

# SOLID NEWS

ISSUE 14

The newsletter of **AJAX EQUIPMENT** – the **BULK SOLID** performer

## MOBILE LUMP BREAKER FOR FOOD PACKAGING SPECIALIST

Ajax has supplied leading food sector packaging specialist, the Alexir Partnership, with a Model 300 lump breaker including a feed hopper, outlet chute and control panel, mounted on a mobile frame.

"Ajax have been an excellent company to work with, they listened to our requirements, allowed us to visit site and test various existing machines and then built us a bespoke machine exactly to our requirements that performs the required tasks perfectly. It was a pleasure to work with Eddie and the rest of the Ajax team who were professional from start to finish and delivered a quality piece of equipment on a fairly tight deadline," commented Mark Avery, purchasing director, Alexir Partnership.



## INCLINED SCREW FOR BARDYKE CHEMICALS

Bardyke Chemicals has again chosen Ajax screw technology with a 4m inclined screw feeder for its factory in South Lanarkshire. Bardyke manufactures a range of copper-based chemicals including cuprous oxide and cuprous thiocyanate for applications from marine paints to pharmaceutical production.

The production process required the screw feeder to be inclined at 25°. To prevent back-spill, Ajax combined specially selected flights and appropriate rotational speed to drive the material forward. The stainless steel screw feeder features Ajax's Lynflow™ flights which have been specifically designed to counter the adhesion of materials to the shaft and blades.

"Bardyke has worked with Ajax Equipment on several solids handling projects in recent years, all of which have contributed to the consistency and reliability of our production line. Ajax's understanding of solids handling ensures the material and process are the foremost factors during design, resulting in effective and efficient equipment," said Duncan Norman, managing director, Bardyke Chemicals Ltd.



**Also inside...** Salt Tablet Production needn't be a Sticky Situation • Get in the mix with Ajax • Ask Lyn • Diary Date

- New Managing Director for Ajax • Ajax announces compact Silo Cascade Mixer • Thermal Blender for Heating Bulk Solids • The Lynflow Chute - Designed for Flow • Get the news

We hope you find our newsletter informative and interesting, your feedback is appreciated.

Please call **+44 (0)1204 386 723**, send an email to **sales@ajax.co.uk** or visit **www.ajax.co.uk** for more information.

# SALT TABLET PRODUCTION NEEDN'T BE A STICKY SITUATION

The unforgiving nature of salt processing can soon highlight any deficiencies in a plant's arrangement and equipment. Ajax Equipment has supplied the UK's largest producer of vacuum salt products, Ineos Salt, with a new handling system to optimise plant productivity.



Salt build up inside a screw conveyor

## Salt Processing

Boiling brine to release salt goes back to Roman times. Today the process is highly automated. Ineos Salt in Runcorn, operating 24/7, produces 500,000 tons of salt per year for food, Hydrosalt water softening tablets, animal feed, industrial and chemical purposes, and de-icing.

Ineos Salt takes brine, boils it in a number of evaporators before using centrifuges to remove most of the water and then transferring the damp salt to two fluidised bed driers. The dried salt is transferred from the driers via screw conveyors to a common collecting screw running between the two driers. The collecting screw transfers the salt to a screw feeder for transfer to a tablet machine. Once this is reached, the collecting screw output overflows onto a belt conveyor for transfer to bulk storage silos and a bagging plant.

Graeme Ainsworth, Development Engineer with Ineos Salt, is responsible for improving the plant's productivity and reliability. "Salt is a difficult material to process. Damp salt is very adhesive and has a tendency to stick to the sides and scrolls of screw conveyors, hence we get lumps forming."

## Problem Statement

"The problem we faced is that the design of the outfeed system from the two driers was such that we could only effectively feed the tablet machine from one drier. During periods of maintenance, if we took off the favoured drier we would also lose our feed to the tablet system, this caused us unnecessary loss of production," said Graeme Ainsworth.



Original plant arrangement

The problem was compounded by the fact that the plant was not effective at only transferring fines for tabletting. In addition, the plant layout meant the tablet screw feed screw was hard to access when it blocked with the gearbox for the screw practically inaccessible. Due to the lack of a stuffing box, salt was damaging the gearbox and bearings. The site had seen a number of unplanned periods of downtime because of these.

## Solution

Graeme Ainsworth wanted a new plant arrangement to smooth the transfer of salt from drier 2 to the common collecting screw as well as ensure only fine salt went to the tabletting line.



New plant arrangement

By offsetting drier 2's conveyor entry point into the collecting screw the likelihood of the screw blocking would reduce. However, due to the limitations of the plant layout, the new screw conveyor would need to be inclined at 35°.

"Many companies are reluctant to supply inclined screws at this angle especially when processing salt, and so we contacted Ajax Equipment," he said.

"When a screw is inclined material tends to fall back into the prior pitch space," explains Eddie McGee, managing director, Ajax. "Inclined screws are best designed with specially selected flights and appropriate rotational speed to generate effective radial pressure to drive the material forward."



Completed Ineos Salt plant upgrade

Ajax replaced the existing screw with a 3m, inclined screw conveyor transferring salt from the dryer. Ajax also introduced a common collecting screw conveyor for taking salt from both dryers, with the entry points for the dryer conveyors offset to reduce the opportunity for blockages to form. The 2m collecting screw serves two outlets: an Ajax screw feeder for water tablet production with the remaining salt discharged onto a belt conveyor below. To prevent lumps entering the tablet screw feeder, Ajax included a special casing profile with tapered slots on the feeder inlet; previously Ineos Salt had used a grill that was prone to blockages and very hard to access and clean.

"The Ajax inclined screw feeder has integrated well with our process, giving a reliable and consistent feed to the collecting screw," says Graeme Ainsworth. "Overall the Ajax system has improved our tablet production capability as well as simplifying the plant arrangement. For example, offsetting the screws from the driers reduces the opportunity for collecting screw blockages. Also, by using Ajax's special slotted casing profile to prevent lumps from entering the tablet screw feeder we have a simpler, more effective solution than using a lump breaker. The design of the tapered slots was something I had not seen before, and it's why we went to Ajax, because of their experience in designing bespoke systems."

# GET IN THE MIX WITH AJAX

Ajax Equipment's range of batch and continuous mixers offer reliable performance for a variety of applications including combining delicate or sticky ingredients during production of foods such as cereals, chocolate or potato products.



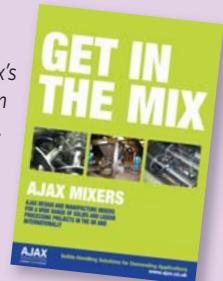
Ajax's Lynflow™ paddles or ribbons efficiently produce a high quality mix by gently mixing and positively combining solids and liquids that differ in flow properties, size, density, or other material behaviour that might lead to segregation.

## Food Manufacture

Ajax's screw geometry provides efficient though gentle mixing with negligible damage to ingredients such as cereals, fruits and other inclusions. To meet strict food hygiene standards, Ajax continuous mixers are available with quick release screw shafts. This allows screws to be quickly removed for cleaning and product changeover, however, clean-in-place is also possible.

## Continuous Development

"Innovation in solids handling is a key part of Ajax's activities. In the past few years Ajax has also been involved in the industry initiative 'Project Chariot'. As part of the initiative Ajax supplied equipment for a product formulation facility at the Centre for Process Innovation as well as using 'Positron Emission Particle Tracking' to investigate how material moves through an Ajax twin screw mixer" commented Ajax managing director Eddie McGee.



## ASK LYN...

**Q I've tried a belt feeder and a screw but even with a Mass Flow design I can't get the even residence time from my hopper that the process demands. Is it too difficult for any powder feeder?**

**A** Mass Flow is often utilised to avoid bulk storage issues, however, uneven extraction does not rectify segregation or effectively de-aerate fluidised material, leads to variation in residence time, which affects in-silo processing, and produces density variations. Various impediments inhibit screw feeders extracting uniformly:

- Initial flights exposed to contents transfer the material axially whilst subsequent flights can only extract a marginal increase in capacity.
- Longer pitches are less efficient at transfer so don't offer the full increase in capacity.
- Longer pitches serve longer portions of the outlet, so the rate per unit length reduces.

Overcoming these handicaps requires considerable expertise and experience. Ajax has developed a design to overcome the 'initial draw' problem and balances the extraction uniformly over the full hopper outlet length. We use wall friction data to effectively select pitches for transport efficiency whilst detailed design process is adhered to for optimising the extraction profile from the silo. These designs are application based so please contact Ajax for the complete solution.

## DIARY DATE

CHoPS 2018 - 9<sup>th</sup> INTERNATIONAL CONFERENCE  
Conveying and Handling of Particulate Solids

10-14 September 2018, at the Greenwich Maritime Campus, London

[www.chops2018.org](http://www.chops2018.org)



## CHoPS 2018

**10-14 September 2018,  
Greenwich Maritime Campus, London**

Ajax will be exhibiting at this year's CHoPS where the theme of the conference is "Fusion of science and industry: from particle contacts to bulk behaviour". CHoPS will discuss newly developed technologies and challenges across a range of sectors from pharmaceuticals, food, chemicals, power generation and waste. As well as exhibiting at ChoPS 2018 Ajax's Eddie McGee and Simon Fields will be presenting papers.

Eddie's paper 'Converting to Mass Flow: Retrofitting Screw and Hopper Insert technology to improve feeding of milled phosphate in Egypt' uses a case study to show how enhancements in screw performance are possible with an approach based on characterisation of the bulk and technological design.

While Simon's presentation 'Using screw technology for best mixing' looks at recent work, by industry and academia collaboration Project Chariot, utilising an Ajax twin screw mixer and PEPT techniques to examine behaviour over a range of conditions.



## NEW MANAGING DIRECTOR FOR AJAX

Ajax Equipment is pleased to announce the appointment of Eddie McGee as Managing Director. Eddie has over 26 years' experience in solids handling and processing with more than 10 years as Technical Director for Ajax.

"Ajax has a great team, producing innovative, performance enhancing equipment for a wide range of solids handling and processing applications across many industries. With

*our capabilities and product innovation I am extremely positive about the growth and future of the company"* said Eddie on his new role.

Commenting Ajax chairman Lyn Bates said "Eddie is a dedicated professional with outstanding experience in bulk technology and solving industrial solids handling problems. He will ensure that Ajax provides world class service to all industries that handle and process bulk materials."



## AJAX ANNOUNCES COMPACT SILO CASCADE MIXER

Ajax has developed a new type of silo cascade mixer enabling batch powder processing in squat, square mixing containers in place of tall conventional conical hoppers, for plants where space is limited. The mixer combines mass flow and intake recycling screw technology that minimises power consumption whilst providing efficient mixing.

The recycling screws have a large entrainment diameter and a twin inlet scoop that reduce the headroom requirement of the hopper section, enabling relatively large volumes of solids to be held within the squat mixer. The mass flow mixer construction ensures that a reliable and predictable flow pattern is attained to counter any tendency for segregation.

## THERMAL BLENDER FOR HEATING BULK SOLIDS

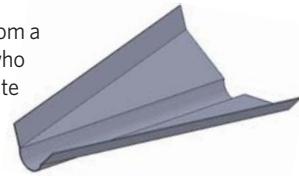
Heating bulk solids can pose a significant challenge. Often the material is a poor thermal conductor, and excessive heat risks damaging the material. By applying its innovative cascade mixing technology, Ajax has developed a thermal blender capable of heating and mixing 10 tonne batches of a mineral product up to 200 C for a leading chemicals manufacturer.

The thermal blender uses a central vertical recycling screw to elevate the powder and cascade it onto the bed contents and down the hopper section, taking advantage of a bulk solid's natural tendency to mass flow. In this way, the mixing action homogenises any thermal difference between different regions of the material being handled.



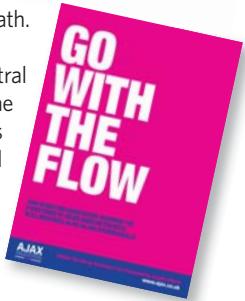
## THE LYNFLOW CHUTE - DESIGNED FOR FLOW

The design of Ajax's Lynflow™ Chute arose from a demanding duty requested by a customer, who wanted to monitor the rate of discharge of a chute from an Ajax continuous mixer. The task was difficult because the product had poor flow properties and the very small and fluctuating rate of discharge being spread over a relatively wide path.



A flared chute was used to focus the material to a central region. The addition of a central trough transformed the performance of the chute. All the flowing material was focused into a bed of uniform thickness and controlled width that was optimum for the detection device.

The design forms part of a range of Lynflow™ innovative designs of equipment offered by Ajax.



## GET THE NEWS

Please sign up for latest solids handling and processing news from Ajax's regular e-newsletter and Top Tips series full of good advice and information on technology developments.

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