

SOLID NEWS

ISSUE 10

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

AJAX KEY PARTNER IN PROJECT CHARIOT

Ajax Equipment is playing a key role in a Government sponsored, advanced manufacturing initiative named Project Chariot. The £18m project, led by Procter & Gamble's Newcastle Innovation Centre, will develop innovative processes for the production of super fine powders for the global supply chain.

Ajax is collaborating with the Centre for Process Innovation and the Universities of Birmingham,

Durham, Leeds and Cranfield to develop a multi-coating system for fine particles based on the company's continuous screw mixing technology. The company is providing a range of processing and feeding equipment for the project.

The three year project is partly funded by the government's Advanced Manufacturing Supply Chain Initiative which aims to help existing UK

supply chains grow and achieve World Class standards, while encouraging and retaining quality manufacturing in the UK.

Ajax director, Mark Waters, said "Chariot will enable Ajax to form long-term partnerships with leading academic organisations and industrial partners, and assist in the future creation of high skilled engineering posts here at Ajax, as well as providing many opportunities for product development."



SWEDISH COMPANY SELECTS AJAX CONTINUOUS MIXER

Ajax Equipment has supplied leading Swedish plastics company Polykemi AB with a stainless steel, twin screw continuous mixer that mixes plastic granulates with additives and pigments for a range of extrusion machines. The continuous mixer replaced a batch mixer and has significantly reduced the downtime needed for cleaning equipment between production runs.



On why Polykemi decided to investigate continuous mixers Roland Persson, operations and maintenance manager, said: "We were looking for ways to shorten our production downtime such as cleaning the equipment, especially with an increasing range of mix requirements". A period of running trials and testing determined that an Ajax continuous mixer could provide the solution. The twin mixer features an almost food quality high standard of finish and quick release couplings, ensuring easy cleaning of the machine.

ADJUSTABLE SCREW FEEDER FOR AMP ROSE

Ajax has produced a custom built mobile and adjustable screw feeder for confectionery processing machine supplier AMP Rose. The feeder will allow the insertion of sherbet powders in confectionery products, as part of a continuous production process.



Using test results with icing sugar and expertise from previous projects Ajax developed the specifications to provide the performance required. "Ajax's detailed approach to solids handling equipment design ensured the screw feeder produced was highly tailored to the requirements of the process and material." said Andrew Mann, sales director, AMP Rose.

Advantages of Ajax's screw feeder include maintaining the product's 'live' condition through agitation and a self-adjusting casing position to centre the filling process.



Also inside... Why Knowing Your Material is Key to Project Success • Inclined Screw Conveyor for High Pressure Biomass Processing • Ask Lyn? • Diary Date • Investment for Tomorrow • Ajax on Twitter • Multi Screw Feeder • Powder Testing in the Fjords • Top Tips

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.

WHY KNOWING YOUR MATERIAL IS KEY TO PROJECT SUCCESS

Bulk solids handling is, by far, the world's largest industrial activity. Over 16 billion tonnes of bulk materials are handled every year. However, many solids handling projects encounter problems simply because of a lack of understanding of the material's characteristics.

Of course, it doesn't have to be this way. Ajax believes that solids handling equipment should work in sympathy with the material's personality rather than working against it. Sounds obvious. But if you're unsure whether you're dealing with Dr Jekyll or Mr Hyde perhaps we can help. Here are our suggestions to follow when embarking on projects with bulk solids.



Solid Knowledge

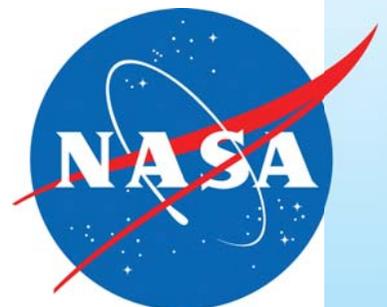
The key to any solids handling project is to know the material, and understand what you are dealing with; details matter. There are well established techniques and procedures for measuring key properties such as bulk density, wall friction and shear strength, all of which provide fundamental data for the design process.

Further specific tests can reveal other relevant characteristics of a material which are pertinent to its behaviour. Up-front and thoughtful evaluation will provide the information needed to ensure correct equipment design and help increase profitability through reliable solids handling, consistent performance with minimal intervention.

It's not rocket science

"Working with soil, sand, powders, ores, cement - etc. - and using hoppers are so routine, that it seems straightforward to do it on the Moon and Mars as we do it on Earth. This paper brings to the fore how little these processes are understood and the millennia-long trial-and-error practices that lead to today's massive over-design, high failure rate, and extensive incremental scaling up of industrial processes."

An extract from NASA's 'Granular Materials and the Risks They Pose for Success on the Moon and Mars', 2004, R A Wilkinson et al, NASA.



INCLINED SCREW CONVEYOR

FOR HIGH PRESSURE BIOMASS PROCESSING

Ajax has supplied process development company PJH Partnership with a two metre long inclined screw conveyor used in the processing of biomass.

PJH Partnership specialises in the application of superheated and supercritical technology to processes involving impregnation, extraction, fractionation and separation. The Ajax inclined stainless steel screw is being used to convey biomass immersed in an organic solvent bath to alter the surface chemistry of the biomass particles. The conveyor features an oil heated jacket and is operated at a pressure of 10 bar. It is compliant with Pressure Equipment Directive (PED) category III and rated for ATEX Zone 1 internally and Zone 2 externally.

The screw is inclined at 30° to the horizontal. *“Operating a screw inclined at greater than 20° presents a number of challenges and can significantly reduce the conveyor’s handling capability,”* says Ajax technical director Eddie McGee. *“When a screw is inclined material tends to fall back into the prior pitch space, dramatically increasing the cross sectional loading of the conveyor as the angle of the screw is now below the contact friction angle of the material. Inclined screws can be successfully operated through the use of specially selected flights and appropriate rotational speed to generate effective radial pressure to drive the material forward.”*



ASK LYN...

Q I have a free flowing blend of granular materials that gives problems in terms of both quality and quantity of packaged output. Are there any aspects of the blend handling that I could change that might cure this?

A Free flowing powders are prone to segregate during the filling and emptying from a hopper that can result in both quality and handling problems, especially in a mixture of two or more materials. Hoppers usually have a single point fill which forms a growing pile of material where the larger fraction usually, but not always, rolls down to the periphery of the mound, concentrating the finer solids in the central region.

A more uniform composition can be retained during filling by fitting an Ajax dispersing device tailored to the geometry of the equipment. A range of complementary inserts are also available to redress an uneven fill composition and produce a more even condition at discharge. Options range from modifying the flow regime to generate mass flow to employing fittings that generate a multiple 'tributary' type draw from many regions of the hopper and re-mix them during discharge.

Ajax offers a range of design techniques to mitigate, minimise and rectify various forms of segregation. A flow audit of existing systems can be made on receipt of operating details. Whereas individual process regions can be considered separately, in general the total flow route should be reviewed to optimise the system.

DIARY DATE

Institution of **MECHANICAL ENGINEERS**

Institution of Mechanical Engineers Seminar

Large Scale Bulk Storage and Handling

19-20 November 2014, Forest Pines Hotel, Scunthorpe.

As the UK continues to push its renewable energy policy, the demand on imported bulk materials such as coal and wood pellets is growing and the pressure to handle and store such materials safely is a priority for the whole sector. With its current facilities, can the UK bulk solids sector manage? Or, will the market need to invest in technology and equipment to support future demand?

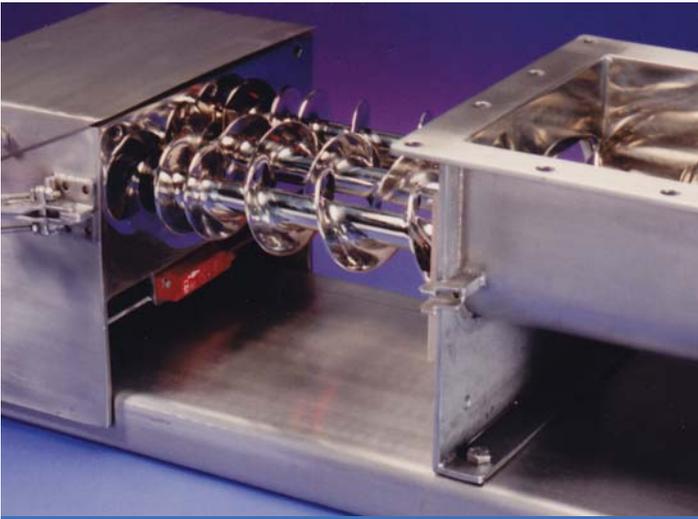
Find out more at

<http://events.imeche.org/viewevent?code=S6155>



Now in its 20th year CHoPS 2015 will bring together scientists and industrialists from across the world in Tel-Aviv to exchange knowledge and ideas on everything particle technology. With lectures from world experts on wide range of topics, the conference is an excellent opportunity to deepen existing knowledge as well as gain insight into new areas.

Find out more at www.chops2015.org



INVESTING FOR TOMORROW

Ajax has recently invested in a centre lathe and forklift truck to enhance production capability. The Colchester centre lathe is capable of precision turning, while at the same time able to offer high production rates providing flexibility within Ajax's manufacturing resources. The lathe will also maintain high quality machined components, and provide the additional resource to reduce production times.

The caterpillar forklift truck has a generous lifting capacity, ensuring that all the equipment manufactured by Ajax can be safely and easily moved. Ajax director Mark Waters commented, "Investing in the new forklift truck and lathe has increased our production capacity allowing Ajax to maintain high quality service to our customers for many years to come"

TWITTER



You can now get the latest news from Ajax on Twitter! Follow us for news, insightful articles, upcoming events and our latest Top Tips.

@AjaxEquipment

MULTI SCREW FEEDER

Ajax has produced a twin screw feeder for a new food processing facility. The eight metre feeder's screws are split in the middle with half the feeder running together while the other half of the screws will be capable of operating independently of the other section and each other. The screws will control feed to various bagging stations making the plant highly responsive to changes in demand.



The feeder has a number of hygienic features including 'Lynflow™' ribbon flights to prevent build-up of material on the blades or shafts, spray bars and smooth welds, ensuring the system can be easily cleaned-in-place.

POWDER TESTING IN THE FJORDS



An Ajax engineer recently travelled to Norway to conduct on-site powder testing for a chemical manufacturer. The objective was to investigate the flow characteristics of the material at different moisture contents, and how these results should influence the design of replacement solids handling equipment.

Predicting the flow characteristics of powders during manufacture is important. Getting the powder flow wrong can be highly disruptive to plant performance and productivity especially where equipment has to be taken off-line and stripped down to clean out blockages.

Several characteristics determine how a powder will behave during handling including shear strength and wall friction. Our tests determined that increasing the moisture content of the powder had a significant effect on the shear strength of the material. The high level of moisture was found to also increase its adhesion characteristics. These aspects in combination encouraged structural arching across the narrow slot of an existing conveyor.

The results of the powder testing can now be used to either modify the existing plant or define the requirements for new solids handling equipment.

TOP TIPS

Recently Ajax launched 'Top Tips', a series covering the essential knowledge for a range of solids handling areas including particle flow, attrition, segregation and achieving reliable flow.

"Ajax Top Tips are for everyone who handles solids. If you have recently joined the solids handling industry or been in it for a number of years, these simple guides give the key points for handling bulk" said Mark Waters, director, Ajax Equipment.

AJAX Top Tips

Achieving Reliable Flow 2 – Designing for Flow

Designing a solids handling system requires many factors to be taken into consideration and balanced against each other; by using our 'Top Tips' you can avoid many of the common mistakes that lead to the production of poor performing equipment.

1. **Make yourself familiar with the full range of conditions of the material to be stored.** Secure a 'fully representative' sample to check that the material is of consistent quality, from homogeneous stock, stable over time and under the full range of relevant operating conditions. If the material varies, identify how and design around the 'worst' condition appropriate to each part of the equipment. See the 'Guide to the Specification of Bulk Materials for Storage and Handling Applications' published by the Process Industries Division of the IMechE for further guidance.
2. **Measure wall friction every time.** For Mass Flow, wall friction mainly determines the wall inclination required for a given geometric construction. For non-Mass Flow, the value indicates the lowest slope that may be used for the container to self-clear. Remember there is no ubiquitous 'Low Friction' material for a hopper wall; it depends upon the product and the contact surface. As wall slip depends almost entirely on wall friction, it is much easier to do something about promoting flow than it is to generate wall slip if the slope of the hopper wall is inadequate. Note that the both the surface material and the sample of bulk material must reflect those prevailing in all conceivable operating conditions.



Above Ratholing, below Arching

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