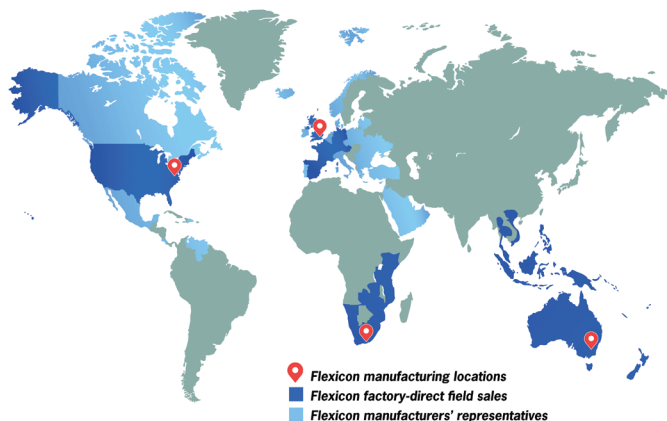




JET-FEED™ garnet delivery system (along back wall) and spent garnet reclamation system (foreground).

Garnet Fed from Bulk Bags to Waterjet Cutter Automatically

GG-0545



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Garnet Fed from Bulk Bags to Waterjet Cutter Automatically

BETHLEHEM, PA — Established in 1974, this large manufacturer of machinery began cutting its carbon steel, stainless steel and polycarbonate sheet on a waterjet in 2001.

Seventy pound (32 kg) bags of garnet were delivered on pallets, requiring operators to manually lift and dump six to seven bags into a charging hopper at the start of every 8-hour shift. Manual dumping incurred about 45 minutes of downtime, resulted in occasional spillage and generated dust, while exposing workers to potential injury. In addition, the waterjet consumed about 60 lbs (27 kg) of garnet per hour, often depleting the volume of garnet in the pressure pot prior to the end of the shift, requiring a shutdown to refill it before resuming operation.

In 2011, management upgraded the process by feeding garnet directly from 4,000 lb (1814 kg) bulk bags to the pressure pot by installing an automated bulk bag discharging-conveying system from Flexicon Corp.

Moving garnet from bulk bags to water jet cutter

Called a JET-FEED™ garnet delivery system, it consists of a BULK-OUT® bulk bag discharger, specifically a BFF model with a removable bag lifting frame that is positioned by forklift above a bulk bag. An operator can then connect bag straps to the frame, which is forklifted into cradles of spring-loaded POP-TOP™ bag extension posts.

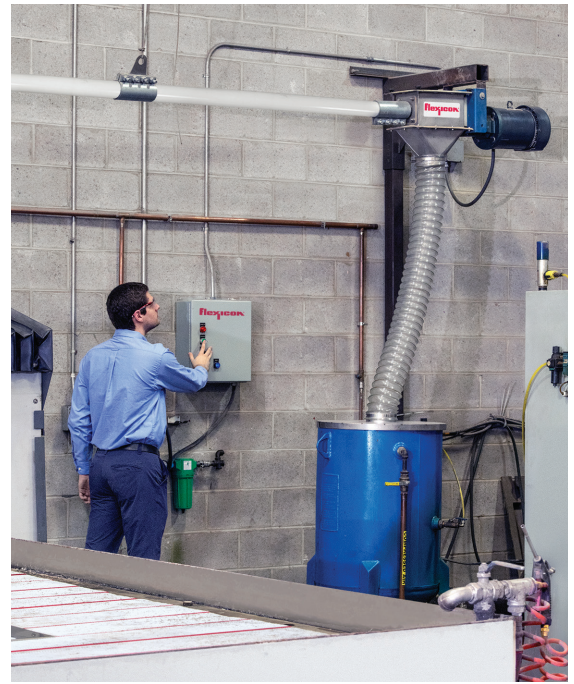
The spout is connected by pulling it through an iris valve, closing the valve around the spout, untying the drawstring, and closing the hopper intake chute. Opening the iris valve slowly prevents uncontrolled bursts of garnet from the bag and dusting from displaced air, while eliminating the spillage that previously occurred during manual bag slitting and dumping.

When full, the heavyweight bag compresses the spring-loaded bag extension posts, which begin to stretch upward as the bag lightens, elongating the bag to promote complete discharge through the spout. Additional flow promotion is provided by FLOW FLEXER® bag activators that raise and lower opposite bottom edges of the bag with increasingly longer strokes as the bag lightens, raising the bag bottom into a steep “V” shape free of dead spots.

The fully-enclosed high-flow hopper is designed with a steep back wall and skewed sidewalls that form a trapezoidal area which reduces the ability of garnet to establish a bridge between the hopper sidewalls. Instead, garnet topples and flows toward and down the steep back wall, eliminating the need for pneumatic or mechanical hopper agitation devices.

Preventing garnet from damaging the conveyor

The qualities that enable garnet to abrade through hardened steel also make it difficult to move without damaging the conveyor.



Garnet exiting the flexible screw conveyor gravity discharges through flexible downspouting into the waterjet's pressure pot.



The conveyor screw is driven beyond the point at which garnet exits the conveyor, preventing contact with seals or bearings.



Garnet delivery system allows uninterrupted operation of the water jet cutter for maximum production without dusting, spillage or worker fatigue, while reducing material costs.

The solution came in the form of a Flexicon® flexible screw conveyor, whose only moving part is a rugged inner screw. "Loose-footed," the stainless steel screw is driven from its upper end beyond the point at which garnet exits through a discharge spout, preventing material contact with seals and associated maintenance, wear and downtime.

As the screw rotates, it self-centers within the abrasion-resistant polymer tube, preventing garnet from grinding between the screw and tube wall, maximizing the life of material contact components.

The conveyor elevates garnet at a 45 degree incline before curving to horizontal for a total run of approximately 40 feet (12 meters).

The enclosed system maintains the same humidity levels as within the bulk bag, preventing garnet particles from agglomerating and resisting flow when too moist, or developing static charges when too dry.

Garnet exiting the conveyor gravity discharges through flexible downspouting into the waterjet's pressure pot. The conveyor can be started and stopped manually, or automatically by a PLC linked to high and low level sensors installed on the pressure pot.

Completing the garnet circuit

In the closed loop system, spent water and garnet collected in the catcher table is pumped to a centrifuge that extracts solids, depositing it in a bulk bag-lined hopper for recycling. The garnet is returned to the supplier, which cleans and screens it to reclaim the portion of spent garnet that is suitable for re-use.

By converting from manual dumping to automated discharging from bulk bags, the plant improved worker safety, plant cleanliness and uptime, while reducing the ongoing expense of a costly consumable.



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