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Offset, gravure ink pigments weighed by bulk bag discharging systems

A R50-billion global provider of print and digital communications, based in Wisconsin in the US, Quad Graphics (www.qg.com) manufactures its own printing inks — not only offset and gravure, but also metallic, fluorescent and invisible inks, as well as glow-in-the-dark inks.

The company's Chemical Research/Technology (CR/T) division is responsible for all facets of ink production, from R&D through formulation and manufacturing. Environmentally friendly offset inks with renewable content as high as 27% are manufactured at a fully integrated facility in Hartford, Wisconsin, while solvent-based gravure inks are produced at a manufacturing facility located in Martinsburg, West Virginia.

At both facilities, pigment for producing various colours is received in bulk bags weighing from 272 to 907 kg apiece, which are emptied and conveyed into mixing tanks using a bulk bag unloading system from Flexicon Corporation.

CR/T began formulating and manufacturing its EnviroTech offset inks in 1992, according to Charlie Buckett, manufacturing manager at the Hartford facility. Upon delivery to the Hartford, WI facility, the bulk bags are loaded into Flexicon bulk bag dischargers, one dedicated for each of four pigment colors. Each model BFC discharger is equipped with an electric hoist affixed to a trolley that rides on a cantilevered beam, allowing bags to be raised from floor level and rolled into the frame without the use of a forklift.

To eliminate dust and promote flow while discharging, a manual Spout-Lock clamp ring is raised pneumatically by a Toe-Tube telescoping tube, allowing the operator to make a high integrity, sealed connection with the bag spout.

The telescoping tube, with a 15 cm OD vent port for interface with a customer designed dust collector, maintains constant downward tension on the bag as it empties/elongates, promoting complete discharge of the non-free flowing pigment into a 0.25 m³ capacity Type "T" pyramidal floor hopper measuring 81 cm square by 107 cm high. The dischargers are constructed of stainless steel and include a Power Cricher™ flow control valve for regulating flow and permitting dust-free emptying of partially emptied bags.

From the hopper, the pigment enters a separate 975 cm long flexible screw conveyor, which employs a flexible stainless steel screw having specialized geometry to move non-free-flowing materials. The conveyor transpents the pigment at a 45-degree incline, discharging it into one of four loss-in-weight feeders, each dedicated to a 940 cm high premix tank located approximately 71 cm from the hopper, where it is blended with varnish to form an approximately 30 percent solids slurry. The flexible screw conveyor discharges according to the amount of weight lost, whereby load cells on which the discharger is mounted, send signals to a PLC to activate the screw when 0.1 kg of pigment have been released into the hopper, and cycle five times to feed 45.4 kg into the premix tank.

“Individual slurries are then fed into a holding tank with separate compartments that can hold up to four premixes,” said Buckett. “From the holding tank, the different colour slurries are fed separately into dedicated horizontal bead mills, each with a capacity of approximately 200 l, for particle size reduction and encapsulation of the pigment to create the finished ink.

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