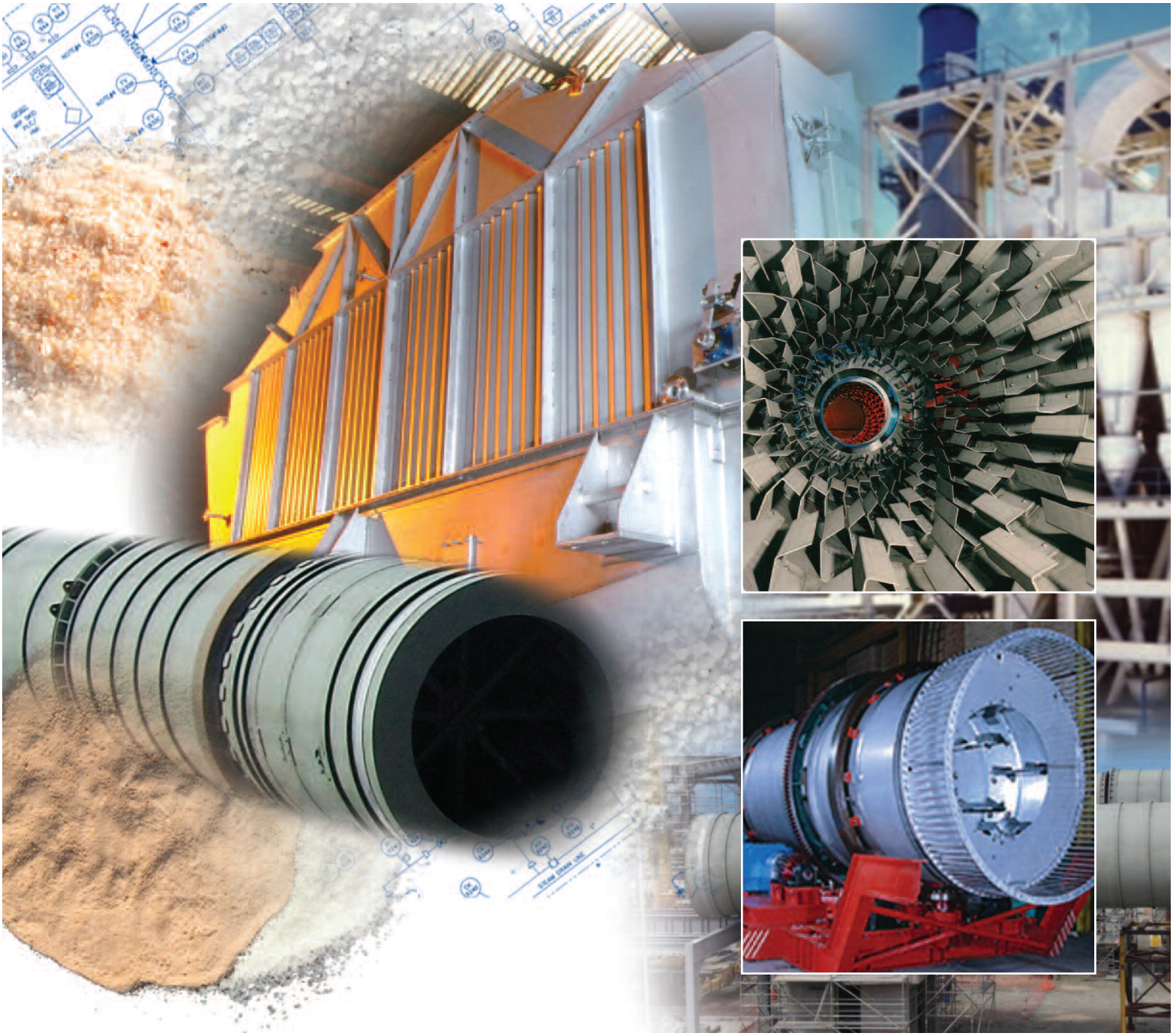
Thermal Processing in the Fertilizer Industry



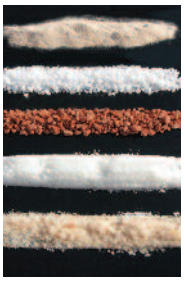
GEA Barr-Rosin

Thermal Processing Systems

GEA Barr-Rosin has extensive experience in the design, manufacture and installation of a range of thermal processing equipment for the Fertilizer Industry. We have supplied numerous units to leading producers throughout the world. Designs are based on in-house 'know-how' as well as licensed technology:

Unit operations include:
- Granulation / Conditioning
- Drying
- Cooling
- Coating
- Holding / Ageing
- Thermal cycling
- De-dusting

Fertilizers and intermediate materials processed include:



- Potash
- Phosphate Rock
- Monoammonium Phosphate (MAP)
- Diammonium Phosphate (DAP)
- Triple Super Phosphate (TSP)
- Granular Triple Super Phosphate (GTSP)
- Ammonium Nitrate (AN)
- Ammonium Sulphate
- Calcium Ammonium Nitrate (CAN)
- Compound Fertilizer
- NPK
- Urea
- Proprietary Formulations

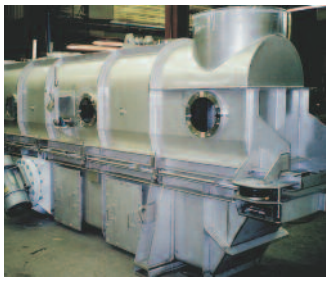
Tailored Systems

All GEA Barr-Rosin systems are tailored to our customers' needs. Each application is carefully considered and the best solution is provided based on pilot plant test results when required and taking full account of product and site requirements.

GEA Barr-Rosin's strength lies in custom-designed technology based on Research & Development efforts and Pilot Plant trials. With a fully operational Pilot Plant facility in-house in Broisbriand, Quebec, Canada, equipment designs could be proposed according to specific operating conditions and process behavior to optimize process flow and operation. Particular attention could also be paid to energy-savings through recuperation and/or equipment integration.

GEA Barr-Rosin is a leading supplier of thermal processing equipment. Previous experience in the fertilizer industry has enabled GEA Barr-Rosin to develop a range of technologies for fertilizer applications, including fluid bed dryers/coolers/de-dusters, rotary dryers, conditioning/polishing/coating drums, contact column coolers, and flash and ring dryers.





Fluid Bed

GEA Barr-Rosin *Fluid Beds* are increasingly used for a broad range of fertilizer products. Capital cost, size and weight are reduced compared with conventional systems. Drying and cooling time is also shorter as the high heat transfer coefficient is achieved in the fluidized state. The process is gentle enough for crystals to prill or for minimizing granule abrasion. Fluid Beds can also be designed to elutriate fines from the product if required. We have supplied numerous units throughout the world with capacities of up to 780 tons/hour.

Combined drying and cooling can also be achieved in a single unit with two fluidizing zones, with the option of exhaust air recycle, which significantly reduces energy consumption and off-gas volumes. Hot air is supplied to the first zone and ambient or conditioned air to the second zone.

Rotary

The Rotary Cascade Dryer and Cooler are widely used in the fertilizer industry. The robust yet simple construction combines flexibility and reliability, enabling it to operate continuously under the arduous conditions experienced in fertilizer factories.

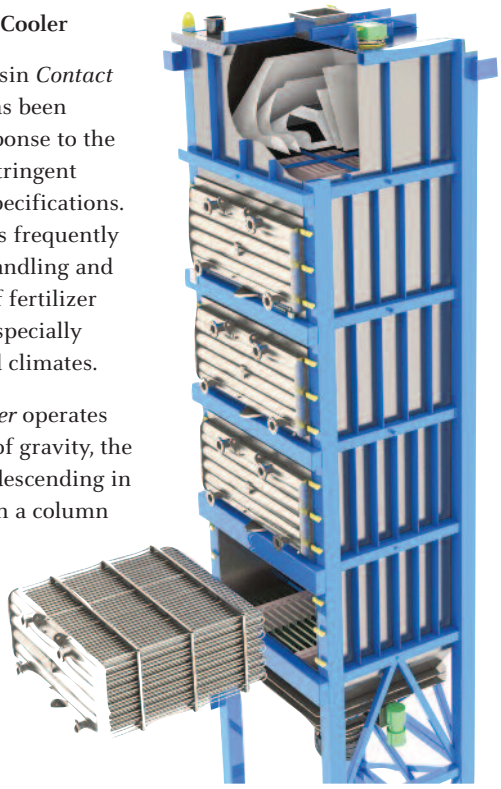
Moisture or heat is removed by showering the fertilizer granules or prills through a hot gas, ambient or conditioned air stream flowing in either a co-current or counter-current direction. Heat



transfer, product distribution and efficiency are influenced by the internal design, while the long but variable retention time governs the rate of water diffusion or degree of cooling.

Granulation drums, with flexible internal rubber panels, ammoniator and sparge pipework can also be supplied, along with coating or conditioning drums for production of controlled release fertilizers.

Contact Column Cooler



The GEA Barr-Rosin *Contact Column Cooler* has been developed in response to the ever increasing stringent environmental specifications. Product cooling is frequently used to permit handling and prevent caking of fertilizer during storage, especially in hot and humid climates.

The *Column Cooler* operates on the principle of gravity, the fertilizer slowly descending in plug flow through a column incorporating bundles of cooling tubes, through which cooling water flows. The tube bundles are arranged in separate sections which allows the unit to be configured for specific thermal duties, both by means of physical bundle geometry and if advantageous, independent water flows and temperatures.

The design may also incorporate a small counter-current upward air flow (conditioned as necessary) to carry away residual moisture.

The GEA Barr-Rosin Contact Column Cooler has no moving parts other than feed and discharge conveyors and water / air circulation equipment. It is both an ecological and economical solution.

Flash and Ring Dryers

Pneumatic flash dryers are used with products that dry rapidly due to the easy removal of free moisture or where any required diffusion to the surface occurs readily. Drying takes place in a matter of seconds. Wet material is mixed with a stream of heated air (or other gas) which conveys it through a drying duct where high heat and mass transfer rates rapidly dry the product.

Applications in the fertilizer industry include products of fine grades and particle sizes, the drying of filter cakes, crystals, granules, pastes, sludges and slurries; in fact almost any material where a powdered product is required. Proper feed conditioning is the key to drying materials with high initial moisture contents which could be achieved by using twin shaft paddle mixers.

As the drying air also conveys the product, this system can be used to discharge at elevation. Product is separated from the drying gas in either single or multi cyclones, and/or bag filters. Sometimes cyclones are followed by scrubbers for final cleaning of the exhaust gases.

The Ring Dryer employs the same basic principle as the flash dryer in that the material to be dried is dispersed and conveyed through the dryer in a hot air stream. However the Ring Dryer incorporates a centrifugal classifier which allows selective internal recirculation of solids, effectively lengthening the retention time of larger particles in the dryer, while finer material, which dries more rapidly, exits the dryer with the exhaust air. Internal recycle also provides additional feed conditioning by reintroducing dry material to the feed point.



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GEA Process Engineering

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