

Silo levels always under clever control

Since many years now, **Scheurich GmbH, based in Wolfegg**, Germany, engages professionally in providing the silo logistics raw material suppliers and processing firms need to assure that working procedures in their facilities always run smoothly. Throughout the years, the interrelations between raw material suppliers and processing firms have changed: today, at many locations and facilities outsourcing with its special requirements is common practise. Although, on the one hand, processing firms must make sure that they always maintain a minimum volume of the raw materials needed, which volume must never fall below this level, volumes must, on the other hand, always be kept on a sufficient level that never exceeds normal supplies to assure an efficient and smooth work flow.

The supplier must be able to depend on the indications the processing firm provides him with in regard to the filling levels that actually exist in the silos into which he is supposed to deliver the material from his bulk material transporter. Incorrect information often result in delayed deliveries that may entail a breakdown of the production. In the same way, deliveries that have been furnished too early, are critical, too. If silos are overfilled, the consequence is that the bulk material transporter can only be discharged partially, which, in turn, may cause great problems to the forwarding agent charged with the delivery!

Level sensors

Various, continuous measurement methods are at disposal:

- Ultrasound
- Silo pilots
- Microwave operated rope hung probes
- Feet type weigh bins (load cells)

All systems have their specific advantages and disadvantages, particularly as the evaluation of data or the purchase price is concerned.

The advantages that go along with a silo weighment made using feet type weigh bins (load cells) are obvious, the installation of which, however, must be considered already when the corresponding basements are being constructed.

All other sensors can be retrofitted or be added-on, but these, however, will only measure the filling level existing inside the silos within a rather small range. Positive or negative bulk cones, however, would lead to wrong volume indications. In addition, it is critical to perform measurements within the area of any such existing positive or negative bulk cones. The filling weight (t) can only be evaluated based on the actual bulk material density and the measuring accuracy is rather limited in this respect.

Filling level measuring performed at the processing firm's facilities

When constructing new silo plants, the installation of the corresponding sensors for appropriate sensory analysis is often dispensed with. As clients more and more tend to outsource the management of necessary silo logistics to their suppliers or to forwarding companies that serve them, correct information about the actually existing

filling levels becomes even more important for any such suppliers. Often, supply distances of up to 1,000 km must be covered, and for suppliers or forwarding companies it is of importance, therefore, to avoid any expensive intermediate storage of the bulk materials to be delivered and to take care that existing filling levels will not fall below the guaranteed minimum level.

Suppliers must thus be able to access the existing silo filling levels for permanent control and to ensure that the supplies required to keep filling levels up are always performed in the most efficient way, at any time. To meet with this demands, this would require to retrofit the silo plant by means of a measuring system that performs permanent measurements and which, on the one hand, serves the processing firm indoors and, on the other, provides the necessary data to the supplier based at a remote location.

In case the processing firm concerned disposes already of such a silo filling level measuring system, the existing system could be extended and accomplished with an additional remote reading system (telemetry system) which enables suppliers to access the system as desired at which point of time ever.

New weighing system, best suited for retrofitting purposes

Based on the "weighing principle", a new and innovative sensor system can now be retrofitted easily without any bigger expenses for additional installations, simply by fitting special sensors within the silo's cone area.

Several electronic cells that form part of this measuring system measure the "upsetting" the related silo is exposed to. Without any need to perform constructional changes, the sensors are simply screwed up to the load bearing implements or to the round frame of the silos in a distributed manner. These sensors enable to obtain a weighing accuracy of e.g. up to 3 % of the final value. Subject to the number of silos implanted and depending on their type of construction, a measuring accuracy within a range from 0 – 100 kg have already been achieved with 30 t silos.

For material monitoring purposes this is still rather imprecise, but regarding mere silo level measuring, however, the cost / benefit ration as compared to necessary investment costs, is unbeatable.

The solution realized with the stand-alone weighing electronics is already able to furnish measuring results and can, via bus systems, be extended to form a complete filling level measuring system.

Remote reading of measuring values

Depending on the targets the companies involved wish to meet with, the most different system solutions can be realized.

Basically, all available silo filling levels are to be visualised locally at the consumer's location. Any such "traditional" visualisation can be realized via small PLC or Soft-PLC.

Modern and cost-advantageous visualisation facilities, however, dispose of WEB-compatible functionalities which enable to feed the filling level visualisation forward into the existing indoor LAN network. All collaborators working with an indoor network

operated within their own facilities who dispose of a WEB browser can thus access the related silo visualisation web site instead of accessing an internet page.

All those interested in it can thus now access the information they need "on-line" and no additional installations must be made or investment costs be defrayed.

If decisions are made to implement such remote reading facilities, processing firms may, for safety reasons, in most cases wish to ensure that no other company can access the indoor network run within their facilities and may also wish to ensure that only those silo filling levels that concern a certain supplier are relayed onto to this particular supplier only.

For Scheurich, relaying of filling levels via internet means to technical problem, but prices for simple direct log-ins via modem are more favourable and the service reliability of such log-ins is higher and such direct log-ins have become practical standard today.

Using their modem / PC suppliers are now able to read all filling levels they must know either periodically or at any time from their remote location and can control the related logistics even if going over and across continents.

The raw material producer will even be enabled to deduce its production forecast from it.

Conclusion: Advantages guaranteed for all, suppliers & forwarding companies & processing firms

Due to the variety of options available to realize such remote reading facilities, it makes sense to seek an independent service provider's advice that considers and covers all requirements and which, in regard to the specific bulk material processed, selects the most advantageous sensor elements that suit best for the sensory analysis they are needed for and which integrates them into the existing control systems and undertakes to realize the required filling level measuring system as a turnkey project on behalf of all parties involved.

Since many years now, **Scheurich GmbH, Wolfegg**, is specialised in covering this particular range of services specially designed to attend raw material suppliers, processing firms and/or builders of material processing plants.

Latest control engineering, a crew of highly experienced collaborators and the readiness to render services and support anywhere in this world, are the characteristics that make Scheurich GmbH stand out as a special provider guaranteeing customers that they will always get a highly reliable filling level measuring system even when retrofitting an existing system.

In many cases, an automatization redeems itself already after its first operating year and suppliers too are often prepared to bear costs accruing for the realization of any such filling level data reading facilities on a pro rata basis which can be accessed from a remote place. The maintenance of cost-intensive message and signalling lines between the parties can now be dropped because there is no need for it any longer.