

Engineering Solution | Automated bagging and packaging

A feed material manufacturer installs a new automated system to create a more efficient bagging process.

Diamond V, Cedar Rapids, IA, creates materials for use in the animal feed manufacturing industry. The base materials used in manufacturing vary greatly and require unique equipment setups to accommodate each material's distinct characteristics.

In 2015, Diamond V wanted to create an automated process for a new product line. However, the powdery, dusty material was extremely hygroscopic, meaning the material easily absorbed moisture from the air, to the point where if the material was even exposed to the atmosphere, it would absorb the moisture in the air and harden. The material needed to be weighed and packaged using a form-fill-seal (FFS) machine with minimal air contact using an automated process.

Finding an automated solution

After contacting several suppliers who were hesitant to approach the

project due to the material's characteristics, Diamond V found Concetti with the aid of its longtime local partner, Bratney Companies. Bratney is an Iowa-based construction and equipment company specializing in agricultural processing facilities, and the US partner for Concetti. Concetti is a powder and bulk material weighing, bagging, and palletizing equipment supplier based in Italy with its US headquarters in Hoschton, GA.

"This was a new process and product for the customer and a difficult task for the bagging equipment supplier," says Mike Giles, Bratney's packaging equipment product manager. "Concetti really embraced the challenges presented by the difficult-to-handle product and worked closely with Diamond V to prepare the facility and bagging equipment for success."

The supplier decided to place the equipment inside a conditioned room to reduce or eliminate the



A new automated bagging system squares every bag it picks up before the bag gets hung and filled, ensuring a clean fill and consistent seal.

possibility of the material taking on moisture and hardening. The supplier provided the room specifications, and Diamond V built the conditioned room inside its animal feed manufacturing facility.

For the client's specific needs, the supplier installed a gross weigher with a screw feeder, an FFS bagging machine, a hybrid robotic palletizer, and a specialized FFS reel to produce bags that would help preserve the material's shelf life. The reel does this via a special seal that allows air to vent out of the bag while on a bag-flattening conveyor, ensuring minimal moisture in the bag and a stable pallet stack. The FFS bagging machine included an industrial thermal transfer printer

to permanently print on the FFS tubular plastic reel as it unwinds from the roll and advances into the bag forming area of the machine.

"The system itself is a pretty standard Concetti automatic packaging line, a testament to their technical capabilities," Giles says. "The packaging system was the last step in a new processing line for Diamond V and was critical to the overall success of the new line."

Fixing bag fill issues

Diamond V returned to the supplier in 2018 looking to install two additional automated packaging lines for animal feed ingredients. The two lines needed to handle several materials, each requiring a different

production time and quantity. The various production runs placed a large demand on the bagging equipment to include automatic recipe changes so that the entire packaging line — from scale through palletizing and wrapping — needed to change for the next material in about 90 seconds or less. The company placed special emphasis on consistent bag presentation to the bag closing system to eliminate bag closing issues. Concetti's reliable bag transfer system is simple yet highly effective and has increased Diamond V's production efficiency.

Both new packaging lines consist of a net weigher with a double screw feeder, an automated bagging machine, an integrated bag closing



Diamond V contacted Concetti in 2018 to provide two new automated bagging, palletizing, and wrapping lines for their animal feed ingredients.



The new Miller Weldmaster bag sealing system, which Concetti integrated with the bagging line, can efficiently close both bag types that Diamond V uses, paper pinch bags and step-cut laminated woven poly bags.

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machine, a metal detector, a check weigher, a hybrid robot palletizer, and a rotary arm stretch wrapper. The new system doses each weightment with the dual screw feeders before dropping the product to the bagging spout. One advantage of the new equipment is that it squares every bag it picks from the empty bag magazine before the bag gets hung to the spout. By ensuring the bag is hung squarely each time, the subsequent bag transfer to the sealer is aligned and consistent for highly accurate and repeatable bag presentation to the sealer.

“The new systems, while fully automated, are brilliantly simple in the design of the bag transfer system” Giles says, “which makes the machine simpler and more

economical, yet highly consistent and reliable.”

These powdery materials are often fluid, meaning the material wants to flow in a way that’s similar to water. If not dosed correctly with an inclined screw-fed weigher, the material would flow past the end of the screw and into the scale, throwing off the weightment. To prevent this, the supplier installed two inclined screws to feed the scale, one large for bulk filling and one small for fine filling. The incline prevents the product from flowing once the screw stops turning. Also, powdery materials can easily aerate and take on air when dropped into a bag, so the material must be deaerated once in the bag using deaeration probes.

The system uses a Miller Weldmaster bag sealing system that can close both types of bags used by Diamond V (paper pinch bags and step-cut laminated woven poly bags). In the case of the paper pinch bags, the bag sealing system folds the pinch top and activates the hot melt glue to close the bag top. With laminated woven poly bags, the system folds the step-cut top (like a pinch bag top), then welds the two plies of poly material together, making an extremely durable seal.

In addition to the production concerns, bag weights need to be extremely accurate no matter what system is implemented. The supplier’s newly implemented systems provide bag weight accuracies of ± 0.2 percent. **PBE**

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