Centrifugal separator provides high capacity screening of resin powders

A new Quick-Clean Centri-Sifter separator from Kason Corp has recently been installed at Solvay Solexis' factory in New Jersey, USA. The company specializes in the production of specialized plastics and materials for use in the industrial sector. Installed by Kason’s distributors, Cino Equipment Inc., the new centrifugal separator has an in-built wire mesh screen that rejects any ingredients that are over 150 microns in size, allowing smaller particles to progress on to the production stage, where the plastics, resins and other materials are formed into a powder ready-for-shipping. Oversized ingredients that breach the limit, on the other hand, are sent back into the process for re-grinding until they meet the specified size requirements. This is achieved with cryogenic grinding, which places extreme demands on the system with temperatures in excess of -82 °C.

Solvay Solexis is a leader in the field of 'fluorspecialities', which essentially means supplying specialized polymers, plastics and resins to industry for use in applications that require hard-wearing materials or demanding performance characteristics. The company's factory in the USA is situated in Hillsborough, New Jersey, where its Custom Services Group is based. As its name suggests, this division can supply custom-designed product to meet and user requirements. The group cryogenically grinds and screens plastic resins such as fluoropolymers, nylons, polypropylene, engineering resins, polyurethanes and polyesters in whatever amount and users desire. The resulting powder is sent out from the Hillsborough factory for use as an additive in paints, inks, polymers, adhesives and specialty resins. Typical applications include fabric coating, sintering and composites for industries ranging from the furniture sector to fire-resistant safety equipment.

The Custom Services Group installed the Kason Quick-Clean Centri-Sifter separator at the factory to enable it to accommodate a planned increase in production precipitated by increasing consumer demand. Since its installation, the unit has helped the factory to increase its output and speed up its production flow. It has also improved reliability and reduced the amount of downtime and maintenance in the process.

Typically, screen changes take only a few minutes and on a cryogenic duty such as this it’s vital to minimize downtime. Screen changes have to be carried out quickly before ice forms at the low cryogenic process temperatures. The speed of change-over procedures at the factory has been increased by up to 25% since the installation. Easy access to the internal components of the Quick-Clean unit also allows rapid wash-downs when the factory is changing product runs, which is another important consideration.

As Craig Davis, the sales and marketing manager for Solvay Solexis explains: "Sifter screens are more susceptible to breakage under cryogenic conditions because of embrittlement from the cold. It is critical to minimize downtime because system components can freeze and any material left in the system can become wet, ruining a batch."
Alternative solutions

In the past, Solvay Solexis have found circulator vibratory separators easy to clean and maintain on a cryogenic duty, but blinding can occur at sizes finer than 300 microns with powder that contains as much as 30-50% of oversized material.

Blinding in a separator happens when the screen plugs with powder, restricting the flow and inhibiting the efficiency of a process. To achieve a respectable throughput rate a circulator vibratory separator has to be large in diameter, which can pose a problem if space is at a premium as it is at the Hillsborough factory.

Rectangular gyratory screeners have enough screen area to keep pace with grinding operations such as the one at Solvay Solexis, but their service in cryogenic operations requires a considerable amount of upkeep due to frame warpage and wear and tear on the gaskets and wire cloth. According to Craig Davis, when a problem occurs with a rectangular screen it takes at least an hour for an experienced person to remove, comb through, repair and finally replace the B-12 screens. The long downtime can lead to start-up difficulties in a cryogenic operation.

Centrifugal option chosen

It is for these reasons that Solvay Solexis decided to specify a centrifugal separator. “Centrifugal units can keep up with the grinding process and with the same efficiency as a rectangular screen but are easier to clean and maintain, like a circular vibratory screen,” explains Davis. “Selecting this unit meant that we didn’t have to compromise.”

The Quick-Clean Centri-Sifter centrifugal separator from Kason contains a stationary, horizontally-oriented wire cylinder, inside of which are rotating helical paddles that continuously propel and accelerate on-size material through the cylinder walls, ejecting oversized particles through the downstream end of the cylinder into a discharge spout for re-grinding. The Quick-Clean unit is equipped with three roller bearings located outside of the screening chamber instead of the normal two. The bearings at the motor end of the shaft, and on a hinged cover at the discharge end, provide the support needed to handle the high speeds and loads of the high capacity screening duty without any vibration. When the end cover is hinged open, the shaft becomes a cantilever supported by the third bearing located between the motor-end bearing and material feed point, allowing the screens and/or paddles to be removed rapidly for replacement or wash-down.

Applications

The Custom Services Group makes a wide variety of resins and plastics for end users, and because of this they are constantly changing the factory’s production run.

A representative application that the Quick-Clean unit is employed in involves the milling and screening of a fine, free-flowing, heat-sensitive fluoropolymer powder to 150 microns at a flow volume of 136 kg/h. Chips of the material are pre-chilled in a cryogenic conveyor before being broken down by a cryogenic hammer mill that is cooled using liquid nitrogen to approximately -82 °C. A flexible screw conveyor then transports the granules to the Kason Quick-Clean centrifugal separator, which scalps any particles larger than 150 microns. With each pass, the process generates 50-70% on-size material. Oversized material is reintroduced to the mill for further grinding and a final yield of 97% of on-size powder is achieved. With the right system parameters programmed in, the final powder produced at the Hillsborough factory meets the customer’s strict specifications for particle size, bulk density, and moisture.

Solvay Solexis chose the Quick-Clean Centri-Sifter partly because the company already uses a number of standard centrifugal separators from Kason on its process runs. The company, therefore, already enjoyed a mutually beneficial relationship with Kason’s systems and with its distributor, Cino Equipment Inc. This existing business relationship was an important factor in the award of the contract and, once again, Solvay Solexis has not been disappointed with the results.

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