CENTRALISED, INDEPENDENT AND COMBINED ASPIRATION SYSTEMS
Technological Tips by Ocrim

As we are all still unable to meet face-to-face with any real convenience, Ocrim have chosen to make their know-how widely available by organising a series of webinars held by their best experts.

In the most recent edition, taking place on Thursday, November 26 and Friday, November 27, Ocrim continues to address the topic of High Efficiency Flow or HEF flowsheet, its pneumatic system application and the application of the flour silo aspiration concept to preserve the integrity of low ash flour.

Being very technical, the Ocrim webinar series is mainly designed for millers and production managers. However it may be appealing for all operators in the milling sector who like to be kept up to date, because after all, there is no such thing as possessing too much knowledge in our industry!

Designing for different passages

Part three of the series sees the return by popular demand of duo Marco Galli, Chief Technologist at Ocrim and Anna Buffa, the food entertainer and author of the Fornelli a Spillo blog, who was charged with introducing and moderating this edition.

The webinar begins with a discussion of Ocrim's HEF Flowsheet, before moving on to the topic of pneumatic system application. On this subject, Mr Galli begins by describing how they are divided into two sub systems, those designed for clean passages and systems designed specifically for all other passages.

Those systems that are designed specifically for clean passages with low ash content are built with the sole intention of extracting the maximum amount of low ash flour passages from the sizing head to the middling group.

The pneumatic system for all other types of passages is designed to handle the remaining, lower quality passages.

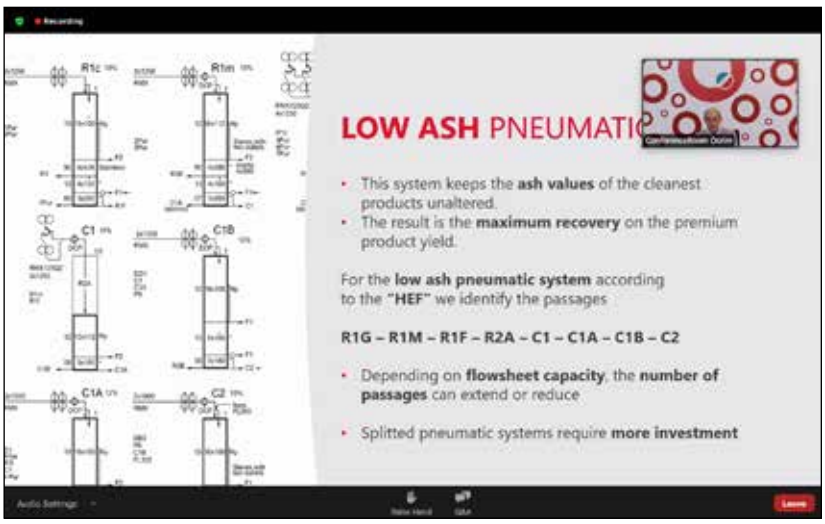
According to Mr Galli, one of the key disadvantages of this system is that the nature of the design creates cross contamination, which in turn leads to a downgrade in product quality.

However, Mr Galli also suggests that this design also affords millers the ability to keep passages with low ash content segregated from the dirty ones, which in turn allows them to maintain its integrity and increase extraction.

On the subject of low ash pneumatic systems, this design keeps the ash valves of the cleanest products unaltered, with the result being the maximum recovery of the premium product yield.

That said, in mill designs that require a larger flow-sheet, a split pneumatic system may be needed which would in turn require more investment.

If we are going to be required to increase the level of investment, the next logical question that we are likely to be



asking is, does the low ash pneumatic system offer any tangible economic advantage? Well according to Mr Galli, the answer to this particular question is "Certainly, yes."

So now we have resolved the issue of whether or not it would be worth our while financially, the next step is establish whether adopting the system makes practical sense.

In order to ensure that this is the case, we would need to look at whether there are currently any technical solutions that would keep the low ash products separate from the low-grade product. Only then could pneumatic aspiration system be credibly assessed as a viable option.

Effective aspiration in grain storage

Following the assessment of the pneumatic system's viability, Mr Galli continues by discussing the design of flour silos, as correctly designing the flour silos is essential, with aspiration is an important part of that process.

As well as the fairly obvious issues relating to storage, a flour silo also has to be designed according to the characteristics of the products that are being simultaneously processed across the various work cycles at the mill, such as the flow rates for products on the transfer line.

Whether the conveying system is either mechanical or pneumatic also needs to be decided, as well as which prevention measures need to be taken to avoid contamination.

All equipment should also be installed in line with all relevant standards and regulations. With all of the previously mentioned factors taken into account, the next step according to Mr Galli, is to select an aspiration philosophy.

Flour silos can be designed with three different main philosophies in mind, with these being centralised, independent or combined.

Centralised aspiration system: low installation costs

Described by Mr Galli as being one of the most commonly used solutions, centralised aspiration systems are most suited to silos without "excessive complications." Centralised systems are also commonly used in facilities where the type of product being processed in the silo is not so heavily governed by quality specifications.

In a centralised system aspiration is achieved by a single unit

that contains a filter and a fan that is equipped with a single manifold that connects to the various aspiration points via a network of pipes.

The segregation of the aspiration of the unused bins and/or aspirated points is obtained by butterfly valves with electro-pneumatic remote control. The aspiration is only guaranteed on these points foreseen by the simultaneity at that moment, based on the active cycle. Correctly identifying these cycles and simultaneities during the design phase are very important.

According to Mr Galli, although centralised systems may offer lower installation costs, this saving is soon lost during the systems operation. Long term losses such as the high costs of electromechanical installation, loss of the aspired dusty products, higher frequency filter maintenance and higher energy costs, all mean that the centralised designed is according to Mr Galli is, "apparently the most economical solution."

Mr Galli then continues by stating that in relation to standards and regulations, the centralised system is a borderline in terms of acceptability.

Because the product recovered from the aspiration filter is qualitative undefined, it is also difficult to reintegrate the dust into the production system, which is even more critical with the addition of additives or when the system has to consider a WWF processing.

In terms of quality and integrity of the final product, Mr Galli believes that in general terms, centralised aspiration systems have a negative impact on the overall handling process.

In terms of further limitations for centralised systems, Mr Galli offers the fact that the various aspiration points must be able to manage different products, problems in the handling of residual products collected by centralised filter and periodic filter maintenance that will require shutdown, as all being critical future issues.

Mr Galli also adds that the system is more complicated to balance due to ramifications, which will in turn result in the airflow rates involved not always being constant.

However, Mr Galli concludes by stating that this system has less flexibility if cycles have not been evaluated in the initial design, with initial low installation costs only masking the potential long-term financial impact.

Independent aspiration systems: reduced maintenance costs

The most commonly used alternative to centralised aspiration systems in flour silos is independent aspiration, which are becoming more common on an almost daily basis.

Mainly applied to the loading of flour bins, independent aspiration systems can also be used in other applications such as blowing line hoppers, flour mixers and scales or any in any situation where high volumes of air are aspirated.

Compared to centralised aspiration systems, the independent equivalent offers millers a solution with no contamination risk or quality product downgrade. This is mostly due to the system's use of single filters that are allocated directly on the individual aspiration points.

Other than the cleanliness advantages, the independent aspiration system is also much tidier at the plant layout level, because fewer ducting runs are required throughout the plant. This is reflected in the fact that independent systems meet every country's standards and regulations as each individual bin is aspirated in isolation.

The isolated nature of the independent process also allows for different products to be handled simultaneously in the same mill, whilst still preserving their respective characteristics.

With the issue of cross contamination presented by centralised systems seemingly dealt with, independent systems also afford millers lower running costs both on energy and maintenance as the whole mill doesn't need to be shut down if there is a problem with one of the units.

The most important advantage of this system is that there is no cross contamination of flour, therefore the integrity of the low-ash flour is preserved in its entirety. This aspect has an economic return, which according to Mr Galli will help to pay back your initial investment quickly. For example, if we were to assume that about 0.2 percent of low ash flour lost due to potential cross contamination, if this was prevented entirely, then the final result would be approximately €12,000 or US$14,500, a year for each cycle.

Combined aspiration: the best of both

The main advantages of the two systems that have been mentioned thus far have offered the advantages of a system that can be centrally controlled and cut cross contamination. Both of these benefits can be achieved in a system that combines the independent aspiration system with the centralised one. Like the independent system, the combined aspiration system is also much more compact solution compared to the centralised one.

This system may also be used in almost every flour silo and even in flour silos with a medium to high degree of sophistication. The centralised aspect also affords an increase in performance for the independent aspiration points, whilst the premium flour circuit is aspirated with individual filters that are separate from the system that manages products of lesser quality.

One option for supplementing a combined system further would be to upgrade the filters, with one option being the FLP high-pressure system.

FLP High Pressure Systems

The FLP is designed specifically for aspiration of single points like hoppers, casings and bins and is available in different versions based on the usable spaces and the required filtering surfaces. The fabric used for the filtering sleeves is particularly suitable for fine dust management, with the sleeves cleaned with high-pressure air jets.

The FLP's on board computer detects the efficiency and status of the filtering sleeves and a built-in electronic timer manages the cleaning air jets. Whilst an electronic panel adds a level of ease to managing both the frequency and bag cleaning time.

This type of filter can be purchased with steel and stainless steel versions allowing for increased hygiene, whilst the design of the FLP allows easy maintenance and inspection.

The FLP system uses the same principles as the traditional filters that are also used in single point aspiration system. However, the main difference, according to Mr Galli, is that this system features an integrated fan that makes it an independent machine.

Returning to the subject of choosing which aspiration philosophy to adopt, the Webinar reached it's conclusion by Mr Galli stating, "It is useless to take care of the details within the milling flow if we do not pay the same attention to all of the handling phases of the finished product.

"It is very easy to lose a few percentage points of premium flour only due to incorrect plant design.

"What today seems to be the least expensive solution, may not be in the medium to long term," says Mr Galli.