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A New Dawn in Rotary Valves

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Flexicon and Muntons

A perfect match made not in heaven but among the fields of barley

Flexicon (Europe) Ltd. are specialists in the field of bulk solids handling, manufacturing systems to move powder, pellets, flake, grain and so on, usually for integration into a process line. Muntons plc on the other hand, established in 1921, are the largest malt and malted ingredient producers in the world. Their combined skills were to prove a perfect partnership.

Each year, from the prime, malting barley fields of Suffolk and Yorkshire, Muntons purchase over 200,000 tonnes of assured grain annually during which time the two locally sited processing facilities produce over 170,000 tonnes of malt and 35,000 tonnes of various malted product serving the brewing and distilling industry and the food and beverage industry with a plethora of malted ingredients supplied in 25kg bags.

The environment is very competitive being driven by their customers' desire for quality, efficiency and economy.

No pressure there then! Not settling for second best those circumstances precipitated the review of production methods on the bagging and packaging line where downtime and operational costs, due to the maintenance and labour required, were clearly prohibitive and adversely affecting the operational efficiency of the vacuum band dryer line.

In the band dryer, liquid malt extracts in syrup form pass through four, steam-heated zones, on 8 driven bands, at varying and ascending levels of heat before being cooled through a final water-cooled zone. The resulting cake-like product is then broken off the driven bands at the line-end to fall into a multi-toothed, cake-breaker. The intermediate coarse powder is then conveyed to a vacuum-break hopper before being pneumatically transferred, via a cyclonic separator and gravity fed through a rotary valve, for final granulation through the cone mill. This continuous element of the process was immediately prior to the temperamental bagging and packing line.

Previous to upgrade, the granulation was directly fed from the mill into 800kg tote bins that were then stored in a holding area, sufficient for some 200 bins, to await bagging and dispatch. On demand an operative would select the appropriately filled tote of a given product for transfer by fork lift truck to a mezzanine floor area where a second operative would, by similar procedure, take the tote about 10 metres to the tipping unit, load the tote, unlock the doors, start the system then go through a reverse procedure as each tote emptied. After which, each tote then required cleaning to comply with Muntons strict hygiene standards. Meanwhile, back on the ground floor on the bagging line the operator would stick the labels on the bags and fit each to the filling head. The 25kg capacity bags were then filled, sealed, palletized and dispatched.

Of the several disadvantages that were identified in this procedure the greatest was downtime on the bagging and packing line, which was too common for comfort. It inevitably led to bottlenecking on the tote fill line and disruption to product shipment to customers.

And so it was decided to make the whole bagging and packing line redundant - in favour of an in-line system.

A new system would be installed directly beneath the existing mill and tote filling tower within a purpose-built, hygienic, packaging room, de-humidified to 30% relative humidity by means of a Munters Wheel. The new packaging room itself would remain within the vacuum band dryer warehouse. It was absolutely vital that, however presented, the new system would ensure the uninterrupted work rate of the vacuum band dryer should any downtime result on the new, "now in-line", bagging and packaging process, as the band dryer was not designed for stop-start production. Following a band dryer shutdown a wash down was necessary. This procedure was costly and time consuming and added to the costs of cleaning the empty totes through vastly increased wastewater treatment and water use.

Other considerations were the raw material characteristics. The malted ingredient was very free-flowing and exhibited none of the often seen compaction-like characteristics. Neither did it aerate or fluidize but it was hygroscopic and potentially hazardous such that it could generate an explosive dust - something that could not be allowed under new dangerous substances and explosive atmosphere regulations now in force (DSEAR).

Flexicon subsequently designed and installed three systems:

- A Bulk Bag Discharger System with a 4.0 cubic metres/hour throughput capacity with Dust Classification: Zone 22 and ATEX Level of protection: Category 3. Although the product is free flowing, manual FLOW-FLEXER' bag massagers were included to aid the product flow from the bag, particularly in the final stages for total discharge.
- A Twin CentrePost™ Bulk Bag Filler System with Dust Classification: Zone 22 and ATEX Level of protection: Category 2.
- A Conveyor System with Dust Classification: Zone 22 and ATEX Level of protection: Category 3.

All product contact surfaces were manufactured from 304 stainless steel and finished to food quality standard.

Two flexible screw conveyors offer the choice of either directing flow primarily into the bagging line or, in the event of a line problem, into a 1-tonne flexible intermediate bulk container (FIBC)

The FIBC on the Bulk Bag Filler Frame in readiness for transfer to the discharge line for bagging or shipment as an FIBC load

Two low-level sensors were employed; one in the receiving hopper of the bulk bag discharger and another within the discharge transmission of the conveyor that fed the bagging line from the cone mill.

Under the new procedure, up to the point of granulation the process remains unchonged. However, when the raw material exits the cone mill via the specially configured feed chutes, instead of being gravity fed into what would have been a tote bin, now feeds through a pneumatically operated, wye diverter valve. This feeds either one of two Flexicon Flexible screw conveyors with a round wire configured screw conveyor and UHMWPe outer tubing. The operator has the choice of either directing flow primarily into the bagging line or, in the event of a line problem, discharging into a 1-tonne flexible intermediate bulk container (FIBC).

When in transit to the bagging line raw material is conveyed upwards through 45∫ along the 6m long screw conveyor and gravity fed via the discharge transmission into the original receiving hopper as material source for bagging.

If however, material is en route to the bulk bag filling station it will transfer upwards through 45∫ via the alternative, 4m long, flexible screw conveyor for discharge in the same manner. The bulk bag filler frame is mounted on load cells for gain-in-weight control, the parameters for which are set through a control panel. Other features include a bulk bag liner inflator and inflatable inlet seal with exhaust vent for dust collection or vent sock. When filling is complete the FIBC is tied and removed from the pneumatically actuated bag loop arms for storage or positioned, when appropriate, within the bulk bag discharge frame for discharge into the receiving hopper feeding the bagging line.

With the FIBC properly positioned within the discharge frame and access via a door in the 'hopper chute', the FIBC spout is tugged through an iris valve, which is then closed, enabling the

bag tie to be released without product spillage. The notched lever of the valve gives instant control over the rate at which the bulk material is allowed to discharge into the hopper, minimising dust emissions although a Dust Collection Plenum, mounted above the iris valve, is designed to extract at 420 cubic metres/hr.

A bag support tray assists manual handling when discharging 25kg bags back into the system if required.

At the point of discharge from bulk bag to hopper 'FLOW-FLEXER' plates' massage the lower side walls of the bulk bag. Although the malted ingredients flow freely this motion greatly assists when the bulk bag is approaching empty. As discharge continues the massaging strokes increase, raising the side walls of the bag creating a 'V' shape, eliminating dead spots and maximising the amount of product discharged by directing the flow to the central flow column. When product within the hopper falls below a pre-determined level it exposes a level sensor which stops the process, making the operator aware of the status.

So the three systems are working well and have delivered the following benefits:

- Removed the double handling of the tote bins.
- Eliminated the tote washing procedures and protected the band dryer from unlikely bagging line downtime.
- Substituted the tote storage area for a narrow aisle racking system. This has eliminated outside warehousing costs.
- Reduced manpower overhead by three operatives.
- Shortened delivery times through in-line packaging.
- Improved reliability and last but not least,
- Opened new opportunities to supply in 1-tonne bulk bags for greater economy of sale.
- Achieving the above has clearly shown that expectation in meeting the brief has been surpassed by exceeding the brief

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The discharge receiving hopper with open hood showing access to the bag spout and iris valve

Euromix Concrete takes another Liebherr batching plant

Euromix Concrete is continuing to source its batching plants and truckmixers from Liebherr and, over the years, the two companies have built up an enviable and loyal business relationship. Euromix's impressive growth sees another new readymixed concrete depot opening up at Greenwich, following on from the establishment of the West Thurrock site in late 2005. Once again, Euromix founder Steve Nicklen has turned to Liebherr-Great Britain for the supply and installation of the batching plant for this latest addition to the Euromix network. A Mobilmix 2.25 plant is now supplying quality readymix concrete to the region, with its delivery carried out by Liebherr truckmixers on Mercedes chassis which is the specification for the whole Euromix truckmixer fleet.

Euromix Concrete is headquartered at Chelmsford, with a further four plants at Ipswich, Southminster (near Maldon, Essex), West Thurrock and now Greenwich. This network is capable of producing over 250,000 cubic metres of concrete per annum and is strategically placed to provide excellent coverage of the northern home counties and greater London, both north and south of the river. The company has been a member of the Quality Scheme for Ready Mixed Concrete (QSRMC) since 2000. Sister company, UK Concrete Pumping Limited, works in parallel with the Euromix plants to provide customers with either boom or static pumping services for concrete placement.

The Mobilmix 2.25 is a mobile horizontal concrete batching plant with high production outputs, features and capabilities which compare favourably with production performance normally associated with static plants. Of robust modular construction and capable of being transported on only a few vehicles, the Mobilmix 2.25 has easily assembled components for fast and safe erecting and dismantling. With all modules fully integrated - and the entire plant with inline and cement silos on their own steel foundations - the Mobilmix 2.25 can be installed quickly with minimum ground preparation and can be ready to batch within a few days.

The heart of the plant is the Liebherr twin-shaft mixer with production capacities of up to 100m≥ "set" concrete per hour. Liebherr's own Litronic MPS II microprocessor control, installed in its own integrated module, regulates and monitors the plant's operation - moisture and temperature measuring devices can be included and, should cement additives be required, Liebherr is also able to supply and install an admixture weigher.

The whole plant, with mixer and weigher platforms, is designed and built to provide ample space for routine cleaning and maintenance procedures.

The configuration chosen by Euromix Concrete for their Greenwich plant is fully enclosed and entirely sheeted. The compact Thames-side site precludes any exterior stockpiling of aggregates, which are delivered by barge. Euromix specified the largest aggregate storage bins available for the Mobilmix plant to provide the solution, giving them 200m≥ total storage with four 50m≥ bins. The cement silo capacities are 100 tonnes each, the belt weigher load maximum is 6,000kg, the cement weigher load is 1,200kg and the water weigher load is 600kg.

Euromix Concrete's growing fleet of truckmixers are all Liebherr models, consisting of a mix of HTM 704 and HTM 804 7m≥ and 8m≥ capacity mixer drums - every one of them mounted onto a Mercedes chassis cab. "The Liebherr Mercedes combination is perfect for my fleet" says Steve Nicklen. "They are both renowned for their engineering excellence and I have found that they simply just carry on working without any problems at all. I don't operate with owner drivers and I need to make sure that we have the best possible and most reliable equipment for delivering our concrete - a Liebherr mixer assembly mounted onto a Mercedes chassis is the right choice for me and my team".

The Liebherr HTM mixer assembly features a drum constructed from special high wear-resistant steel with wear protection on the mixer spiral blades for extended working life. A further and important factor in extending the working life of both mixer drum and its Mercedes carrier chassis is the Liebherr developed high-quality steel frame and U-clamp fixing method.

Drum support pedestals are secured to the substantial U-channel sub-frame at the "underlay" by stirrup bolts that accommodate flexing. These are fitted close to the frame to avoid stress transference and to distribute loads uniformly to the truck chassis. The design, coupled with the side plate fixing arrangement, enables the mixer sub-frame to be rigidly attached at regular intervals over its entire length. This forms a composite strength with the chassis while still allowing the body to flex as necessary to avoid stress damage and/or misalignment occurring within the mixer superstructure. This, in effect, produces such a rigid and stress-free fit that problems of cracking or distortion on either mixer frame or truck chassis are avoided. The result is a considerably extended operating life for both mixer assembly and host vehicle.

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