

Mastering moisture

Many food products being handled today can be affected by the moisture contained in ambient air conditions. Closed loop pneumatic conveying using dry air overcomes these problems and has distinct benefits for the transfer of food products, explains **Garry Dance** of Aptech Powder Systems.

Many food products being handled today can be affected by the moisture contained in ambient air conditions. Hygroscopic products including sugars, milk/whey and egg powders, potato flakes/powders and food additives will readily absorb moisture from the atmosphere which can lead to product deterioration, agglomerating, caking, flow problems, down stream blockages and mould growth.

Conventional pressure and vacuum pneumatic conveying systems continually pull in large volumes of air from the atmosphere and depending on humidity conditions, moisture in the conveying air can be transferred to the product. Conditioning this large volume of air requires expensive dryers and increased running costs. By careful design the efficiency and quantity of dried air required can be substantially reduced.

Closed Loop Pneumatic Conveying using dry air overcomes these problems and has distinct benefits for the transfer of food products.

Product is transferred in an enclosed loop of pipe which has dry air locked into it. The same air is continually circulated thus avoiding the introduction of moisture and contami-

nants into the conveying line. Product is kept dry, free-flowing and hygienically clean, and the system can provide reduced loss and contamination. Closed loop conveying has minimal dry air requirements and losses so the size of the drier required is very small and running costs are very low.

To date Aptech has designed and installed over 150 closed loop conveying systems throughout the UK and Europe for many different applications, of which a most recent project included the storage and transfer of potato powder.

Aptech had already successfully completed a dry air closed loop conveying system in Holland for LEMB Weston for the transfer of potato powder for the manufacture of packet mashed potato and chips. When Belgian company Farm Frites required a similar system to store and convey potato powder used to make savoury snack foods and crisps they also approached Aptech.

Farm Frites required an economical system that would allow them to convey and store their product under controlled dry air conditions to prevent product spoiling.

The first part of their process involves the manufacture of mashed potato which is dried on a drum drier and the resulting flakes milled to a powder. The powder is then check weighed and pneumatically conveyed to either an FIBC filling station or to 1 of 6 off bulk storage silos. A facility to discharge product from FIBC into the system was also required.

Aptech's closed loop conveying system uses a regenerative desiccant drier which continuously introduces a controlled volume of dried air into the silos. The pneumatic conveying system draws on this air to convey the product through the system to the silos.

As the air is re-circulated the drier only needs to be sized to accommodate the system air losses resulting from rotary valve leakage and silo discharge. The drier is also used to initially purge the conveying line and silos and the whole system is maintained above atmospheric pressure preventing ingress of ambient air from atmosphere. When a silo is discharged the

flow rate of dry air is increased to replenish the volume of discharged material. A separate two speed blower is used to change the air flow through the drier to suit the running duty.

A weighing system is used to totalise throughputs and inflatable seat butterfly valves are fitted to prolong valve seat life from repeated use. After being weighed the product enters the closed loop conveying system through a rotary valve and is picked up by the dried conveying air and transferred at 3 TPH a maximum distance of 50m to either a big bag filling station or the silos. The conveying air is then returned to a filter receiver where any remaining fines not separated are returned back into the system via a rotary valve. The filtered air is returned back to the inlet of the blower to re-circulate. Actuated diverter valves are used to direct product to the selected destination and open Y branches used for air return.

The closed loop conveying system provides an ideal and economic solution to many conveying applications. Further developments in pneumatic conveying include Aptech's Air Speed Control system which has been designed to minimise breakage and degradation caused when friable/fragile products such as crumb, flake and granules are conveyed. The Air Speed Control system continuously monitors conveying air speeds and maintains pre-set minimum conveying velocities for all feed conditions and distances. A recent application included the conveying of bread crumb used for food coatings. The crumb could be produced at different feed rates and conveyed to various locations, in addition, each grade of crumb required a different conveying velocity. Maintaining the minimum conveying velocity for all conditions and grades results in gentler handling and minimal product damage.

Other common problems such as dust explosion venting into factory buildings or the fitting of explosion suppression devices can be eliminated by designing the closed loop system for explosion containment. This has recently been carried out on a system for conveying sugar. Alternatively inert gas can be used as the conveying medium.

Applications previously thought unsuitable for pneumatic conveying are feasible using the closed loop conveying system. ■

BELOW: Air drier piped up for closed loop conveying and silo conditioning

