

PVC calendaring improved by switching to bulk handling

A BULK bag unloading system with pneumatic and flexible screw conveying has improved the operations at a Mexican PVC film plant with increased process quality, more efficient use of the workforce and a safer work environment. The equipment was supplied by Flexicon of the USA, whose European office is at Herne Bay in Kent.

Oplex calenders PVC sheet for applications like advertising banners, automotive seat covers and door-panel liners, truck canopies, awnings, shower curtains and synthetic leather. The company produces sheet on two calendaring lines that receive PVC compounds from a central batch-mixing system.

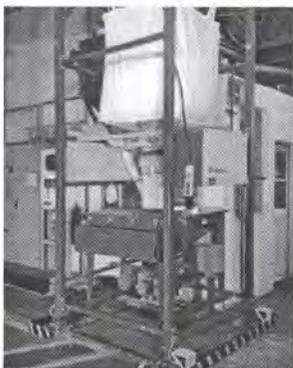
Previously, workers had manually loaded 25 kg paper sacks of PVC and calcium carbonate into a mixer and used a conveyor system of the company's own design for adding liquid components such as plasticisers, stabilisers and lubricants.

During the the process, manual loading created problems, notably in quality control. Oplex was mixing six batches per hour (144 per day), each batch weighing 200 kg including liquid additives. With one batch mixed and discharged every 10 minutes, workers were rushed, which led to mistakes. It was not unusual for them to forget how much product had been added to a batch and since bags were opened with knives, particles of paper sometimes fell in the mix. The work was repetitive, which created the potential for injuries from carrying bags to the mixing station and the empty bags also had to be collected and disposed of, increasing production costs.

Oplex decided to automate the mixing with a bulk-bag unloading system, reasoning that this would not only improve batch quality but enable it to use several dozen 700 kg or 1,000 kg bulk bags in place of hundreds of 25 kg sacks. An automated system would also create a safer work environment by reducing the amount of manual labour required in batch loading and mixing.

The company developed a specification for a PVC materials handling system that demanded equipment compatibility with a programmable logic controller and in-house software. Calcium carbonate would still be loaded by hand from 50 kg sacks because it is not packaged in bulk bags. Oplex, nevertheless, still intended to install a more efficient hopper and additive mixing station for it.

The first part of the system is a BFC Series bulk bag unloader. This has an electric trolley hoist on a cantilevered beam that lifts bags weighing up to 1,450 kg into place above a carbon steel frame about 6 m tall. PVC flows from the bag through a Tele-Tube telescoping tube that attaches manually to the bag spout with a Spout-Lock clamp ring, which creates a dust-tight connection. The tube raises and lowers pneumatically, applying continuous



Oplex installed a Flexicon BFC Series bulk bag unloader to improve its PVC compounding operation. Features include a cantilevered I-beam and hoist, Bag-Vac dust collector, Flow-Flexer bag activators beneath the bag for positive material flow, Tele-Tube telescoping tube and Spout-Lock clamp ring at the bag spout interface, hopper, and PLC-controlled rotary valve.



PVC from the bulk bag unloader is pneumatically transported to a 36 inch diameter (91.4 cm) filter-receiver and hopper on the third floor of the Oplex plant. The flexible-screw conveyor empties calcium carbonate into the smaller weigh hopper. Both ingredients are then gravity fed to the mixer on the floor below.

downward tension to elongate the bag and keep the spout taut, which prevents the spout from bulging outward (creating dead pockets) or falling inward (creating flow restrictions), for complete evacuation. A bin vent dust collector mounted on the discharger frame also keeps dust from escaping into the plant. This not only helps to safeguard worker health by reducing airborne particles but also improves plant

cleanliness and reduces the risk of product cross contamination.

A pneumatically actuated Power-Cincher flow-control valve allows an operator to close partially full bulk bags should the need arise. Four elliptically contoured cincher bars close concentrically around the bag's outlet spout in an overlapping fashion to eliminate trickle flow of material.

The Oplex plant is in an old building with little horizontal space, so operations are spread over several floors. Flexicon's vacuum pneumatic system conveys PVC from bulk bags to a filter receiver on the third floor. A hopper integral to the bulk bag discharger directs material to a drop-through rotary valve, which meters it into one of two 75 mm diameter pneumatic conveying lines transporting it 60 m to the 1,000 mm diameter filter-receiver above the mixer. The bulk bag discharger is equipped with load cells to allow the PLC to receive loss in weight data as material is conveyed from the discharger. This enables the PLC to control the feed of the pneumatic conveyor so that the required weight of PVC is delivered to the filter receiver, then dropped through a chute to the mixer. The two separate pneumatic conveying lines prevent cross contamination when running different products.

On the second floor Flexicon installed a bag dump station with dust collector for loading CaCO₃. Material from the dump station is transported to a small weigh hopper on the third floor by a Bev-Con flexible screw conveyor. A flexible stainless steel screw, designed to move difficult-to-handle materials, rotates in a 90 mm diameter, 9 m long plastic tube set at a 45 degree incline. The screw self-centres as it rotates, providing clearance between the screw and tube wall to prevent grinding of the material. The conveyor is powered by a 4 kw motor at the discharge end where the CaCO₃ enters the weigh hopper through a transition adapter. Load cells under the weigh hopper permit precise weights of CaCO₃ to be measured. From the hopper, the weighed batch passes through a slide gate valve to the mixer.

The accuracy of the automated system's loading, weighing and mixing operations has improved overall product quality and repeatability. Moreover, by permitting the use of bulk bags in place of 25 kg sacks of PVC, the automated materials-handling system reduces the amount of floor space needed for materials storage.

From the third floor, the PVC and CaCO₃ are gravity-fed from the filter receiver and the weigh hopper respectively, to the mixer on the main floor where the liquids are added. After the batch is processed it is metered into two compounding machines. One compounder, a Buss Kneader, processes up to 1,200 kg/hour. The compounder is discharged to a two-roll mill for aeration and then into a calender where it produces sheet 1.8 m wide. The other line uses a Banbury mixer that processes compound at the same rate and discharges it into a two-roll mill and an extruder-strainer and then into a second calender, which produces sheet 1.6 m wide.

www.flexicon.com

New feeder/blender has conveying built in

THE latest generation of Graviblend feeding and blending systems from Colortronic Systems has a fully integrated material conveying system – integrated both mechanically and in terms of the system control. The company says this means fewer interfaces, improved ease of use, and with material changes taking less time, increased savings in production. Because of its reduced height, the new system also takes up less room than its predecessor.

The Graviblend is aimed at continuous production processes needing high levels of formulation accuracy and blend homogeneity, such as the manufacture of textile and chemical fibres, the extrusion of foam sheet and multi-layer special-purpose films and the compounding of masterbatches.

The new equipment is fully modular and its integrated material loaders can convey raw materials from silos, octabins and other storage containers. For ease of operation all functions are combined in a single user interface on the C2 control system. New sight glasses in the material hoppers permit visual control of the material flow.

The Graviblend can be operated either as a single-line or multi-line system, with up to eight feeding stations per line, and is rated for continuous 24 hour operation.

Like its predecessor, the new Graviblend operates with differential metering; each individual

component is metered by weight and the synchronous metering of all materials maintains the formulation and an optimum blend of the components.

The feeding module has four possible modes of operation. In production mode, the module feeds the material into the collecting vessel. The shut-off device of the feeding system prevents any after-spill of material and the dosed quantities of material slide down channels into the middle of the collection hopper where they are mixed.

The second mode of operation permits the taking of samples to prevent start-up waste when calibrating during change over from one product to another. The two other modes of operation are by-pass operations: either the extruder can be fed with material without any feeding function (the extruder is simply flooded with material) or the system can be emptied rapidly such as when changing the screw or for changing over from one material to another.

www.colortronic.co.uk



New Graviblend adds conveying to feeding and blending.

Vacuum loaders designed for system expansion

NEW features of TSM Control Systems vacuum loading equipment are said to facilitate installation and expansion. A typical TSM system comprises a central VAC350 or CP2000 vacuum sequencer, a centralised pump station, dust filtration with blowback cleaning, and individual self cleaning loaders situated on top of the material reservoir bins.

The VAC 350 can control up to 40 remote loaders and five pumps, each with a dust collector. Various filling sequences can be programmed according to material priorities to optimise the use of each pump and ensure that a process is never starved.

Additional loaders can be connected in a daisy chain fashion and simply allocated an ID number. An additional loader is automatically recognised and added to the filling sequence. The system allows integration with existing non-TSM loaders.

Latest units are reduced in height and have removable pipe adaptors. An on/off switch is built into the vacuum receiver and construction is in stainless steel.

www.tsm-controls.com

The height of TSM's vacuum loaders has been reduced.



DEB Dispensing centralises loading

A CENTRAL loading system was installed at DEB Dispensing's refurbished production facility in Little Eaton, Derbyshire, to streamline materials handling for the company's 11 injection moulding machines.

The equipment was supplied by New Omip of Italy through Intelicare.

The materials processed include PET, and Intelicare has supplied a 400 litre hot air dryer and a 600 litre dehumidifying dryer to complement the existing dryers.

Material is fed to the central loading system through a manifold. Each machine is connected to the central loading system with the receiver capacity optimised to the machine size and throughput.

Most machines have also been equipped with volumetric colour dosers, some with the optional electric paddle mixer which allows liquid colour to be used.

Control of the loading system enables parameters to be entered either at the central operating panel or at the machine receiver. Each main controller can accommodate 60 receivers and four vacuum blowers and the system can be extended by wiring additional receivers into the existing communication cable: there is no need to run the cables back to the main panel. Proportional valves may also be added and connected directly into the loading system.

www.intelicare.co.uk

Materials transfer hoses are anti-static and abrasion resistant

NORRES Airduc PUR 355 MHF and 356 MHF PU hoses are transparent, flexible and resistant to chemicals and are claimed to have abrasion resistance five times better than rubber. They are vibration resistant and suitable for plastics conveying including transfer of material to and from silos at high throughputs.

A special threaded sealing insert adapted to the outer hose contour is said to ensure that Connect 231 safety gland systems are explosion proof. The metallic insert is in contact with the adapter when systems are assembled,

creating a secure connection capable of static discharge.

Systems are offered in diameters from 25 to 100 mm and may be used with Airduc 355 and 356 hoses. The shells are in aluminium, easy to fit and may be reused. Norres says that external connectors were formerly used but under high pressure could become detached or lose tightness.

The company will shortly introduce high temperature hoses which may be used over short periods at temperatures up to 150 degC.

www.norres.com

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