Flour Feeding and Weighing System

Case Study 20:

STB completed a flour feeding and weighing system for a major bakery based in Lancashire, manufacturing cakes and pastries.

The system was designed to discharge into bins, with high accuracy weighing and feeding.
The client, who manufactures a range of cakes and pastries for the large supermarket chains, was looking for a system to eliminate the manual handling of sacks and to reduce the amount of warehouse space used.

The upgrade comprised two 24 tonne storage silos including a land based blower, inline sifting and a pneumatic conveying system designed for a rate of 3 tonnes per hour to the four dispensing units.

Plant/ System Description

The purpose of the plant is to provide weighed batches of flour into mixer bowls associated with four mixing machines located adjacent to the weigh hoppers.

The flour is stored in silos situated outside the main building from where it is drawn into the conveying line. The flour is transferred from the silos to any one of four weigh hoppers using a 4” stainless steel vacuum conveying line.

Ingredients Handling

Storage Conveying and Weighing

Silos

2 x 24 tonne, skirt mounted storage silos (fed by a land based blower) manufactured and erected on site by STB.

Mounted on load cells with a sealing arrangement to provide a watertight and hygienic seal to prevent the ingress of water and vermin.

Dispensing Units

Each dispensing unit is fully automated to ‘top-up’ on demand with ingredients when required, from the silos and to dispense ingredients at the input weight into the mixer bowls.

Hoppers

The vacuum weigh hopper units are manufactured in stainless steel and are capable of holding 350kgs of flour. Generally the weighments made are around 80kgs and consequently the hoppers may hold several batches.

During normal operation, the weigh hoppers are refilled in the period between dispensing, the hopper capacity being set in the control panel.

Individual weighment settings can be set using the interface unit, the amount required being determined by the relevant mixer to be filled, filling is carried out in a ‘loss in weight’ fashion.
**Operational Sequence**

**Tanker Filling to Silo**

Connect tanker blowing hose to the blower line.
Close dehumidifier butterfly valve connected to silo.
Disconnect dehumidifier hose and attach blanking cap.
Connect tanker hose to silo fill line.
Close manual valve below the bin activator in silo base.
Switch silo to tanker connected, to initiate the filling sequence. The silo can be filled to the level probe or to a specified weight.
The high level probe, when reached, starts an alarm and the tanker flow must be manually stopped. The line is then run empty and the blower stopped.
The tanker fill hose is removed, the reconnect dehumidifier reconnected and valve opened.
The tanker blowing hose is removed and the tube end capped. The valve in the silo base is then opened.

**Dispensing Hopper Filling**

Select source at HMI panel, the filling sequence starts automatically, on demand. When flour is required the equipment starts up as follows:

- Diverter valves move to the correct position to fill the selected hopper
- Vacuum valve on hopper opens
- Reverse jet filter starts
- Sifter starts
- Exhauster starts
- Silo rotary valve starts
- Bin activator starts
- When the target weight is reached the system shuts down in the reverse order

**Dispensing Hopper Discharge**

The dispensing hopper can be programmed via the HMI to discharge any amount of flour. The loading bellows must be in the lowered position before the discharge starts.

When lowered, the sequence is started by pressing the start weighment button on the HMI, this will start the rotary valve.
The valve is controlled via an inverter and initially runs at high speed to discharge 95% of the required weight and then switch to low speed. To achieve the target amount the valve will inch to dispense the last few grams.

This installation has been operational for the past 4 years. The clients are very pleased with the system, it has achieved the objective of reducing the need for manual handling and increased productivity.
STB keep in contact with our clients long after the job has finished and are always on call with advice and support.
STB Engineering: Bulk Materials Handling & Pneumatic Conveying Specialists

STB Engineering Ltd was founded in 1969, and had soon established itself as one of the UK’s leading Bulk Materials Handling and Pneumatic Conveying specialists.

STB’s success is the result of combining innovative and cost effective design concepts with the highest quality of engineering technology, all brought together by having the advantage of decades of in house engineering design and manufacturing experience.

We specialise in:
- Pneumatic conveying systems (dilute and dense phase)
- Weighing and feeding
- Storage and discharge
- Big bag and sack handling
- Control systems
- In house: project design and management, manufacture, installation and commissioning.

STB offer a total, end to end, in house solution for bulk materials handling, giving one point of contact and a system tailored to suit each specific application.

Using the latest Solidworks & AutoCAD design packages we manufacture our silos, vessels and conveyor systems in our purpose built factory in Stroud, Gloucestershire.

We are an ISO 9001 Quality Assured Company.

The people at STB are passionate about what they do and take great pride in their work. Our engineers have many years experience in solids handling and a thorough understanding of our customers’ process needs and objectives.

Our dedication and commitment to our customers is at the forefront of everything we do which is why our customers keep coming back to us.

“Engineers who do what they say they will do”