

It is tempting to assume that because conveyors are mechanically simple, they are therefore easier to specify than, say, a liquid filling machine or a cartoner, and so less time and care needs to be taken researching and specifying a conveyor or conveyor system. "All it does is take products from A to B."

In fact, most conveyors do far more than simply take products from one point to another and are every bit as complex to specify as any other piece of packaging or processing equipment.

And as circumstances change, so conveyors are being asked to handle different products. For example, with dollies and returnable transit packaging such as plastic trays becoming more and more popular, so conveyor systems must be adapted to handle more awkward shapes.

Another problem with conveyors is that their apparent simplicity encourages many people to believe that the conveyor budget is the one that can be trimmed if money is tight. After all "it's just a bit of conveyor".

This, too, is a dangerous assumption, since a well designed conveyor system is essential if high production line efficiencies are to be achieved. Put another way, you may have bought the best machines on the market but, if you skimp on the conveyors, the overall line performance will be poor.

### Moving at constant speed

So what else is happening on a conveyor, apart from taking products from A to B?

At its simplest a conveyor is used to move products from one place to another at a constant speed, maintaining the relationship between products on the conveyor and not allowing any movement between products and the conveyor surface.

However, in many conveyor applications it is desirable, if not essential, for products to be able to move relative to the conveyor surface, allowing them to change direction, change speed, or to accumulate.

# 'It's just a bit of conveyor'

*Not so, writes Martin Keay. Conveyors are every bit as complex to specify as any other piece of packaging or processing machinery.*

Moving products from A to B without altering their orientation or position relative to each other is a typical requirement in the biscuit and confectionery industries. The classic solution is the belt conveyor. However, designing the dead plates between one conveyor and the next to avoid products stopping, sticking or turning is easier said than done.

### Choosing the correct belt

So, too, is choosing the correct belt material. The belt surface must have sufficient friction to stop products moving about, which implies a rough surface. But a rough surface is difficult to clean, so the choice must be a compromise.

The choice of belt material must also take into account how the surface friction of the belt will change in use. Some products will cause surface friction to increase, while others will gradually polish the surface and reduce surface friction.

The ability of a conveyor to allow products to accumulate is an important, but frequently misunderstood function. An accumulation conveyor is one that has the ability to allow machine A to keep running when machine B is stopped. Therefore, the appropriate positioning and sizing of accumulation conveyors on a line is crucial to achieving good line efficiencies.

The accumulation capacity of any

type of conveyor is the time that machine A can continue running while machine B is stopped.

### Re-feed the product

So the ideal accumulating conveyor is one that contains very little product while machines A and B are running normally, can store large amounts of product without them being damaged when machine B stops, and has the ability to re-feed the accumulated product once machine B restarts, preferably on a first-in, first-out basis.

Slat band conveyors are frequently used as accumulation conveyors for bottles, plastic tubs and cans while driven roller conveyors are used for crates, cases and trays. However, one of the most successful types of accu-

mulation conveyor is the air conveyor, used for cartons and empty PET bottles.

Air conveyors reduce the friction between the product and the conveyor surface to the absolute minimum, and have the ability to convey at very high speeds with large gaps between the products during normal running, then store the product with minimal pressure when machine B stops. Unfortunately, the use of this type of conveyor is confined to products which are relatively light or have a large conveying surface area to weight ratio.

The accumulation capacity of a conveyor is frequently confused with the residence time of a conveyor. Residence time is the time it takes for a product to get from A to B. So a conveyor with a residence time of 2 minutes containing products spaced a product length apart will therefore have an accumulation capacity of 1 minute. However, if the products are touching, there is no accumulation capacity at all.

In many situations on bottling lines an important role of a conveyor is to allow products to change speed.

Machines A and B may be running at the same speed of, say, 200 bottles a minute, but they may have different pitches. This will mean that the linear speed of the products as they leave machine A will be different to the linear speed required for machine B. A low friction slat band allows the containers to change speed from A to the conveyor and from the conveyor to B without falling over.

Slat band conveyors are also ideal when it comes to changing the direc-

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**“One problem with conveyors is that their apparent simplicity encourages many people to believe that the conveyor budget is the one that can be trimmed if money is tight.”**

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tion of products, since they allow the products to be moved across the surface of the conveyor width.

Choosing the right type and size of conveyor for a particular application is critical, as is designing the right amount of accumulation between machines on a line to achieve optimum line efficiency, but so too is choosing the right conveyor supplier.

It is true of most types of processing and packaging machinery, but particularly true with conveyors, that the know-how to manufacture the equipment is only part of the story. The real skill is understanding how to handle a particular product, and in sizing and choosing the correct types of conveyor for each element of the conveying system. ■

**TRANSNORM SYSTEM**

## Tote box sort system doubles capacity

An automatic sorting system installed by Transnorm System for tote boxes has doubled handling capacity at the main distribution centre of sportswear and sports equipment retailer JJB Sports.

The boxes, used for transit to JJB branches, are carried from the two main order fulfilment areas, where textile products and footwear are stored on adjacent three and two tier mezzanine floors, to a sorting area at ground level.

As an order document is raised, a bar code label is fixed to a tote box, which in turn is placed on a trolley. Product is then order picked sequentially from shelving on the third and second floors, as operatives move towards a powered roller conveyor positioned at the front edge of the mezzanine.

Tote boxes with completed orders are lidded and strapped, then taken from the upper levels to ground level on a series of Transnorm powered roller and declining belt conveyors.



**Sorting tote boxes:** Tote boxes at JJB Sports distribution centre are marshalled and fed down a central conveyor (above) and then directed by sort modules (left) to spur lanes for individual shops

Other orders for goods in tote boxes are raised and 'quick picked' from bulk store to be integrated into the carousel conveyor system at ground floor level.

The previous system, also installed by Transnorm, met the handling criteria of JJB Sports at the time, but was more labour intensive and involved sorting the boxes manually from a carousel conveyor for palletising by hand.

As numbers of tote boxed orders increased, this culminated in ever increasing pressures on manual handling capabilities, resulting in system back-log all the way through to order picking areas, as Keith Lowey, associate director of distribution services at JJB Sports explains:

"As a result of increasing order throughput, there was an obvious need to expand the capability of what had been a very successful handling system. Due to sheer pressure of numbers, backlogging on the previous handling system was not only a logistical problem, but a frustrating experience for order pickers, who could only operate as fast as the system could clear."

The solution from Transnorm System is to use the bar codes to allocate boxes automatically to spur conveyors on the basis of store codes.

JJB Sports employs a wave picking

system, whereby orders are picked in batches of typically 15-20. A communications link between JJB's warehouse management system and Transnorm's conveyor control system identifies current waves to the control system.

As before, product is conveyed on Transnorm powered roller and belt conveyors from the mezzanine and 'quick pick' bulk areas to accumulate as necessary for controlled feed, via a 'three to one' merge, to a sorting conveyor.

The two outer lanes transport totes from order picking sectors, situated either on the three or two tier mezzanine areas. The third lane is a re-feed line to introduce totes which cannot be sorted for various reasons.

Tote boxes feed onto the main sorting infeed conveyor where the bar codes are scanned and the boxes directed to the take-off lane allocated to given store codes.

Local controls display totes received at the sorting conveyor against totes in the system, allowing supervisors to re-allocate lanes with, for example, an expected low volume from the wave pick data. If a wave is incomplete by a small number, then by re-allocating the lane a second full wave can be introduced.

If required, the system will also allow the totes for one shop to be

diverted to two lanes, alternating the flow between the two selected lanes.

Typically, for high volume orders where a lane is full and totes are purposely re-circulated, or a label is missing or cannot be read, the tote boxes are returned via the 'three to one' merger to feed back into the flow.

Sensors control the merge with priority being determined on a 'first come first served' basis except where the re-feed loop is full and has covered a high level sensor on the accumulation conveyor.

**More information - enter 101**

**GUTTRIDGE SERVICES**

## Screw conveyor lifts sauce to hopper

Screw conveyors and elevators don't always spring to mind as obvious solutions to the problem of elevating and feeding materials such as sauces and pastes.

However, a suitably specified Guttridge Bulkflo was recently chosen by a food manufacturer as the best solution to deliver a barbecue sauce product to a kettle for heating, prior to enrobing.

The £12,000 Bulkflo machine will



**Lift for sauce:** Guttridge Bulkflo elevator delivers barbecue sauce

form part of a new line installed to coat meat products for a new product launch planned for later this year.

The semi-solidified sauce will be tipped from 15 litre drums and manually pushed into the 200 litre Bulkflo hopper, where the feed and elevating screws then break up the sauce, feeding it to the 2.5 metre high kettle intake in a controlled stream.

The standard Guttridge screw jointing system allows easy dismantling for cleaning. However, in this installation, to comply with particularly stringent plant safety regulations, the clamping system was fitted with special coded magnetic safety interlocks to ensure that the system is completely protected.

**More information - enter I02**

#### ALPMA GB

## Curved unit offers belt change in one minute

A 90deg curved conveyor on which the polyurethane belt can be changed without tools in under one minute is now available from Alpma to avoid cross-contamination in applications involving naked food.

This changeover speed, says the company, contrasts with some 90deg curved belt conveyors that can require 5 minutes for changeover.

Maximum product width is 300mm and the unit, which will take a maximum load of 10kg, is mounted on an adjustable stand to give conveyor heights of 600-1150mm.

Constant speeds up to 45 metres/min are available, depending on the motor, as well as an infinitely variable drive giving 27-72 metres/min. Protection is to IP65.

**More information - enter I03**

*For further information on items appearing in Machinery Update, enter the appropriate number on the free reader service card in this issue.*

#### PLANET FLOWLINE

## Unscrambler for all shapes has inbuilt turning unit

A Fava Artemio bottle unscrambling system which uses an integral belt turning device to handle square, rectangular and oval containers, from 250ml to 1.4 litres, at speeds up to 4000 an hour, has recently been delivered by Planet Flowline.

Fava machines operate with two discs contra-rotating in the horizontal plane which, says Planet Flowline, increases efficiency and eliminates risk of jamming while providing speeds up to 13,000 an hour.

Machines are available to handle even very large items, such as 20 litre bulk containers.

In a further recent contract, Planet Flowline supplied two mirror image machines, which accept the 20 litre containers with any side leading and feed them out with the filling spout leading, ready for downstream processing.

Container orientation is sensed by a photocell and those that need turning are rotated 90deg in either direction or 180deg as required, using a pincer device.

**More information - enter I04**

#### FLEXLINK SYSTEMS

## High level conveyor gives extra floorspace

A high level conveyor installed at chilled cream cake manufacturer Laurens Patisseries, Newark, has saved sufficient floorspace to give the company room to install an extra production line.

Supplied by FlexLink Systems, the conveyor replaces a low-level conveyor to take over 1500 cartons of custard tarts an hour from the high



**Saving space:** FlexLink alpine conveyor at Laurens Patisseries

risk production and packing area through a partition wall and into the low risk area where coding and palletising takes place.

"Due to the efficient way the FlexLink solution utilised both horizontal and vertical space we at Laurens have been able to install an extra production line beneath the transport system," explains engineering executive Ron Chillery.

The FlexLink installation employs food quality XM plastic chain conveyors with supporting framework in 316 stainless steel. It receives cartons from the cartoning machine, raises them to high level on a high gradient cleated chain conveyor and then, in the low risk area, employs a compact alpine conveyor to return cartons to low level for coding.

A U-shaped conveyor then carries the cartons to the packing bench.

**More information - enter I05**

#### CONVEYOR SYSTEMS

## Spiral system links heights and provides a buffer

A range of spiral conveyors has been announced by Conveyor Systems Ltd (CSL) for applications in which

restricted space makes differences in height difficult to link with inclined belts and elevators.

In addition, says the company, the conveyors' compact construction makes them well suited to act as a buffer between packing and palletising, or where a delay is necessary for products to cool or dry.

"The spiral conveyor does not need complex synchronisation, which results in increased handling capacity compared with other conventional lift systems," says CSL.

"The continuous slatted belt construction conveys product from infeed to discharge station as simply and effectively as a straight conveyor, and requires no additional maintenance attention. Individual slats can be easily replaced with no need for special tools."

CSL's spiral conveyors can be made in coated or stainless steel depending on the application, and the various infeed/discharge configurations allow them to be combined with a specific angle to offer a bespoke handling service for difficult applications.

Load capacity is up to 50 kg/metre, belt widths vary from 200 to 600mm, and operating speed is up to 90 metres/min at inclinations between 3 and 9deg.

**More information - enter I06**

SYSPAL

## Carousel suits hand packing operations

Stainless steel carousel conveyors in a choice of length are now available from Syspal for end-of-line packing and similar operations in which operators require to be 'topped up' with product regularly.

The Syspal Carousel can be produced in extended lengths to create space for as many operators as necessary for a particular operation, the basic carousel shape being oval to allow a number of operators to work comfortably alongside each other.

"Unlike simple rotary turntables, the Syspal Carousel can not only accommodate a large number of operators but multiple infeed conveyors as well," points out the company. Modular construction allows virtually any configuration to suit both production and planning constraints.

For hygiene, particularly within the food industry, the carousel has been designed to give access for cleaning via simple removable hdp side barriers and stainless steel access panels.

**More information - enter I07**

CKF SYSTEMS

## Feed system handles fragile trays of biscuits

An automatic feed system to transfer a random flow of fragile thermoformed trays, loaded with biscuits, into the flighted infeed of a flow-wrapper at speeds up to 60 a minute has recently been built by CKF to replace a manual operation.

It was made for Rose Forgrove and is now installed on one of the company's machines at a biscuit manufac-

turer in the north west of England.

The profile and fragility of the trays prevented high levels of accumulation, since any impact could dislodge biscuits from the pockets. So a multibelt arrangement was adopted to marshal the tray infeed, separate the individual trays and synchronise the feed into the flighted infeed conveyor of the wrapping machine.

The first stage incorporates a pair of belts with differential linear speed and a positive stop arrangement. This creates a small head of trays behind the stop and generates a suitable gap when product is released – through the differential speeds – to actuate the stop for the next tray.

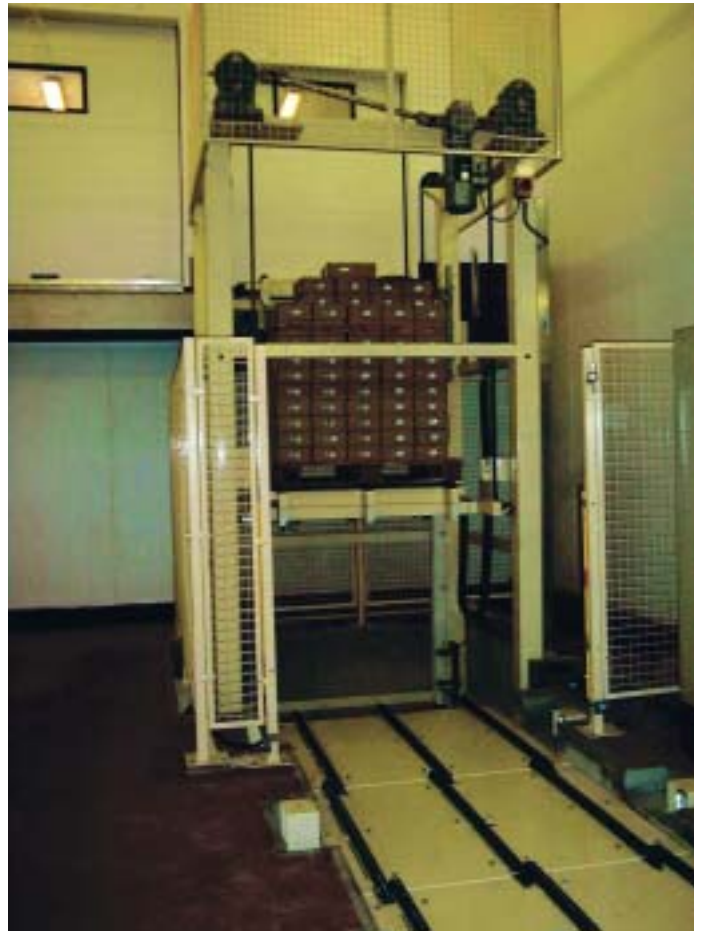
Synchronisation of the transfer into the infeed is achieved through a pair of narrow belt conveyors mounted either side of the wrapper infeed.

A series of sensors monitors both the tray and flight movements and signals the release and acceleration of an individual tray into the wrapping machine flights.

The system was supplied as a standalone unit complete with integral electrical controls, Allen Bradley PLC, single phase inverters, emergency controls, operator interface and auxiliary contacts to connect with associated equipment. This also



**Feeding trays:** Multibelt feeder built by CKF Systems



**Pallet lowerator:** Astec Conveyors built this system for Lubborn Cheese

included all localised interlocked access guards.

**More information - enter I08**

ASTEC CONVEYORS

## Lowerator links levels in cold store expansion

Lubborn Cheese, Somerset, has integrated its new cold store with its distribution centre – two existing adjacent buildings with different floor levels – using a pallet lowerator and accumulating chain conveyor system designed and installed by Astec Conveyors.

The new chilled storage area was created by refurbishing an existing building to free up factory floor space for increased production and packing facilities. However, the floor level is 3 metres lower than the factory and the pallet loads of cheese products tend to be unstable.

Astec's solution is an automatic system that takes pallets from one

level to the other, through a fire rated roller shutter access door.

In the factory, various shaped cheese products are loaded on 1200 x 800mm Europallets, to a maximum of 500kg and 1800mm in height, and then fed, one by one, into a guarded loading station.

An operator starts the system by pressing an accept button, and the pallet moves forward to a stop position in front of the access door. Photocells monitor the presence of the loaded pallets, inhibiting operation of the lift and door until the next station is clear and the platform is located at the top access door.

Then, with all operations monitored by photocells, the door opens, the pallet is fed to the lift, the door shuts and the lift moves down to warehouse level.

Because pallets are moved around the cold store by man rider hand trucks, discharge from the lowerator is at ground level onto triple chain conveyors, designed at the outset to be sunk into the floor as part of the new building construction.

Infill plates are fitted for clean-

liness and safety reasons, with a strengthened 10mm thick plate being located at the end position to support trucks driving on and off.

To overcome possible dead areas which, Astec points out, can occur when transferring pallets on butted chain modules, the system was designed with overlapping chains to ensure positive contact with the pallet base and provide continuous drive and smooth transfer.

The design criteria called on the system to handle pallets of 500kg at the rate of 10 an hour. However the lift far exceeds these capabilities, taking a load of 1500kg and being able to handle 60 pallets an hour.

**More information - enter I09**

#### DT PACKAGING SYSTEMS

## Unscramblers in linear and rotary formats

Swiftpack unscramblers from DT Packaging Systems are available in both rotary and linear formats to handle round and irregular shape bottles.

The Swiftsort rotary unscramblers are made in three sizes and use a rotary starwheel system which is said to provide simple operation with minimal use of size parts.

Bottles are randomly loaded into a large covered hopper where they are raised into the starwheel by the flighted infeed. The starwheel separates the bottles and loads them into pockets which carry them to a sec-

ondary starwheel for placement onto a conveyor, any upside down bottles being ejected using compressed air.

Speed is up to 150 containers a minute while changeover of bottle formats can be completed within 5 minutes without tools.

Swiftpack linear unscramblers are available with a step feeder or disk feeder and give speeds up to 240 bottles a minute.

The step feeder employs flighted steps to position containers onto a belt orientation system, which is said to provide a highly flexible method of separating various types of container, including square and narrow necked bottles with parallel sides, with no need for change parts.

Using stainless steel flights the bottles are fed from the bulk hopper and presented to a belt conveyor on their sides. The bottles are transported by the belt, neck or base first, into the orientation device where they are turned as necessary before being brought upright.

The disk feeder works with the same orientation system as the step feeder, providing rotary feed instead. It can feed curved sided bottles and handle up to 40 different bottle types using a few simple change part sets.

**More information - enter I10**

#### WRIGHT MACHINERY

## Horizontal reciprocation improves handling

A range of horizontal movement conveyors that can be operated in a factory environment in one piece up to 25 metres long, giving gentle product handling, reduced maintenance and improved hygiene in food, cereals and snacks packaging, is now available in the UK from Wright Machinery.

The Slipstick series of conveyors was developed in the US by Triple/S Dynamics and is now being built



**Gentle handling:** Slipstick conveyor avoids risk of damage from vibration

also in Britain by Wright Machinery, following a manufacturing agreement between the two companies. Construction is in stainless steel.

Unlike conventional vibratory conveyors, which employ vertical and horizontal movement to vibrate and carry product forward, the Slipstick conveyors use only differential horizontal movement of the tray. A slow advance carries the product forward and is followed by rapid retraction of the conveyor tray, which overcomes friction in the product.

"Compared with vibratory conveyors, this means that much greater conveyor lengths can be contemplated without risk of damage to fragile products, stratification of mixtures or creation of dust," points out Wright Machinery sales manager Mike Reed.

"Compared with belt conveyors, the single stainless steel tray resists build-up of sticky residue from oily or sugar-based products, since the sliding action is essentially self-cleaning. This means that downtime for cleaning is very much reduced."

The Slipstick conveyor is powered by a single drive unit which can be positioned anywhere along its length. This, coupled to the low profile trays, means that the conveyors can be supported easily from the

ceiling of a production area and the drive unit positioned outside clean areas if required.

Tubes, rather than trays, can also be employed on the Slipstick conveyors to contain hygroscopic or otherwise sensitive materials, while gates can be incorporated for multi-point distribution to packaging machines and screens introduced for size control.

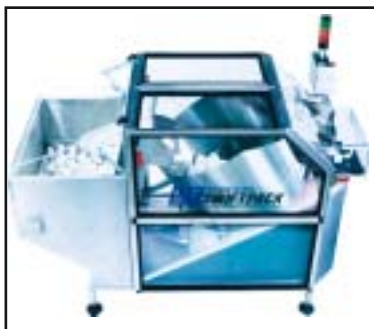
**More information - enter I11**

#### RECORD PELKMAN

## Spiral range can offer better air flow

The range of spiral conveyors built in Italy by Tecnopool is now available from Record Pelkman in choice of configurations and for a variety of food processing applications.

The Tecnopool spiral conveyor is driven by a central shaft, rather than a drum mechanism as in conventional designs which, points out Record Pelkman, gives the advantage that each tier is independently driven, so that tension is equal throughout the conveyor.



**Rotary unscrambler:** Swiftpack machine uses starwheel separation

## MECHANICAL HANDLING

"Another advantage is that the central shaft allows better airflow than a drum, so heat is transferred better in, for example, a proofing spiral conveyor system. Finally, the design makes the system easier to clean," says the company.

**More information - enter I12**

### PROPACK AUTOMATION MACHINERY

## Unscrambler can load bottles into pucks

The Rototech unscrambler has been developed by Italian manufacturer Ronchi particularly to load unstable bottles automatically into pucks, although the machine can also be used as a standard bottle sorter.

Unscrambled bottles are transferred by starwheels to the orientating turret where they are gripped mechanically, inspected for proper orientation and turned 180deg if necessary and placed in the pucks. A no-bottle/no-puck system prevents empty pucks entering the line.

Also built by Ronchi, particularly for personal care, household and medicinal products, is the Rotomatic unscrambler said to be capable of handling pre-decorated and pre-labelled bottles without risk of damage or scratching.

Selector pockets are able to handle different bottle formats without changeparts while an ejector device automatically removes deformed bottles without stopping the machine.

In addition, Propack Automation offers the Halbach HLS 700 linear sorter for handling caps. Two principal UK aerosol manufacturers have now standardised on the machine.

For sorting special containers or where combinations of components make use of standard machinery difficult, Propack is able to supply equipment from DMP, Germany, which specialises in sorting, orientat-

ing and assembly machines. UK installations include units for sorting caps, discs, collars, bottles, tubes and twist-up components.

**More information - enter I13**

### BURGE EQUIPMENT

## Counter and feeder replaces weigh/count

Motor drive rather than vibration is used in a new system for component counting and pouch feeding now available from Burge Equipment, which represents the US manufacturer Palace Packaging in Europe.

Designed to replace weigh counters which, says Burge, may be inaccurate and inconsistent, the system is also capable of feeding loose pouches such as desiccants and sugar sachets from bulk. In addition it can batch-count components as they are produced by a moulding or assembly machine.

The system operates by separating components from each other for counting by movement along variable speed channels in a tray, which is designed for specific products and can be quickly changed over.

For example, the Model OT-12 has up to 12 channels on the tray, depending on the dimensions of the components. A count is taken as components drop into a holding bin, which empties into the container when the set amount is reached.

Up to four containers can be filled at a time. Throughput rate is 240 containers a minute with a single component per container, although this speed can be increased by using a model with a greater number of tray channels.

**More information - enter I14**

For full details of PPMA members able to supply conveyors, unscramblers and product feeding systems, enter 402 on the free reader service card in this issue, or visit the PPMA web site: [www.ppma.co.uk](http://www.ppma.co.uk).