

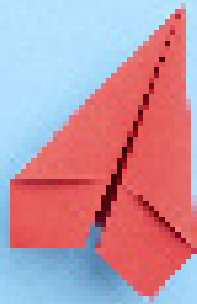


**MOVING**

IN A

NEW

**DIRECTION**



**Mike Abare, Magnum Systems, USA,** explores how conveyor systems can be used effectively in the transfer of products, and advises on the best process for starting a new project.

A conveyor is defined as a contrivance for carrying objects from place to place. Conveyor systems are exceptionally versatile, and can be designed to accommodate a wide range of applications and materials to be conveyed. Conveyors range from basic free-rolling mechanical conveyors to complex automated conveyors. Some of the most common types of conveyors include belt conveyors, roller conveyors (free rolling or motor powered), screws/augers, drag conveyors, pneumatic conveyors (pressure or vacuum), robotics, and more.

When choosing an industrial conveyor, several criteria must be considered. The material's characteristics, such as bulk density, cohesiveness, temperature, moisture content, particle size, degradation, and abrasion are important to review. Other considerations include distance, the volume of material, cross-contamination, power requirements, and space considerations. Creating viable solutions might require additional equipment to integrate the conveyors (i.e. staging and pacing conveyors, surge hoppers, isolation valves, and more).

The following study utilises pneumatic conveying to transfer abrasive products from PD trucks to storage silos and pressure dense phase conveyance from the silo skirts into the packaging area.

In the packaging area, various conveyors, including roller and chain conveyors, fill and transfer 50 lb bags and up to 3000 lb bulk bags.

#### **Case study: The Quartz Corp.**

- Product handled: Quartz sand (quartz, mica, feldspar).
- Particle Size: 3 – 240  $\mu\text{m}$ .
- Bulk density: 38.6 – 89.5 PCF.
- Bag type & capacity: 50 lb valve bags on the Model A valve bag, 1000 lb and 2000 lb bulk bags on the IBC3000 bulk bag loading station.
- Dense phase convey rate: 36 000 lb/hr.
- Plant location: North Carolina.

## Application summary

The Quartz Corp. is a key supplier of high-purity quartz sand and several different purities for the solar, semiconductor, and fibre optic markets. Though headquartered in Oslo, Norway, the company's quartz is sourced in Spruce Pine, North Carolina, a 3.9 square mile town nestled in the Appalachian Mountains, 2559 ft above sea level. Spruce Pine's unique geology presents the world's highest purity quartz deposits mined from a mountainside.

The Quartz Corp. was already producing 50 lb bags and bulk bags at a nearby facility. Yet, market demand for this quartz sand skyrocketed so high that, with the current rates the company was yielding, it could not keep up. The Spruce Pine location became a new production facility in an existing building that The Quartz Corp. acquired to produce much more of this valuable commodity.

## Increasing production required:

- A fully automated system with pneumatic conveying, bulk bag filling, and 50 lb valve bag packaging systems.



Figure 1. Dilute phase transfer system allows for material to be transferred to one of two surge bins. The surge bins gravity discharge 1000 lb of material into a Gaylord tote filler. Roller and chain conveyors index the Gaylord totes into and away from the filling station.



Figure 2. Automated system example moving 50 lb bags on belt conveyors, roller conveyors, and robotics for palletisation of material.

- System equipment capable of standing up to quartz's severe abrasiveness.
- The ability to pneumatically transfer 10 different materials for loading into bulk bags of 2000 lb and 50 lb, and for 10 different bulk densities and particle sizes, using only two dense phase systems: one for each silo.
- The ability to transfer to either the bulk bag station or the 50 lb bag station without allowing either station to be short of material.

## Equipment solution

Magnum Systems' design and project management teams worked closely with The Quartz Corp.'s team to deliver a PD truck-to-pallet solution on time and within budget. After material testing at Magnum's test lab, the team fine-tuned the valve air packer and bulk bag station to fill at the rate The Quartz Corp. team desired, exceeding prior rates. The IBC3000 bulk bag fills up to 3000 lb at a rate of up to 30 bags per hour, and, using a robot palletiser, the 50 lb valve bag line results in 12+ bags per minute. Also, the material can be transferred to both valve and bulk bag stations. At The Quartz Corp. team's request, Magnum implemented automation for processes ranging from empty valve bag placement to robot palletising.

Magnum Systems' ability to offer packaging from its Taylor Products division and pneumatic conveying from its Smoot Co. division was critical to effectively integrating all The Quartz Corp.'s equipment. Also, the agreement between The Quartz Corp. and Magnum Systems to work together after the installation has been an essential part of this project's success.

## Equipment featured:

### Dry bulk storage

- Magnum Systems provided two storage silos for receiving materials via PD truck, each complete with bin vents for air filtration, level indication, and bin activators to aid in material discharge from the silos.

### Pneumatic conveying system

- In each of the silo skirts, Magnum Systems provided a pressure dense phase pneumatic conveying system to transfer the materials to one of the two surge hoppers in the bag filling area. Dense phase was selected as the preferred convey method to reduce system wear and tear due to the abrasiveness of the product.

### Packaging systems

#### Magnum's valve bag filling

- A surge hopper complete with level indication, bin discharger, and rotary airlock for feed control.
- Three model A valve bag fillers with robotic bag placing for packing of 50 lb bags.
- The conveyor system includes small bag conveyors, a bag labeler, a check weigh conveyor, an empty pallet dispenser, robotic palletising, and a stretch wrapper.

### Magnum's bulk bag filling (IBC3000)

- A surge hopper complete with level indication, bin discharger, and rotary airlock for feed control.
- An IBC3000 bulk bag filler for weighing of up to 3000 lb bulk bags.
- The conveying system includes an empty pallet dispenser, slip sheet dispenser, full pallet chain conveyors, check weigh conveyor, metal detection conveyor, and a robotic palletiser.

Magnum Systems provided a complete control package for the automation of the conveyors, including several HMIs for operator interface and safety interlocks.

### Conclusion

In the case of The Quartz Corp., multiple conveyors were used to handle the customer's materials. Access to numerous solutions allowed an efficient solution to be designed and implemented, and should provide many years of hassle-free conveying.

When starting the process of securing design and pricing for a facility, it is important to know conveyor vendors will require a fair number of details to ascertain the best solution for the application. There may be multiple solutions depending upon what is being conveyed. Calling a manufacturer directly to discuss their equipment's pros and cons, and to get insight into the



Figure 3. Chain conveyor receiving pallets from pallet dispenser, feeding into and out of a 1000 – 2000 lb bulk bag filling station.

competition or other solutions outside their offering can be very worthwhile. Another approach is to contact a local representative to ask about access to multiple vendors, allowing for various solutions from numerous manufacturers to be evaluated. Invite them to assess the application, collect data, and develop viable, efficient solutions.

New customers are empowered by the knowledge that representatives and manufacturers are genuinely interested in a project's success. They do not want to implement a solution that does not address the customers' needs, and they want to provide a successful solution, because this protects their reputation and builds a trusted relationship. **DB**