

NPK Dry Granulation Plant Project Development and Implementation



Köppern



Project Development – Two Partners Join Forces

As a worldwide operating developer and supplier of high-performance compacting and granulating facilities we are known not only for the excellent quality of our systems, but also for our close cooperation and partnership with customers. Below is a report of an exemplary project that illustrates our technological competence and expertise as well as our customer-oriented policy:

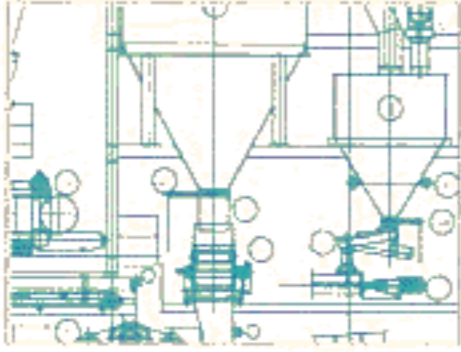
The TVM company – now named Bige Holding – is one of the largest fertilizer producers in Hungary. To meet the market requirements, TVM decided in 2002 to install an NPK dry granulation plant. After initial talks with various plant suppliers, their choice finally fell on our company.

Mr. Ferdinánd Bánhidi, who is in charge of the Bige Holding Compacting Department, comments on our successful cooperation as follows:

“Discussions with various plant operators convinced us that the equipment and compactors supplied by KÖPPER N were very reliable. We placed an order with KÖPPER N for the process layout and basic plant engineering as well as for the supply of some key plant components. The most important NPK formulations for TVM were first tested in the KÖPPER N Technical Center. During these tests, the compacting conditions were defined and the crushing and screening cycles optimized. When the project was implemented, it became clear that the basic engineering developed fully met the expectations. KÖPPER N completed its services and supplies well within the stipulated 7-month deadline. The development of detailed engineering from KÖPPER N’s basic engineering and the construction of the buildings were carried out with no major problem in cooperation with local partners. The plant was started up with support from the specialists of KÖPPER N, and even now KÖPPER N remains available to us for expert advice at all times.”



Ferdinánd Bánhidi
Head of Compacting Department
Bige Holding

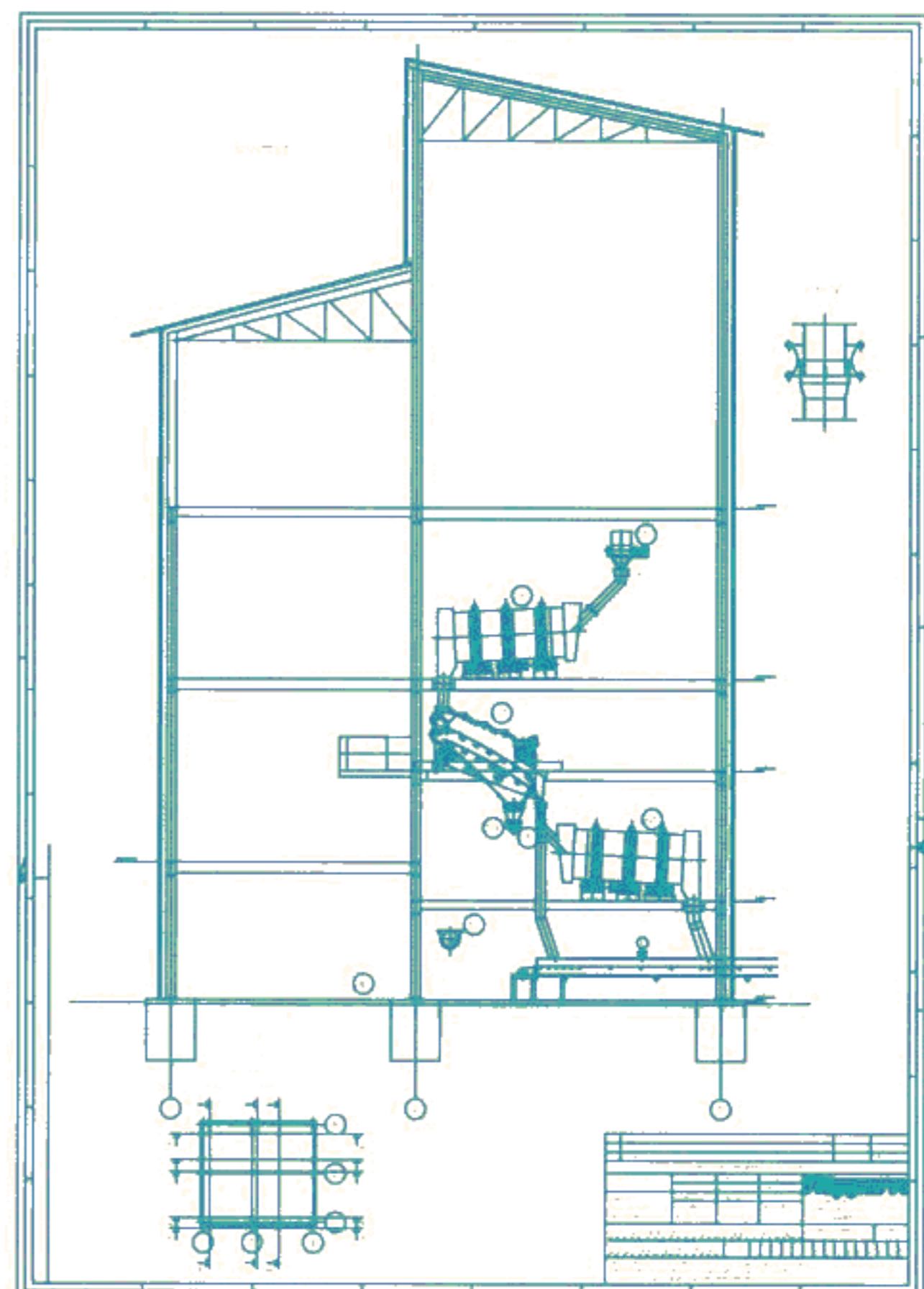
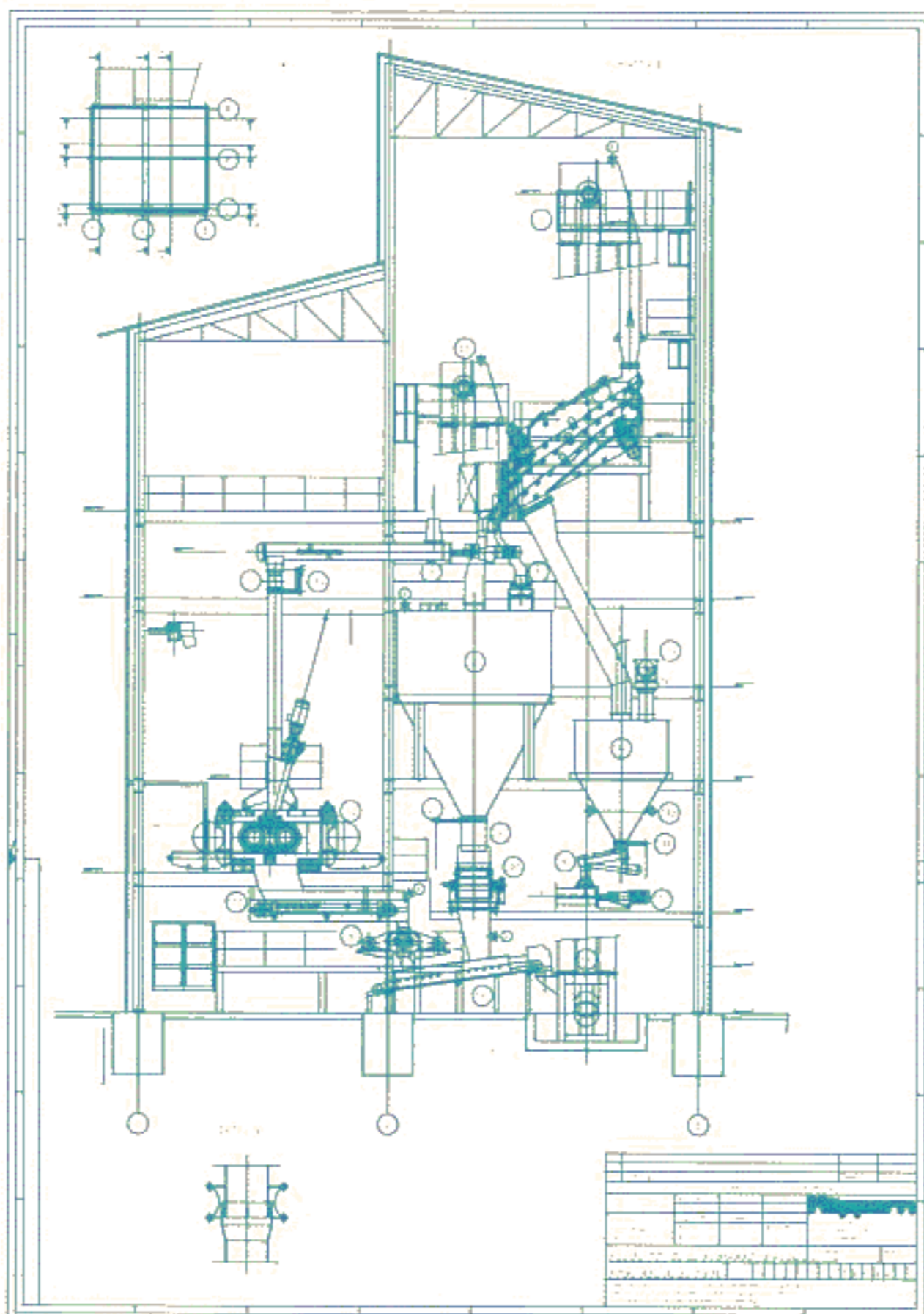
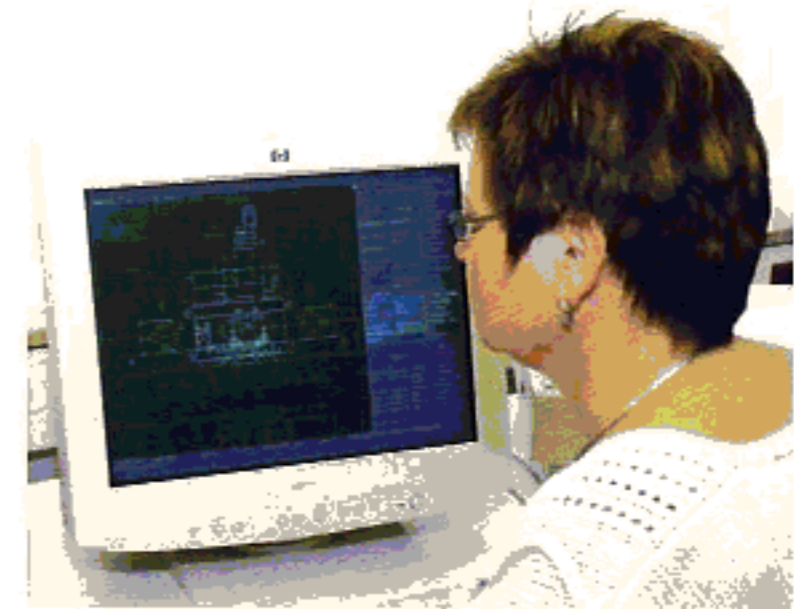


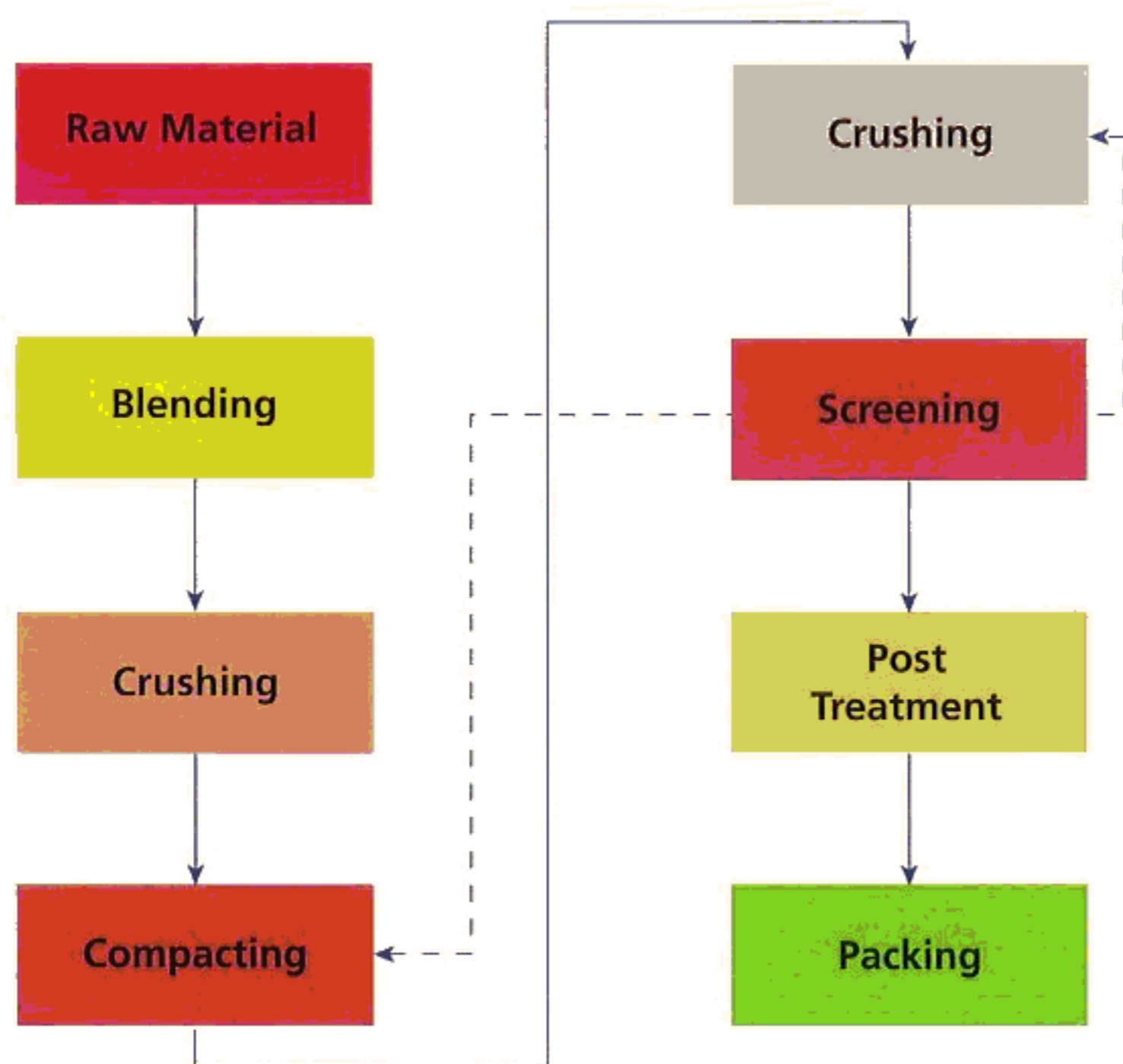
Requirements Analysis

Although the principle of the compacting process is always the same, the development of each plant layout starts with an analysis of the customer's individual requirements.

That analysis covers the entire process from the arrival of the raw materials to packing and shipping. Planning a greenfield plant is a rare case. Most of our prospective customers are already engaged in some form of fertilizer production activity. Thus the planning exercise needs to take account of existing conditions. This may have an influence even on the design of buildings, depending on the choice of the material handling system – either horizontal or vertical.

However, all modern plants have one thing in common: automatic operation from a control room that monitors online all process steps and documents the quantity and quality of the end product.





Operation of Plant:

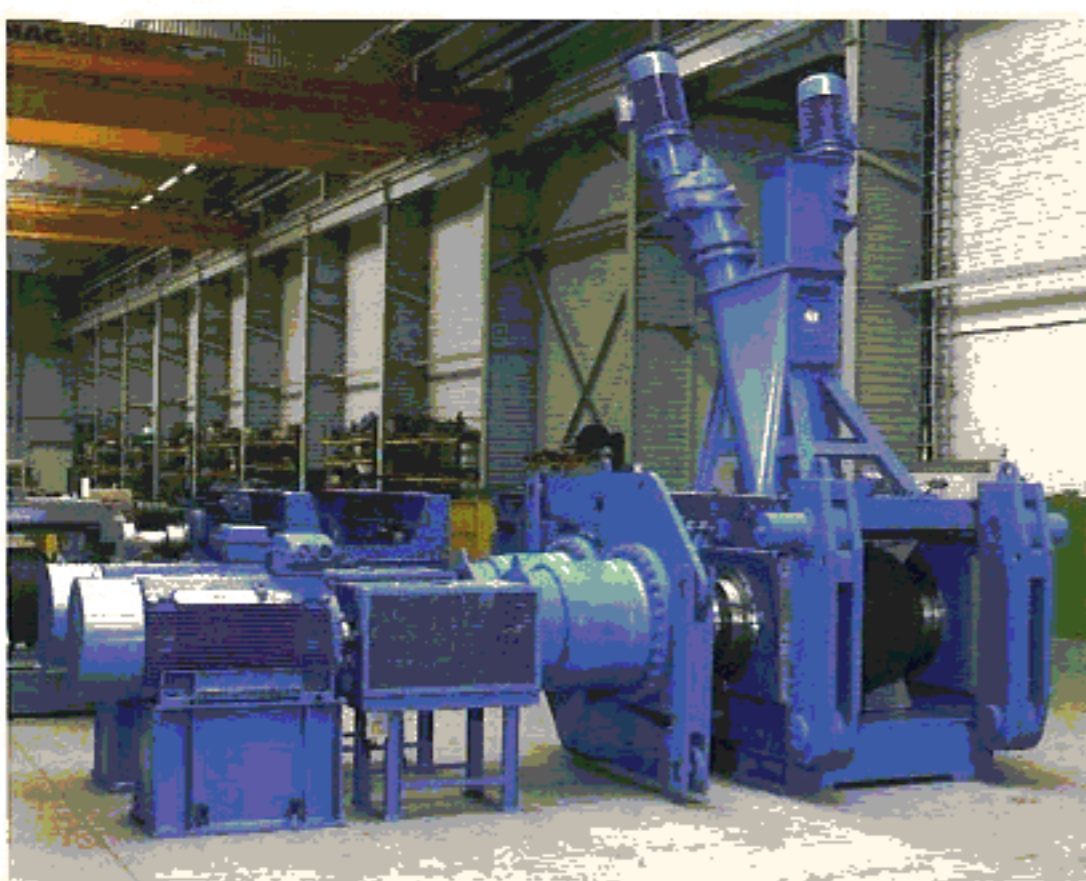
1. Material Preparation

The blend of virgin materials is fed to the primary bin by belt conveyers and a bucket elevator. The main raw materials are urea as a source of nitrogen, MAP as a source of phosphorus, and MOP. Where necessary, dolomite is used as filler. This blend serves primarily to produce the NPK formulations 15-15-15, 0-10-28 and 8-21-21. These products are marketed under the name **GENEZIS**.

The primary bin filling level is measured by means of level probes, and the measured values are transmitted to the compacting line's programmable controller. The material blend for press granulation is volumetrically metered by a vibrating feeder. In this way the material flow is precisely controlled, taking account of the amount of material recycled into the process.

A primary crusher fed by the vibrating feeder serves to homogenize materials of different hardness and/or particle size to a uniform fraction of < 1 mm.

The virgin material and the recycled under-size material from the screening process are homogenized in a twin-shaft mixer. A magnet separator arranged at the twin-shaft mixer inlet serves to remove tramp iron from the material flow to avoid damage to the roller press and the crusher.



Operation of Plant: 2. Compacting Line

The roller press is fed by a trough chain conveyor. The material is guided to the roller press through an opening in the chain conveyor. At the end of the trough conveyor, there is a further overflow that makes sure that a sufficient flow of material is constantly supplied to the operating roller press. A flowmeter provided in the overflow chute controls the flow of material supplied to the system that feeds the press.

The rollers are driven by single planetary gear units. This drive concept was first used by KÖPPER in 1998 in large-size compactors supplied to the German potash industry. In the meantime, customers in Brazil, Canada and Russia have also realized the advantages of this type of drive (now in use in a total of 17 presses).

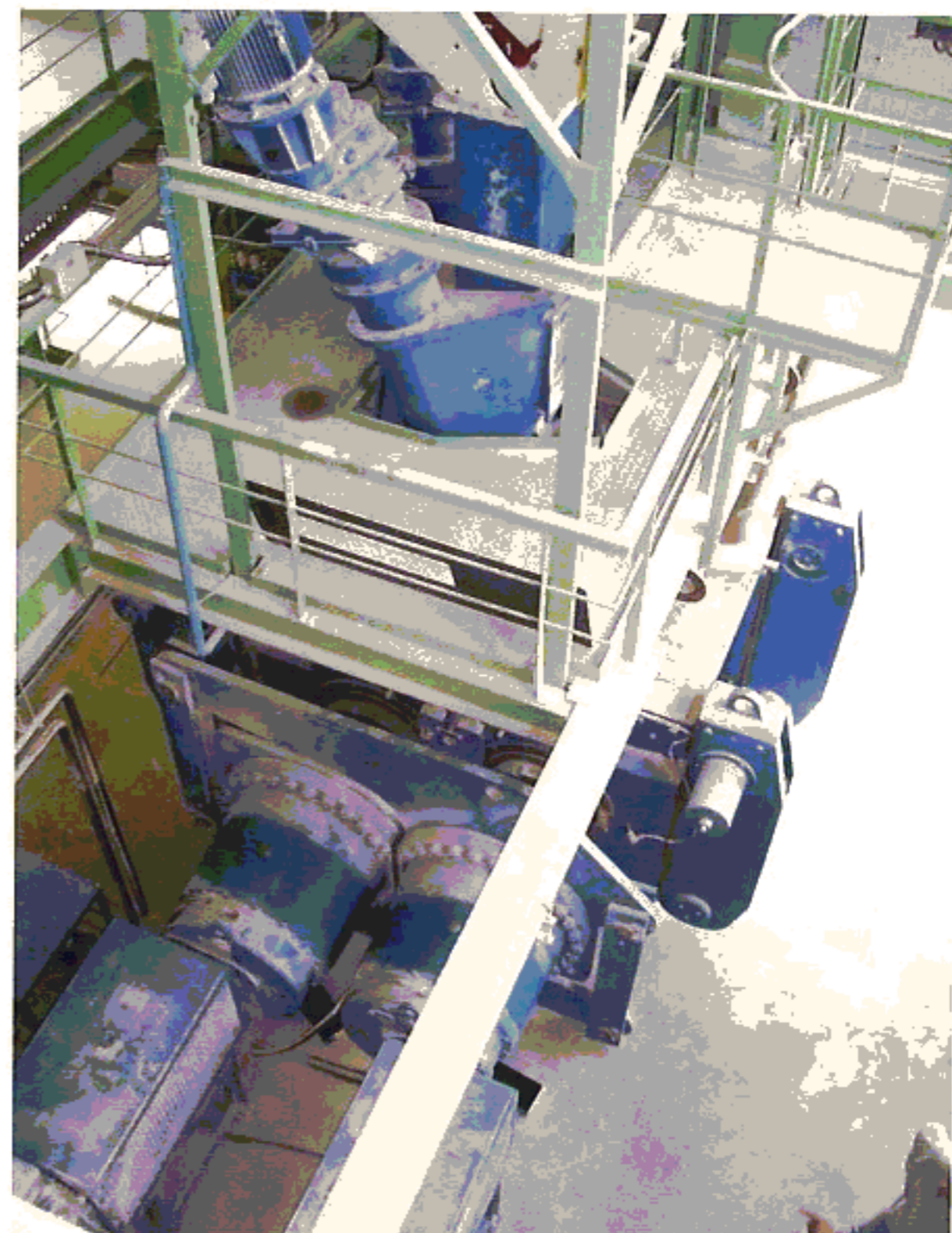
The TVM/Bige Holding plant is the first-ever NPK compacting facility to be equipped with a planetary gearbox roller drive.

The floating roller is supported by an automatically operating hydraulic system, which permits the working pressure to be controlled to perfectly suit the raw material blends used.

The arrangement is such that each bearing housing of the floating roller is supported by two hydraulic cylinders, which guarantees optimum load distribution on the bearings. Novel-type pendulum pistons prevent the rollers from jamming in slanted position.

The press rollers are fed by a screw feeder featuring two vertical screws. The feeder, which is an essential component of the press, is mounted on the press frame. Each of the screws is driven by a variable speed electric motor.

The screw speed is controlled in accordance with pre-selected roller gap. Observance of the chosen roller gap ensures consistent quality of the pressed sheets over the entire working width.



Operation of Plant: 3. Granulation



Below the roller presses is a sheet crusher which reduces the sheets to an initial fraction of < 30 mm for handling purposes. The entire material from the sheet crusher is conveyed via belt conveyors and a bucket elevator to a three-deck screen.

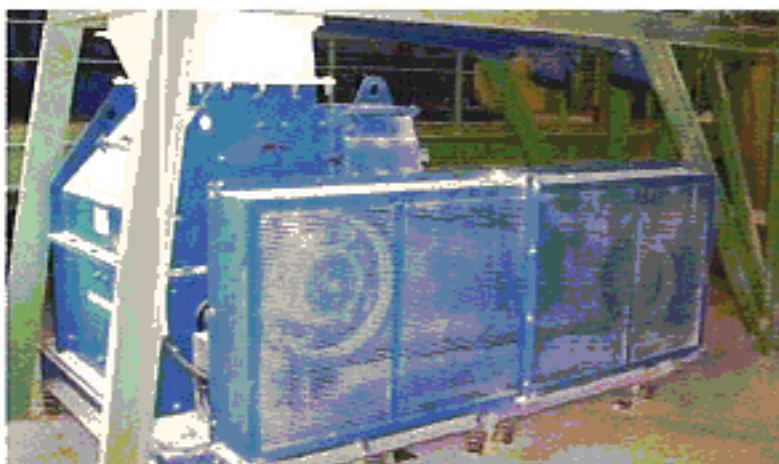
The major portion of the material from the sheet crusher is > 4 mm in size; this fraction is transferred to a bin for curing. The 2-4 mm granules are transferred to the post treatment section and the < 2 mm under-size fraction goes to the recycling bin, from where it is added to the virgin material flow in dosed quantities.

After curing, the oversize material is reduced in a granules crusher to a defined grain size. The crusher speed must be adjustable to ensure that the optimum size reduction for the specific raw material used can be obtained.

The crushed oversize material is returned to the multi-deck screen. This type of screen is compact in size and provides high screening efficiency.

As described above, the 'oversize', 'product' and 'undersize' fractions are separated and fed to the relevant conveying routes.

The crushing and reduction cycle is thus completed.



Operation of Plant: 4. Post Treatment

The granules from the compacting line are fed into an abrasion drum where sharp edges are rounded off. This operation is followed by a final screening process that serves to remove the separated fines.

The granules, after having been subjected to high loads in the drum, will undergo less abrasion during shipment to customers.

If necessary, the granules are coated with an anti-caking agent in a coating drum to keep the grains from caking together during long storage times.

A belt weigher arranged at the end of the production process serves to measure the quantities produced on a continuous basis. Depending on the formulations produced and the raw materials used, a maximum production rate of 25 t/h can be achieved.



Sum-up of Overall Result

Since it was started up in April 2004 the plant has been operated by Bige Holding on its own. In automatic operation, granulating rates of up to 25 t/h are achieved. The following blends are produced, among others:

15-15-15, 0-10-28 and 8-21-21

The products are marketed under the tradename **GENEZIS**.

Due to the plant's central location in the heart of Europe, the end products can be sold to neighboring countries with differing fertilizer requirements. The flexibility of the plant and the dry granulation concept permit widely varying formulations to be produced with short change-over times.

This highly customer and requirements-oriented concept guarantees the commercial success of the plant.


GENEZIS
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Our Worldwide Services

The roller press is the heart of many agglomeration processes. Even so, this technology is used only where other technologies are unsuitable or uneconomic. This is true not only for fertilizer compacting systems. We do in fact supply a worldwide niche market with this technology.

To defend a leading world market position, a company must not only offer superior technology, but ensure customer proximity.

Köppern maintains service points at strategic locations around the globe. This ensures fast supply of high-quality spare parts. Well-trained experts from the parent company in Germany or from a branch operation are available to our customers at all times.



More Information ...

The above description of a single exemplary project was intended to give you an initial impression of our expertise and customer-oriented policy. If you wish to inform yourselves in more detail of our company and our projects, you can do so by visiting us on the Internet. On our homepage at www.koepfern.com you can find more information. There is also a dialog option by which you can contact us by e-mail. We are looking forward to your contacting us.

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