

Introducing the AJAX Newsletter

AJAX has a clear mission. We aim to provide a world leading service by supplying equipment and services that offer the best in solids handling!

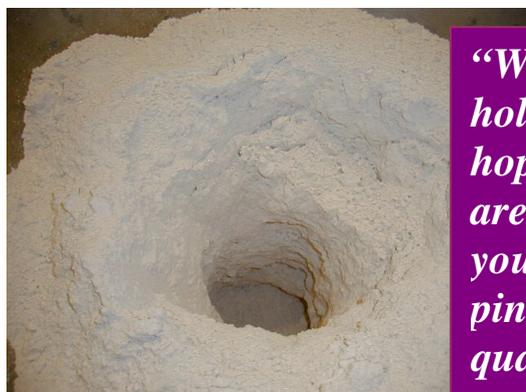
If your hopper is reluctant to give reliable flow the evidence is usually clear – hammer rash! This is not good for the structure and not good for the operator's back! Bad design means you only get a 'pint out of a quart pot'. If you want more - speak to **AJAX**. We are adept at making your inventory fully retrievable. Our ideas and fancy shapes will suit your powder and fit within your plant. The **AJAX** approach starts with measuring **wall friction** and ends with a hopper that flows well, without arching, ratholes or other problems!

Mixing is an age-old activity, but modern plant needs continuous output, high efficiency and flexibility in production. **AJAX continuous twin mixers** are good at the job and nifty features like quick changeover augers mean your plant can chop and change between different mixes with ease- see page 3 for more❖

GO WITH THE FLOW - Part 1

Get the right hopper shape

Eddie McGee chooses geometry for flow



“With a rat hole in the hopper, you are lucky if you get a pint from a quart pot”

A conical hopper may be easy to make but it is not the best shape for flow. This is because the bulk solid has to converge simultaneously in two planes. This squeezing takes a lot of effort but the potential energy available is limited. Consequently, arching and ratholing problems are common so operators reach for scaffolding poles to 'coax' flow. The outside of the hopper is beaten until it develops “**hammer rash**”.

The above photo shows titanium dioxide forming a 'rathole' in a conical hopper.

Continued on page 2



The AJAX Invertabin™

The IBC for Pharmaceutical powders!

AJAX offer the best flow shape, clever valve docking for containment and a twin screw feeder to deliver to a reactor!

LOOK INSIDE...MORE 'GO WITH THE FLOW' AND AJAX TWIN MIXERS LYN ANSWERS YOUR SOLIDS HANDLING PROBLEMS, MEET THE STAFF AND WE FOCUS ON AJAX QUALITY

WE HOPE YOU FIND OUR NEWSLETTER INFORMATIVE AND INTERESTING YOUR FEEDBACK IS APPRECIATED PLEASE CALL ++44 (0)1204 386 723 OR SEND AN EMAIL TO newsletter@ajax.co.uk

The central region of the hopper above the outlet may empty well but a stagnant inventory remains. This static material gets stronger with time until total discharge is no longer possible and the effective volume of the hopper is severely reduced.

Mass flow hoppers provide the optimum flow conditions because the bulk material slips on all the wall contact surfaces so there are no 'dead' regions of storage. The ability of the material to slip at the hopper wall is governed principally by the shape and the friction coefficient of the bulk solid against the wall material.

AJAX routinely measure **wall friction** and have the technological base to use the results to design reliable flow hoppers. This approach is a sound way of avoiding flow problems; gravity is available for free so it makes sense to use it rather than throw extra money at the numerous discharge aids that actually reflect a failure of design. Titanium dioxide has very high friction even against polished stainless steel and it is rarely practical to make a conical the hopper wall sufficiently steep to generate mass flow. However other geometries can be exploited that offer intrinsically better flow shapes.

One approach is to use a Vee shaped hopper. This is a better shape for flow because the bulk material only has to deform in one plane as it approaches the outlet. This is easier to do and so the wall angle can be relaxed making it possible to squeeze the required capacity within lower headroom.

It is often convenient to combine two successive stages of single plane reduction so that the hopper walls approach a final circular outlet that sits neatly with down stream feeder requirements.

The photo below shows a hopper featuring such novel wall geometry.

A novel hopper with a shape that has steep walls, single plane convergence and focuses product flow into a screw feeder – ideal for flow with no need for a hammer!



Even better results can be achieved if the end walls actually diverge whilst the sidewalls converge steeply. This technique relaxes the confining stress in one plane – coined “**Sigma2 Relief**” by **Ajax Equipment** – and it facilitates an even narrower slot outlet. **AJAX** supplements this method with screw feeders that offer fully progressive extraction along the length and width of the slot.

When the dimensions for flow reliability demand very big outlets **AJAX** supply multi screw feeders with state-of-the-art stepped shaft and variable pitch flight configurations to ensure that the flow takes from all regions of the outlet.

Our next issue will examine measured flow properties and how they are used to ensure the correct hopper outlet and wall angle.❖

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

QA salesman promises me the solution to my hopper flow problem is to fit polyethylene sheets to the walls. How can I be sure this is the right thing to do?

A Ask if the proposal is based on measured wall friction values. UHMWPe may give improved slip properties – but not always! It will not work miracles or correct a basic design deficiency. Liners of any material should not be fitted without proper design authentication as incorrect selection or over-use can have adverse effects.

There may be better ways to solve a given flow problem. The fact that the existing hopper is a poor shape does not preclude modifications to the flow regime by means of hopper inserts or new discharge arrangements. Where there are any operating difficulties it is essential to determine what is the root problem.

I'd recommend you seek a second opinion. Ajax technical services will provide this without obligation, and explain in simple terms what other options there may be and the reason for their recommendations.

CALENDAR OF EVENTS

SCREW FEEDERS LECTURE

HOLIDAY INN, WOOLSTON, WARRINGTON
2ND DECEMBER 2003

AN IMEChE PROCESS INDUSTRIES EVENT

TALK BY LYN BATES

BULK INDIA 2003

RENAISSANCE HOTEL, MUMBAI, INDIA
9 – 11 DECEMBER 2003

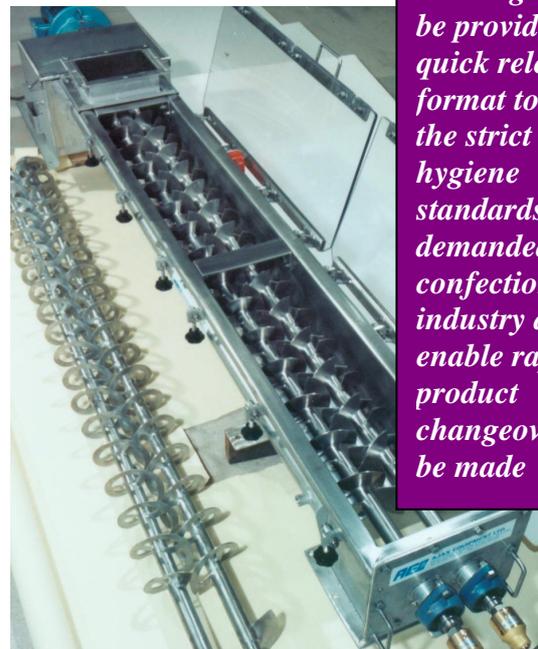
LYN BATES IS TO GIVE A KEYNOTE LECTURE AT
THIS FIRST INTERNATIONAL CONFERENCE

AJAX are in the Mix for Cereal Bar Production

Another recently supplied Ajax Continuous Mixer mixes a new and highly successful cereal bar.

AJAX mixers produce a homogenous mixture of ingredients, even friable constituents such as corn flakes and crispies, with foams and viscous pastes that require working to secure even dissipation.

Innovative design features include the use of **Lynflow™ Ribbon flights** on the twin mixing shafts. These perform a gentle effective mixing operation with negligible damage to the constituents. The open form and geometry of the ribbon flights inhibits build up of sticky ingredients and allows thorough cleaning to be carried out with ease.



The augers can be provided in a quick release format to meet the strict hygiene standards demanded by the confectionery industry and enable rapid product changeovers to be made

The same unit can be used to provide more **intensive mixing** simply by fitting alternative auger forms fitted with **paddles** or crescent blades.

The machines are made in a range of sizes for differing capacities and are available with jacketed construction if heating or cooling is required. ❖

Focus onQuality

Mark Waters, Director, is committed to ensuring AJAX meets its customer's requirements

For over thirty years **AJAX** has developed a reputation for quality equipment. From concept through to manufacture we have prided ourselves on ensuring that all exacting requirements are met.



*Ajax mission is to
"Provide a World
Leading Service to
the Bulk Solids
Industry"
Quality in all aspects
of design and
construction is the
best way to deliver
on that promise*

The recent increase in **Pharmaceutical** work by **AJAX** demonstrates our ongoing commitment to quality. Most equipment is mechanically polished to fine tolerance **Ra** values and electropolished. The acquisition of the latest **surface finish testing** equipment allows us to confirm our compliance to customers exacting standards. Our consistent attention to quality benefits all customers whether applied to simple fabrication or process equipment. ❖

SO WHO DOES WHAT AT AJAX?

MEET SIMON FIELDS

TECHNICAL SALES ENGINEER

Background A graduate with a degree in Mechanical Engineering from Sheffield University with 12 years experience in industry

Role at AJAX My main responsibility is responding to enquiries by producing technical specifications and quotes. We rely quite heavily on our powder testing and pilot plant machinery to both verify and support our proposals. I recently put together a demo for a customer who wanted to break up hard lumps and elevate them into a reactor. With a bit of improvisation, I managed to recreate the whole process and develop a design for their application. The system was installed earlier this year and is reported to be a great success.

Of note I designed and constructed the AJAX web site. It has many interesting features about the products and services that AJAX provides and has useful information on-line like the bulk density database and a hopper design flowchart. See it for your self on www.ajax.co.uk ❖

What can AJAX help you with?

- Please send me your technical sales literature
- I'd like to know more about 'Flow in hoppers'
- I'd like to know more about Ajax Mixers
- My interest is
- Contact me, I have an application to discuss!

Name:
Company:
Address:

Postcode:
Telephone:
Fax:
E mail:

If this newsletter should be addressed to someone else in your organisation please advise.

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