

NEW **AJAX** LUMPBREAKER AT BRENNTAG

Brenntag (UK), the UK market leader in bulk and packaged chemical distribution and part of the international Brenntag Group, is using an Ajax Equipment Lumpbreaker and loading table at its Newcastle-upon-Tyne blending facility.

As part of an investment programme at the facility, Brenntag was looking for a way to reduce the size of raw materials prior to blending in a reactor. Positioned above the reactor, the

lumpbreaker reduces the caked crystalline chemicals to a consistent powder condition before tipping into the reactor, enabling improved blending.

For ease of handling, the lumpbreaker also incorporates a loading table on which the operator loads the partly solidified, bags of chemicals, removes all packaging and then closes the loading table tray lid to energise the tipping tray and lumpbreaker for safe operation.



"Prior to using the lumpbreaker the crystalline material was broken up using mallets - as a temporary measure. The Ajax lumpbreaker and loading table is safer and more efficient, and has made a significant improvement to our handling and blending operations," says Gareth Dobinson, capital logistics manager, Brenntag UK Ltd.



SCREW ELEVATOR AND HOPPER FOR WASTE PROCESSING

Following the earlier supply of 32 compactor screws for a range of waste handling processes, Ajax Equipment, has recently supplied a leading waste processing systems company with a heated screw elevator and hopper for handling shredded containers.

The heated screw elevator forms an integral part of a fatty oils and packaging separation system by providing a means of secondary non-mechanical residue separation. This high efficiency secondary system applies heat to the shredded materials and oily residue through a fabricated steel steam jacket, which efficiently conducts heat directly to the shredded waste. The oils and fats are then collected separately for disposal whilst the shredded containers are elevated for further processing.



"Maximum separation of oil and fat from packaging depends on process heat and shredder operation but crucial to the performance is regulated out feed and presenting dry shredded material to subsequent equipment. Ajax screw technology handles the long shredded pieces and regulates feed for efficient plant operation," says Mark Waters, director, Ajax Equipment.

ATEX FEEDERS FOR ALKALOID PROCESSING

Ajax Equipment has supplied a twin screw feeder and plug screw feeder to Macfarlan Smith Ltd, part of Johnson Matthey PLC's Fine Chemicals Division, and a world leader in the production of alkaloid opiates and other controlled drugs.

The twin horizontal screw feeder in 316L stainless steel is used to discharge material from a centrifuge into individual kegs at a controlled rate, in ATEX zone 2 hazardous area. Ajax has designed the plug screw feeder, also in 316L stainless steel, such that the auger can be retracted for ease of cleaning.



Screw feeders for Alkaloid processing at Macfarlan Smith

Also inside... Improving 'in-feed' characteristics of a reversing feeder • Ask Lyn? • Diary • Screw Elevator and Hopper for Waste Processing • Kemira Chemicals: Ajax Batch Mixers set the standard • Recent Recruits... Our Expanding Skills Base • New Lynflow IBC • Preparing for take-off - 28m screw conveyor

IMPROVING 'IN-FEED' CHARACTERISTICS OF A REVERSING FEEDER

Various types of screw feeder are employed to discharge bulk storage hoppers. In some cases the feeders may be reversible to either serve two different outlets or reject unsuitable product. An advantage of this technique is the headroom saving when feeding two separate locations, compared with a two-way valve and bifurcated chute.

Engineers should avoid making the mistake of believing that taking a conventional feeder and simply reversing the screw will achieve the desired outcome. The problem is that the duty of serving two outlets with their separate supply are mutually exclusive, the feeder only able to discharge to one or other receiving point.

Below we describe the key elements of a reversing screw and how progressive 'live' extraction can be secured from an elongated hopper outlet slot when feeding in either direction or both at the same time, without loss of discharge rate.

Reversing screws

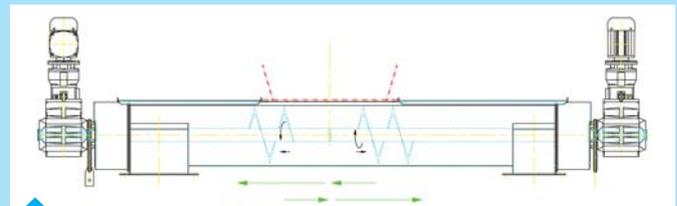
A reversing screw must have a uniform pitch and diameter in the region exposed to the hopper contents, otherwise the flow of material will be interrupted by material passed along the screw axis into a region of reduced transport capacity whilst also subjected to a confining pressure by the superimposed product in the hopper outlet. This limits the inlet length that can be used for mass flow, and means extraction from a hopper with a longer slot develops high shear load. A further limitation is that the feeder can only discharge to one outlet at a time.

A technique to improve reverse feeding is one that allows longer slots to be effectively employed for reverse feeding by exploiting the mechanics of the screw form. Using two screws in a common casing means that both outlet positions can supply either receiving point separately, or crucially both at the same time (even at different rates, if required), without either loss of discharge rate or compromising the 'live' extraction from the elongated hopper outlet.

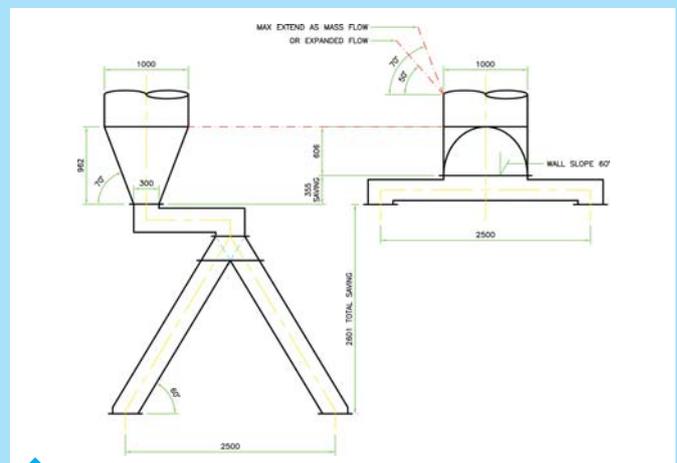
The efficiency of axial motion of the screw contents has been shown to depend on the combination of the screw flight helix angle and surface contact friction on the flight face. This technique permits a single screw, serving a hopper outlet slot length of up to the three screw pitch lengths, to generate 'live' extraction, but limits it to only one if the unit is to be reversed and serve two outlets.

The way to extend the limitations of single screw for reverse feeding is to install twin, cantilever-mounted extraction screws with variable face friction flights on both sides in the above manner in a common casing, such that they have independent drives and fit end to end under the centre of the hopper outlet. Regulating the separate drive speed such that the speed of rotation of the second screw in the direction of motion is twice that of the initial screw, an effective 'live' flow outlet slot of four to six times the screw diameter can be served. A further benefit of this arrangement is that the screws can be employed to deliver to either outlet, or both at the same time without jeopardising the live extraction of material over the total slot length. The amount of material that the screws are delivering to either end is determined by the screw construction nearest the receiving outlet it delivers to, whether feeding in one direction or both. Once the relative speeds are set for the drives in each direction, no adjustment is needed to secure the selected discharge rate; whether feeding to either or both receiving points.

The combined flow, capacity, headroom and segregation countering benefits of plane flow for a mass flow hopper outlet region with



Twin, opposing screws, end to end in common casing



Combined benefits of a double-reversing screw arrangement

reversing facilities can thus be secured by a design of feed screw employing this 'Lynflow'™ method.

The technique enables the axial distance of 'live' extraction from a hopper outlet to be extended in length to a distance equal to three pitches of the screw and so secure the flow benefits of plane flow, increasing hopper storage capacity from the longer outlet and less steep hopper walls. These benefits are uniquely secured using the method for screws that reverse to deliver to two outlets located at opposite sides of the storage hopper.

The combination of an extended slot outlet with specially designed reversing screws enables two outlets to be served, either independently or simultaneously from a storage hopper. It also offers other benefits, such as enhanced storage volume, reduced headroom for a given capacity, including the potential for mass flow and associated benefits of 'first-in first-out', more uniform residence times and improved de-aeration properties.

KEMIRA CHEMICALS: AJAX BATCH MIXERS SET THE STANDARD

Leading manufacturer of inorganic coagulants and water treatment polymers, Kemira Chemicals UK Ltd, has added two further vertical screw blenders from Ajax Equipment, to the four supplied by Ajax for the manufacture of dry polyacrylamide at its Bradford production facility.



Kemira Chemicals manufactures water treatment solutions for industrial and municipal water treatment plants. Ajax Equipment has successfully designed, manufactured and installed replacement mixing screws of a modified design for two vertical screw blenders at Kemira. As a result of the improved performance secured, it was asked to provide four, high capacity, vertical screw blenders as part of a plant upgrade.

The two new mixers have been similarly designed for maximum capacity within a small footprint and limited headroom, and a screw to provide a high re-circulation rate and mixing efficiency. They use central 'fountain' - type mixing augers featuring special taper design with increasing pitch and taper reducing centre cone. Lower sweep arms on the screws collect from the base of the blenders to provide rapid discharge.

"The four Ajax batch mixers have performed very well. When the two remaining 30 year old mixers caused some problems, we decided on a maintenance replacement of them both, standardising on the Ajax mixers," said Steve Sanderson, manufacturing improvement engineer, Kemira Chemicals UK Ltd.



ASK LYN...

Q A screw I am using to handle chopped waste repeatedly jams, even though the clearance is larger than the chips. What power should I use to overcome this problem?

A Brute force is not the answer as it is likely to be inadequate or damage the equipment. Shredded, chopped and irregular shaped products, like reclaimed timber, plastics, biomass and waste materials tend to laminate and jam, even in quite large clearances.



Various design techniques have been developed by Ajax to counter jamming of this kind, but each application requires a robust and experienced assessment to determine an optimum construction, so further details are required. Close co-operation with the supplier is essential.

DIARY DATE



Institution of Mechanical Engineers Seminar
'Know your enemy': Avoiding project failure and cost increases through bulk material characterisation

Wednesday 25 September 2013, Institution of Mechanical Engineers, 1 Birdcage Walk, London SW1H 9JJ.

Characterisation is a fundamental element in delivering successful bulk materials handling. Knowing the material you are dealing with thoroughly means that you are more likely to avoid costly mistakes in purchasing, process downtime, retrofits to equipment, wear, breakdown and blockages.

This seminar provides you with a comprehensive overview of the measurable properties of powders and bulk solids, and how these can be used to prevent such problems at your plant. Learning from a range of case studies, you will be able to demonstrate the value of knowing your enemy when it comes to dealing with a bulk solid - and the consequences for project failure, increased costs and wasted resources.

Book now or view full brochure:
www.imeche.org/events/S1779

RECENT RECRUITS... OUR EXPANDING SKILLS BASE

Ajax Equipment has strengthened its design team with the appointment of Igoris Gonciarukas as Mechanical Design Draughtsman. A qualified mechanical engineer, Igoris will work with customers on solids handling design using AutoCad. Before joining Ajax, Igoris was a Design Draughtsman with a thermal processing engineering company.



"Igoris is a welcome addition to our design team, enabling us to respond quickly to satisfy new orders," says Eddie McGee, technical director, Ajax Equipment.

Ajax has taken on two new apprentices; Alex Buck and Ben Jones for sheet metal work and welding. The three year course will lead to the advanced apprenticeship qualification, and when combined with our in-house training will provide them with a sound education in engineering.

"We are committed to developing the skills base for solids handling equipment manufacture," says Mark Waters, director, Ajax Equipment. *"By investing in new staff we are ensuring Ajax keeps pace with the latest mechanical engineering thinking and techniques."*



L-R: new apprentices Alex Buck and Ben Jones

NEW LYNFLOW IBC

A new range of Lynflow Intermediate Bulk Containers (IBCs) for the storage and transportation difficult flow bulk materials, is now available from Ajax. Using an innovative outlet design to prevent arching and ratholing during discharge, the IBCs allow mass flow without the need for vibrating discharge stations.



PREPARING FOR TAKE-OFF - 28M SCREW CONVEYOR

Ajax has recently completed the manufacture of a 28m long screw conveyor, around half the wing span of a Hercules aircraft. Using a 400mm diameter screw, and supported by multiple hangar bearings, the floor mounted conveyor includes many hygienic processing features. The conveyor's screw is in two parts allowing food product to be collected from a series of ovens along the length of the conveyor which are then discharged from a single outlet. *"Long screw conveyors are a particular speciality of Ajax. The length and stresses on the screws and casing are a common source of problems which are readily avoided by drawing on our experience of both similar projects and the materials being processed,"* says Eddie McGee, technical director, Ajax Equipment.



LUMPBREAKER TEST FACILITY

Ajax Equipment has an in-house lumpbreaker test facility allowing companies to assess how the machine can handle their processing materials. Lumpbreakers are available in steel and stainless steel in a range of cutting blade configurations, and cutting speeds, allowing the lump breaker's performance to be fine tuned to reduce hard crystalline material to a consistent particle size.



"Ajax lump breakers are an ideal solution for companies faced with feeding raw materials where lump sizes can vary a lot either as a result of storage or a change of supplier," says Ajax technical director Eddie McGee.

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