

MODERN PLASTICS

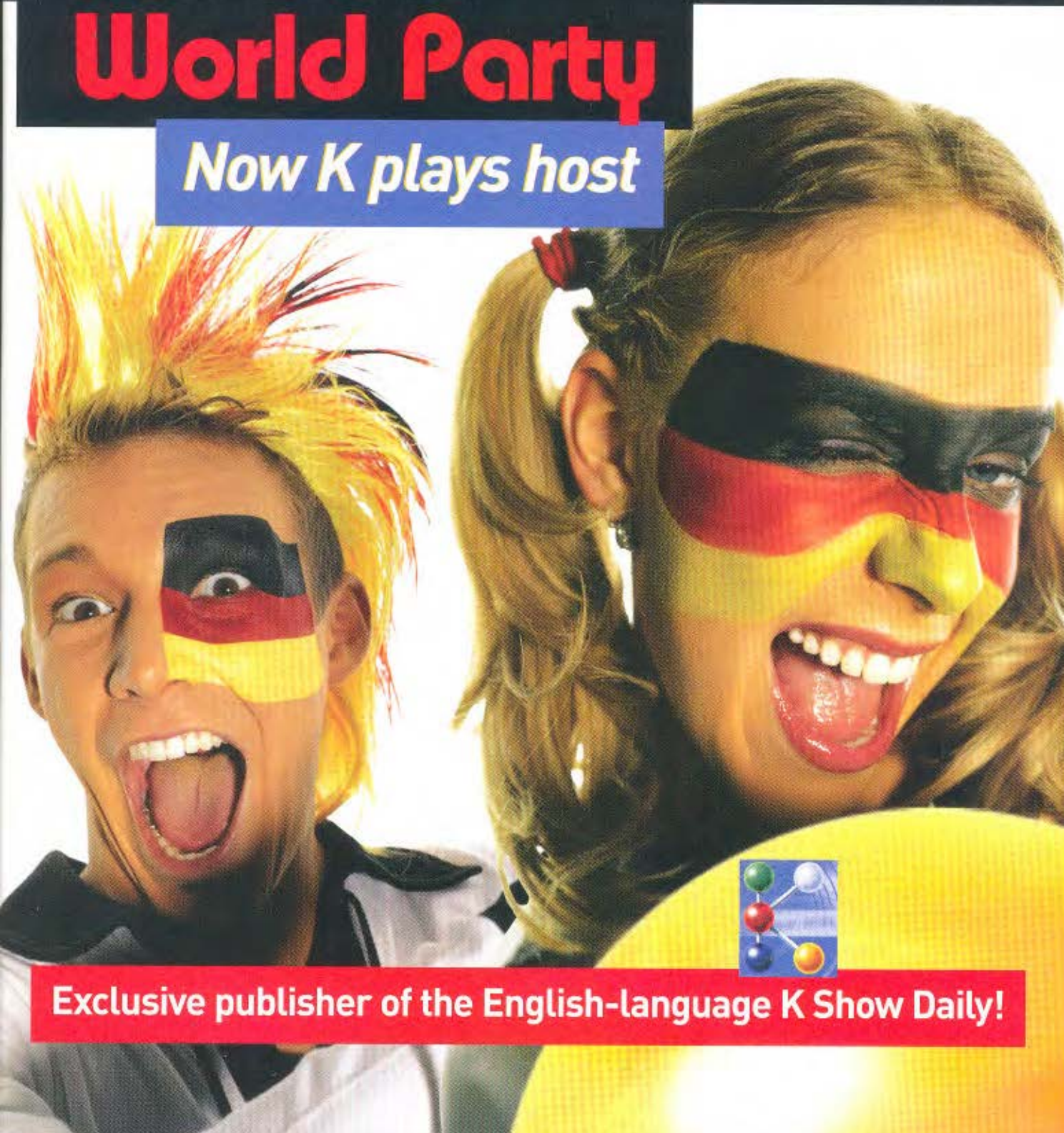
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Bulk-solids handling upgrades calendering operation

One of the largest plastics processors in Mexico City streamlined its materials handling, improved process quality, created a safer work environment, and made more efficient use of its workers by installing a bulk-bag unloading system with pneumatic and flexible-screw conveying.

Oplex S.A. de C.V. calenders polyvinyl chloride (PVC) sheet on two calendering lines for applications such as advertising banners, automotive seat covers, and door-panel liners. The lines are fed from a central batch-mixing system. Workers had manually loaded 25-kg (55-lb) paper sacks of PVC and calcium carbonate (CaCO_3) into a mixer and used a conveyor system of the company's own design to add the liquid components: plasticizers, stabilizers, and lubricants.

Carlos Barra, director of operations at Oplex, says manual loading created problems, notably in quality control. Oplex mixes six batches per hour, each weighing 200 kg (440 lb), including liquid additives. Rushed employees sometimes forget how much product had been added to a batch. Plus, empty bags had to be collected and disposed of.

Oplex decided to automate PVC mixing with a bulk-bag unloading system, both to improve batch quality and to permit use of bulk bags in place of hundreds of 25-kg sacks. An automated system would also reduce manual labor and create a safer work environment.

Among the requirements was that the system had to be compatible with a programmable logic control (PLC) and software Oplex developed in-house. Although it's not packed in bulk bags, Oplex also wanted to install a more-efficient hopper and additive mixing station for CaCO_3 .

The first part of the system is a BFC Series bulk-bag unloader made by Flexicon Corp. The unloader features an electric trolley hoist on a cantilevered beam that lifts bags weighing up to 1450 kg (3200 lb) into place atop a carbon steel frame about 6m (20 ft) tall.



Mexican processor Oplex reaped the rewards of automated PVC mixing.

PVC flows from the bag through a telescoping tube that attaches to the bag spout with a clamp ring for a dust-tight connection. The tube pneumatically raises and lowers, applying continuous 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. An operator can close partially full bulk bags should the need arise.

Oplex's operations are spread over several floors. A vacuum pneumatic system conveys PVC from bulk bags to a filter receiver on the plant's third floor. A hopper integral to the bulk-bag discharger directs PVC to a drop-through rotary valve, which meters the material into one of two 3-inch- (7.6-cm) diameter pneumatic conveying lines transporting it 200 ft (60m) to the filter-receiver above the mixer. The bulk bag discharg-

er is equipped with load cells to allow the PLC to receive loss-of-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 CaCO_3 . Material from the dump station is transported to a small weigh hopper on the third floor by Flexicon's Bev-Con flexible screw conveyor. 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, Barra says. Moreover, using bulk bags has reduced the amount of floorspace needed for materials storage.

From the third floor, the PVC and CaCO_3 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, which feed two, two-roll mills for aeration, and then into the calender sheet lines.

To account for the thin air found at Mexico City's high altitude, 2240m (7349 ft) above sea level, Flexicon adjusted the pneumatic conveying system and ensured the cooling fans for the motors generated enough air flow to be effective. *Flexicon Corp., Bethlehem, PA, U.S.A.; +1 610-814-2400; www.flexicon.com*