

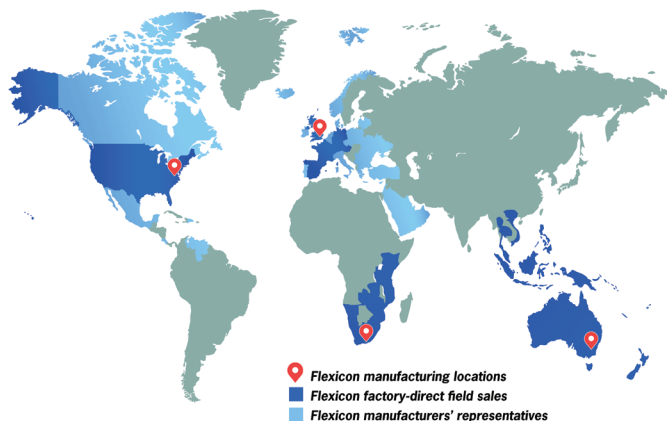
FLEXICON CASE STUDY



Flexicon's multi-ingredient weigh batching plant uses flexible spiral conveyors to meter cohesive powders in precisely proportioned quantities to the mixing and thermal extrusion processes at Welland Medical's new adhesives production facility.

Automated Turnkey Batching, Blending, Extrusion System Provides 18-Month R.O.I.

P-1104



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Automated Turnkey Batching, Blending, Extrusion System Provides 18-Month R.O.I.

CRAWLEY, WEST SUSSEX — The need for a flexible adhesives manufacturing plant in a confined area led Welland Medical to select Flexicon (Europe) Ltd. as the main contractor for equipping its new Technical Centre at Crawley, West Sussex, with a purpose designed batch weighing, mixing and extrusion system.

Welland Medical is a specialist manufacturer of medical disposables, with particular expertise in the use of advanced materials technology. It applies its skills with films, plastics and adhesives across a product range predominantly consisting of high quality, ostomy appliances for medical markets worldwide.

The Company has sought to achieve independence from outsourcing the adhesive compounds employed in the preparation of its products. Therefore, it needed a hygienic, materials handling and processing system that would provide a flexible production facility, able to respond quickly to adjustments in recipes both at the research and full-scale stages.

The system has been designed so that various formulation values can be keyed simply into the controller. On completion of each conveying, batching and mixing cycle, the necessary batch data is recorded for product quality analysis. Thereby, optimum recipes can readily be repeated to a high level of accuracy.

Flexicon was responsible for the turnkey project and for designing the flexible, spiral conveying and batch metering system. The process control is PLC based and integrated with a gain-in-weight control system by Defiant Weighing. The project also called for incorporation of heavy-duty mixing and thermal extrusion of the primary adhesive product. The production experts at Welland were confident in the choice of Winkworth Machinery to provide the high shear mixing equipment necessary to cope with the viscous characteristics of the material.

The requirement was to produce varying grades of a unique hydrocolloid formulation using proportioned quantities of pectin, cellulose and gelatine ingredients. The tightly controlled recipes also require the addition of polyisobutylene, which is manually introduced during the final mixing stage.

Since the plant was commissioned, Jeff Hughes, Engineering Manager for Welland Medical says that preliminary test results have been very encouraging. Reliable batch weights have been achieved to within 0.05lbs (0.02kg) accuracy. The system is able to mix a homogenised batch in approximately ten minutes, ready for transfer to the master batch mixing and extruding process.

Welland expects to recoup its \$400,000 investment in the plant within a period of 18 months by becoming an almost totally, self-sufficient manufacturer of its products. The Company operates to the ISO 9000 standard and CE mark accreditation, therefore, consistent high quality output and hygiene were important pre-requisites in establishing its own manufacturing plant.



To ensure continuous batch cycling and to meet the required flexibility of operation, Flexicon responded with a split-level scheme. This was designed to maximise the limited floor space available, while utilising the full height of the building. Sacks of ingredient are emptied individually into separate surge hoppers. These are served by a single, dust extraction unit from which a flexible intake tube can be deployed above the hoppers in turn, as material is loaded.

Each hopper is fitted with a vibratory flow assister to fluidize the cohesive powders and to ensure a continuous flow of material. Integral, flexible, spiral conveyors elevate the bulk ingredients to the batch mixer installed on a mezzanine floor directly above. Proportioning of the 3 materials by weight is achieved in a buffer hopper mounted on an electronic weigh scale. As the target weight for each batch is reached, the conveyor speed reduces automatically to an accurate trickle of final material to the hopper.

Health and Safety considerations were high on the list of design priorities. The conveyors each comprise a simple, one-piece spiral driven within a tube made of ultra high molecular weight polyethylene (UHMW-PE). Powders are moved in a mechanically controlled and totally enclosed system, enabling emission containment of the highest integrity.

The weighed ingredients are discharged via a pneumatically operated valve to the preliminary mixing machine where they are homogenized. During the mixing process, the conveying system automatically completes another batch cycle to the weigh hopper. The ability of the spiral conveyors to move batches of material with differing characteristics automatically was a key factor in designing a system suitable for this application.

The homogenized batch is fed by the action of the spiral mixer blade through a manually operated slide gate valve. Transfer to the thermal mixing and extruding process at ground level is carried out by a short section of horizontal spiral conveyor, which picks up the mixture gravimetrically from a small intermediate hopper. The rolling turbulence created by Flexicon's centerless screw type conveyor ensures that the blended particles of powder are prevented from separation.

The conveyor's design serves as its own slip clutch, enabling the conveyor to accept a continuous loading of material without additional mechanism to reduce flow rate. The outlet of the conveyor feeds materials directly down into the mouth of the mixer/extruder through a dust tight connecting sleeve.

Use of spiral conveyors has given Welland the added convenience of in-place cleaning. By reversing the screw rotation, the conveyor tubes can be evacuated of residual material routinely before a new recipe is introduced.

The system is said to have met the flexibility requirements demanded and has the potential to fulfill Welland's future plans for new product development.



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