or cause caking situations: the quality of the granules at the outlet of the compaction line has to be improved to make sure that migration of water from inside the granules to the outside or from outside to the centre of the granules are minimised.
- Improve storage conditions: the status of granules going to storage, as well as adjustments to storage methods such as pile heights, will have an impact on caking.

### Conclusion

Auditing processes in existing compaction plants, such as those organised by Euragglo, will help improve the operation of plants without the need for a large CAPEX and, simultaneously, help train operators to have a better understanding of the key points in terms of materials, equipment, process, and maintenance, in order to optimise the final properties of fertilizer compacted granules. **WF**