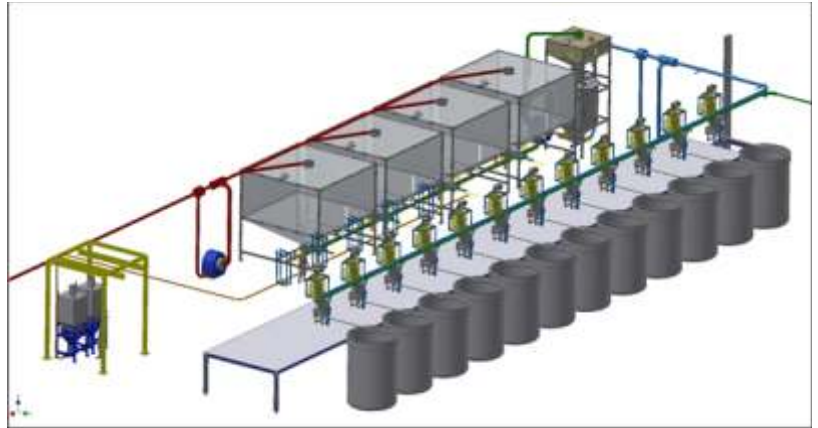


EPS & Fibre Handling Plant

System Overview

C J Waterhouse company were contracted to develop a bespoke materials handling system to intake, batch process and deliver expanded polystyrene spheres and fibrous powders to multiple mixing lines as part of the production process for flotation devices for oil rig drill shafts. The overall system

creates a volumetric batch of EPS before conveying it to one of 12 blenders. The fibrous powders are then conveyed to receiving weigh hoppers and dosed into the blender by weight together with resins and additives. After a lengthy process the EPS are coated with a blend of fibres and resins to create a hard shelled ball. These balls are then conveyed to an out-loading hopper and dosed into tote bins by weight.



EPS Intake System



The bulk intake system accepts EPS deliveries in either tote bins or bulk tanker format and conveys it to four 65M3 fabric silos via a venturi conveying system providing negative pressure extraction at the infeed point and positive pressure conveying to the receiving silos. The materials are transferred through a single conveying line to the four silos via three diverter valves.



The storage facilities comprise of Polypropolene fabric hoppers suspended from mild steel frameworks and incorporate viewing windows and filtration membrane on the upper face for removal of conveying air. Each silo is fitted with ultra sonic level detection systems and a pneumatically operated discharge slide valve.

EPS Measurement



Due to the very low and potentially fluctuating bulk density of the EPS batches are measured volumetrically rather than by weight. Material is conveyed to the fabric receiving hopper again by venturi. From this vessel the EPS is dosed into the volumetric hopper via a rotary valve. The volumetric hopper is fitted with a number ultra sonic sensors which take an average reading from three separate positions to provide an accurate measurement of the material volumel. Once the required batch volume is achieved the rotary valve stop and the batch is identified as complete and ready for transfer to the required tumbler.



EPS Delivery

The EP delivery system transfers the pre-measured batch of material from the volumetric hopper to the required tumbler destination. This transfer is again completed using a Venturi conveying system via a single conveying pipe which incorporates eleven diverter valves to permit automated routing to any of the twelve tumblers.

Upon receipt of the transfer request and confirmation of interlock satisfaction the volumetric hopper discharge valve is opened, the conveying system blower is started and material is removed from the hopper under negative pressure. The EP material is conveyed directly into the tumbler through a dedicated connection spigot and conveying air is expelled through the tumbler vent assembly.



Fibre Delivery

The twelve tumblers are divided into two groups of six. The fibre delivery system to group one is of semi-automatic operation with material extracted from sacks whilst the delivery to group two is fully automated with extraction from bulk bags.

Fibre materials are conveyed to weighed receiving hoppers via vacuum. This hopper dispenses material by loss in weight to an agitated intermediate hopper below which then doses the material batch to the tumbler via screw feeder when the recipe calls for its inclusion.

The semi-automatic system uses a manually positioned extraction lance to extract material from bags. When the target weight is achieved the vacuum is removed. The fully automatic system discharges the fibre from one of two bulk bag stations via rotary valves into a single vacuum conveying line with 5 diverter valves to route material to the required destination.



Outloading System



The finished product (coated EP) is extracted from the tumbler and transferred to a storage hopper using a Venturi conveying system as with the uncoated EP systems. The storage hopper is fitted with a bespoke air separator unit which is designed to reduce the product velocity and remove surplus conveying air. From the storage hopper the finished product is discharged into a weighed tote bin via a multi-position slide valve. The operator sets the required batch weight from the local HMI display panel before commencing the discharge sequence, upon arrival at the target weight the discharge valve closes. The tote bin is then removed and replaced with an empty one before the next batch discharge commences.

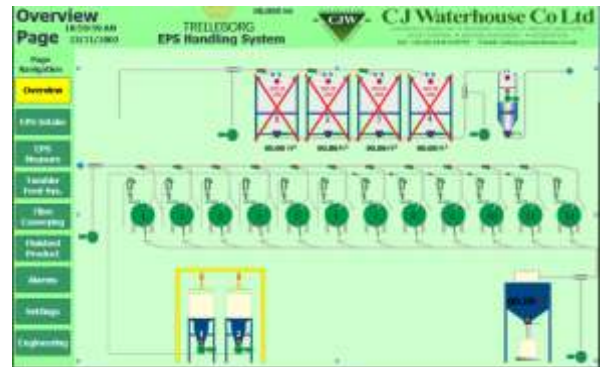
Control System

The control philosophy for the EPS and fibre handling system comprises of a central automation panel housing the main PLC and HMI display with a number of distributed remote I/O and operator display panels.

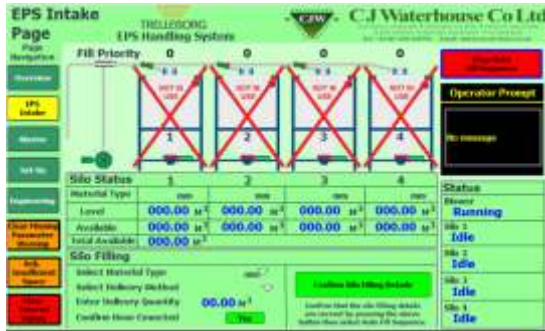


Central Automation Panel

The central automation panel is located on the ground floor and housed the main Siemens S7 PLC and provides fully automatic control of the EPS intake, measurement and delivery systems together with the discharge, weighing and dosing of fibre materials. This panel also incorporated a door mounted touch screen HMI unit providing both a graphical representation of the plant and specific plant data. From this main HMI display the operator can access and view data relating to any area of the materials handling system together with system alarms and engineering / set up pages.



Intake Display Panel



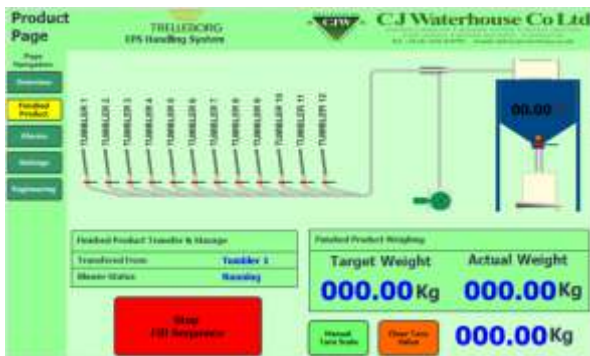
The intake panel is located adjacent to the EP unloading area and incorporates a HMI unit providing specific information relating to the EP intake system. This display provides system information, controls, alarm monitoring, configuration and allows the operator to set the delivery type, intake material, silo destination and conveying parameters.



Intake Display Panel

Each fibre weigher incorporates a locally mounted control panel housing a remote I/O module together with motor starters & variable speed drive for the associated feeder station. These panels provide automated control of the fibre conveying, weighing and feeding to the blender.

Outloading Panel



The out-loading panel is located adjacent to the finished product weighing system and incorporates a remote I/O module providing automated control of the finished product conveying, storage and weighing system. This panel also incorporates a HMI display providing operator information for the tote bin filling and weighing system.

