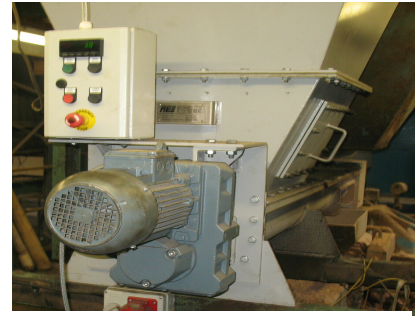


Wardle Storeys turns down the noise with Ajax Equipment hopper and twin screw feeder

Ajax Equipment has supplied a hopper and screw feeder to Wardle Storeys in Blackburn, Lancashire. The new equipment has enabled the company to overcome segregation and bridging problems during the manufacture of thermoplastic and synthetic rubber sheeting products.



Wardle Storeys is a specialist manufacturer of flexible polymeric noise insulation and vibration damping products manufactured from polymer granules, pellets and powders which, after mixing, are stored in a large hopper and transferred to a compounding mixer via a screw feed. The company experienced bridging problems at the hopper outlet, and inconsistent flow. Ajax tests of the hopper's contents showed poor flow due to the polymer's 'stickiness' and tendency to bind together.

Ajax has replaced Wardle Storeys pyramid-shaped, hopper with a wedge-shaped, hopper that squeezes the stored materials in one plane to create a single planar flow, encouraging mass flow and preventing segregation. The hopper also features a wider outlet to prevent bridging and provide a consistent flow to a new, twin-screw, feeder transferring polymer to the compounding mixer.

"Ajax Equipment's approach to our solids handling problem has enabled us to put in place a flexible facility for continuous manufacture of all our products, thermoplastic or synthetic rubber. The new hopper is working well, and with no bridging problems whatsoever," said Craig Snape, Technical Manager, Wardle Storeys (Blackburn) Ltd. ❖

Screws for Tetra Pak Cheese Making Machine

Ajax Equipment is supplying Tetra Pak, the world leader in food processing and packaging solutions, with two screw augers with dairy quality finish for cheddar cheese production equipment.



The 3.5m augers will be used in the Tetra Tebel Alfomatic, a large, cheese making machine processing up to 4 tonnes of cheddar cheese per hour.

Mark Adams, purchasing manager, Tetra Pak CPS Ltd, said, "We chose Ajax Equipment because our regular auger supplier was unable to provide the level of surface and crevice-free finish that we need for this type of application." *Cont page 3.* ❖

Hosokawa Micron UK Selects Ajax for Handling Difficult Powder

Ajax Equipment has supplied Hosokawa Micron Ltd with a hopper and screw feeder as part of a turnkey powder processing system designed for the pre-conditioning of potassium carbonate powder during agrochemical manufacture.



"Given the nature of the powder we've designed the hopper shaped with a V-tapered bottom section to encourage mass flow during discharge. Of course the screw feeder has to fully serve the long length of the hopper outlet to avoid any stagnant zones, so we have to take a lot of care in selecting the geometry of the screw flights and shaft," explained Eddie McGee, technical director, Ajax Equipment. ❖

Also inside...

Getting the right angle on Hopper Design...Web Site Update and Stainless Steel Lump Breaker.

Ajax Solves Silo Powder Flow Problem

Achieving mass flow discharge, and preventing bridging and formation of rat holes, in large silos can be problematic when an existing silo is used to store new materials. Here we describe our approach to modifying a large silo ahead of its new use to store a poor flowing plastic powder.

Plastics Powder Processing Plant

The plastics company discovered from bitter experience that the plastic powder was very poor flowing. Unassisted gravity flow did not occur and a lot of manual rodding was required to get any discharge from the large silo. A stable rathole formed comparable with the outlet size and near constant operator intervention with rodding sticks was needed to generate any flow at all. Due to the nature of the product it was forbidden to inject air into and use the conventional discharge aid associated with this silo. Emergency action was required and the fastest safe discharge method that could be used was to vacuum the contents out from above - a process that took the company over 2 weeks to fully clear out the contents of the silo.

The silo was 7.6m diameter by 14.2m tall parallel section with a maximum holding capacity of 300 tonnes. The silo was constructed from aluminium and fitted with a bin activator that focused the output to a nom. 250mm diameter down spout.

Powder Testing

Flow property tests carried out by Ajax Equipment included measuring the wall friction characteristics of the powder against various contact materials and the shear strength under compaction.

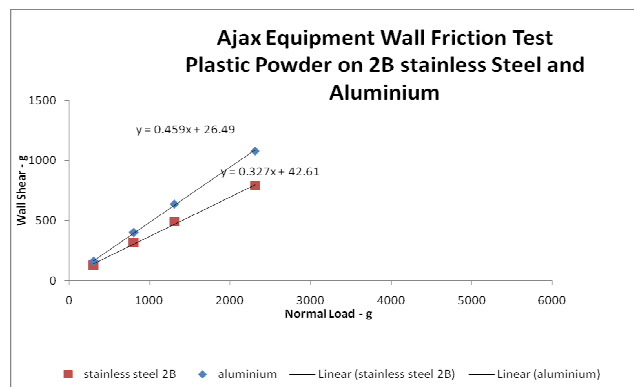


Table 1 - Results

Wall Friction Angle on stainless steel (2b) 18 degrees

Wall Friction Angle on aluminium 25 degrees

Test data confirmed the unsuitability of the existing silo 'as is' for storage of the plastic powder. The aluminium cone of the large silo was too shallow for mass flow and the powder was so strong that it arched, particularly when consolidation pressures were high in a large silo with substantial inventory level. Furthermore the product's potential for absorbing vibration confirmed the bin activator would not be a suitable discharge device.

Shear strength tests results indicated the potential for the product to form stable rat holes approaching 3m diameter so it was clear that the existing cone would have to be converted. Tests to examine the merits of stainless steel 2B finish as a contact surface for slip showed that stainless steel 2B offers significant slip advantages over aluminium.



Figure 1 shows the new AJAX hopper and triple screw feeder.

However Ultra high Molecular Weight Polyethylene (UHMWPE) was found to offer even more superior slip behaviour flow. The copolymer powder's potential dust explosion hazards meant a liner had to be sourced which not only met the slip criteria, but had suitable electrical properties too.

Converting the silo to provide reliable flow

The proposed plant modifications included removing the bin activator, diverter mechanism and chute work giving almost 4m of headroom into which the new hopper bottom could be fitted.

For the transition hopper section with a stainless steel construction (2B finish), a 70 degrees wall angle to the horizontal was used, providing the transition to single plane convergence e.g. chisel or Vee shaped hopper section, to produce mass flow.

From the vertical shear tests, the final outlet slot was 0.9m wide. Ideally this slot should have been 2.7m long, however by maintaining steep end converging sections this could be reduced to between 1.8m and 2.2m whilst still maintaining mass flow potential and an ample outlet size.

The silo cone lined with UHMWPE sheeting provided a lower friction surface for the powder and inserts were fitted to encourage flow from multiple local regions adjacent to the central region. These, and the addition of a multiple screw feeder fitted on the hopper bottom, mass flow section, (Figure 1) have provided effective discharge of the plastics powder. ❖

SOLIDS HANDLING PROBLEM? AJAX M.D. LYN BATES IS HAPPY TO OBLIGE WITH SOME EXPERT HELP

Q. *I have to think long and hard about investing in new equipment because of our wide range of product formulations and differing sources of raw ingredients. What should I do and look for from equipment suppliers to spend wisely?*

A. A very apt query. There are clever ways to design 'agile' equipment suitable for a wide range of use or tolerant of variations in bulk material properties. Whilst equipment cannot be designed to handle 'everything', and standard equipment is invariably limited, some precautions are essential when changes of use are contemplated. The key feature is to assess the bounds of variation that may be expected, and employ advanced technology to exploit space and money available to secure the widest versatility of application.

For example, a hopper that has to accommodate a range of products that may vary in bulk density, wall friction, shear strength, segregation tendency or age deterioration, should be mass flow, with a wall inclination to deal with the highest wall friction value expected. Optimise the outlet section for the best flow prospects available in the space and ensure the feeder guarantees 'live' flow over the total outlet.

The 'Spider' diagram method of describing the flow related bulk properties, developed by Ajax's technical director Eddie McGee, provides a useful overview of potential problem areas. You should note that the experience of a specialised manufacturer with a sound track record is obviously invaluable in achieving equipment flexibility.

If you would like a copy of the McGee Spider Diagram publication then please email eddie@ajax.co.uk and ask for your FREE personal copy ♦

♦ Solid News Forthcoming Events ♦

November 26, 2009

Sustainable Waste Management Seminar
IMEchE, Birdcage Walk, London SW1H 9JJ.

Dr Eddie McGee is presenting a paper on plug screw feeders entitle, 'Keep Plugging Away – Feeding Technologies for Pyrolysis Systems'.

For more details visit <http://events.imeche.org/>

Screws for Tetra Pak Cheese Making Machine

Cont from page 1...

One auger uses a round bar construction to level curd on a feed belt, while the other traditional screw auger feeds salted curd chips from the outlet of the mixing drum to the inlet of the mellowing belt. Both screws are stainless steel and mechanically polished to give a crack and crevice free, dairy quality finish.



"The quality of our construction and manufacture including polishing, together with our experience of accurately interpreting customer requirements are key strengths of Ajax Equipment, hence our ability to meet the quality expectations of the Tetra Pak team," Eddie McGee, technical director, Ajax Equipment commented. ♦

Ajax Equipment Web Site Updated

The Ajax Equipment web site at www.ajax.co.uk has been updated with more product information, news, articles and movies.

The Ajax web site also features movies showing types of hopper flow, small screw feeder, drum emptying station and lump breaker.

Part of the site is given over to Powder Testing Equipment and Techniques including wall friction, vertical shear, tensile test, shear and attrition, cohesion and compacted density.

"Over the years the Ajax Equipment web site has evolved into a repository of knowledge on solids handling equipment and common problems," said Mark Waters, Director, Ajax Equipment. ♦

Recessions come and go, but quality endures

The current economic downturn has impacted on manufacturing with some sectors suffering more than others. It's not all bad news though, observes Mark Waters, Director, Ajax Equipment.

Many companies are taking the opportunity to review their manufacturing processes. Those plant inefficiencies tolerated during more buoyant times have come into sharp focus as price competition intensifies and bottom lines get squeezed.

"We've seen a greater emphasis on powder testing and exploiting the latest technology developments. Companies are increasingly aware of the costs of problems they are experiencing," says Mark Waters.

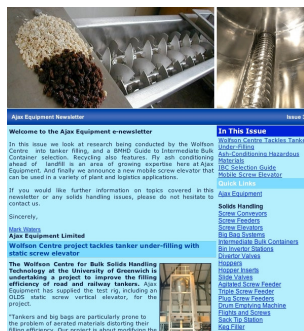
Much greater emphasis is being placed on exploiting the latest technology and developments...

"Well designed, state-of-art solids handling equipment addresses these issues" notes Mark. "It reduces waste and re-work, copes smoothly and reliably with production demands and consistently delivering the right quality, so reducing the burden on quality control requirements.

"The capital cost of such key plant usually has little relation to the value of goods produced. Now, more than ever, is the time that farseeing companies will look to invest in improvements." ♦

Ajax Equipment e-newsletter keeps you up-to-date

In addition to 'Solids News', Ajax Equipment also publishes an e-newsletter covering topical news and solids handling issues. Each issue contains a mix of recent news stories, articles and case studies with useful links for further information.



To subscribe to the Ajax Equipment e-newsletter email: sales@ajax.co.uk. ♦

EQUIPMENT UPDATE: Stainless Steel Lump Breaker

The Ajax Equipment stainless steel lump breaker is the latest evolution in the technology, following feedback from customers. It is used for breaking up raw materials, previously held in drums and sacks, ahead of processing.



The presence of lumps can lead to charge chutes becoming blocked, reaction vessel stirrers being damaged and process reaction times extended.

The Mark III lump breaker is mechanically polished; with a crack and crevice free finish. Readily integrated within chemical, food and pharmaceutical processing plant in-stream, for example, beneath a big bag or above a hopper and chute feeder; the lump breaker ensures a more consistent powder quality.

The new lump breaker is compliant to Atex Zone 2/22.

For more details on the Mark III Lump Breaker contact Ajax Equipment on 01204 386 723. ♦

IMechE Innovation Award for Ajax Equipment Director

Dr Eddie McGee, technical director, Ajax Equipment, has received the Institution of Mechanical Engineers' prestigious 'Bulk Materials Award for Innovation' for his work on predicting the flow of bulk solids in manufacturing processes.



John Pethulis (R), chairman of the IMechE's Bulk Materials Handling Committee presents the Bulk Materials Award for Innovation to Dr McGee.

In presenting the Innovation Award John Pethulis, chairman of the IMechE's Bulk Materials Handling Committee said, "Dr McGee's spider diagram is a useful approach which integrates the flow related characteristics of bulk solids and a significant contribution to tackling the problem of characterising the many materials handled in industry." ♦

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