



*The UK's most experienced manufacturer of materials handling & drying equipment.*

# BELT DRYER



# BELT DRIER

## PERRY BIOMASS ENGINEERING

The Perry Belt Drier is ideally suited to drying almost any non-flowing product. Popular applications have included biomass, anaerobic digestate, grass & seeds.

The Perry Belt Drier is ideally suited for these materials:

Wood chip	Beans and soya beans	Extruded pet foods
Wood shavings	Shredded recycled matter	Finely ground wet chips
Wood pellets	Sewerage sludge &	Grass
Other feed pellets	Digestate	Grass seed
Saw dust	Flaked maize	Orange peel
Biomass straw	Nuts	Pulp granulates
Miscanthus and bagasse	Fruit and fruit slices	Solid shredded waste
Herbs	Compost	Granular & shredded plastic
Combinable crops	Cotton rejects	Poultry manure

Traditionally, drying these types of materials has been achieved by rotary drum driers. However this method has many disadvantages, including:

- High risk of fire due to the average operating temperature of 426°C (800°F).
- Balling up of products.
- Potentially volatile emissions which may require additional permits.
- Not suited for heat recovery due to their higher operating temperature.

The Perry belt drier overcomes all of the issues listed above along with being more economically efficient due to the lower operating temperature and providing the opportunity to recover waste heat.

Drying for biomass:

It's highly likely that your biomass materials need to have their water content reduced before you can use them, to:

- Ensure the optimal heating efficiency of the material, including a greater flame temperature.
- Prevent incomplete combustion of the fuel leading to tar and creosote emissions.
- Prevent corrosion of the flue by water recondensing.
- Improve the efficiency of the transport and storage of the material.



A large industrial drier with a complete housing. The drier is a long, rectangular structure with a blue corrugated metal cover. It is situated on a concrete base. The background shows a large green industrial building with a corrugated metal roof. The drier is connected to a network of pipes and ducts. The overall scene is an industrial facility.

Drier with Complete Housing

Product Discharge

# BELT DRIER

## *Key Points*

- Fine mesh drying belt.
- All galvanized construction - stainless steel as an option.
- Multiple heat sources available including biomass, steam, oil, kerosene or gas.
- PLC touch screen panel with internet connectivity.
- Levelling device.
- Modular construction.
- Rotary brush to clean belt.
- Various widths up to 3m available.
- Designed and manufactured in house.
- Optional cooling section.



View of the Exhaust Plenum

## *General Design*

Modular galvanised steel construction available in 1.5m, 2.2m and 3m widths. The drier can be increased in length in 1m increments from 8.5m to 38.5m (including drive and tail). The overall height of the drier is dependant on the heat source chosen.



Drive End



Heat Exchangers



Burners

# BELT DRIER

## *Heat Sources Available*

### Heat Exchangers

- These are commonly used for applications where a biomass heat source is available such as woodchip boilers to produce hot water, or if there is a steam heat source available.
- The drier can be tailored to accept a customer's existing heat exchangers if required.

### Oil or Gas Fired Burners

- If a separate heat source is required a direct fired furnace with diesel, kerosene, LPG or natural gas burner can be used. Alternatively a heat exchanger with the same burner can be used for indirect heating if required.



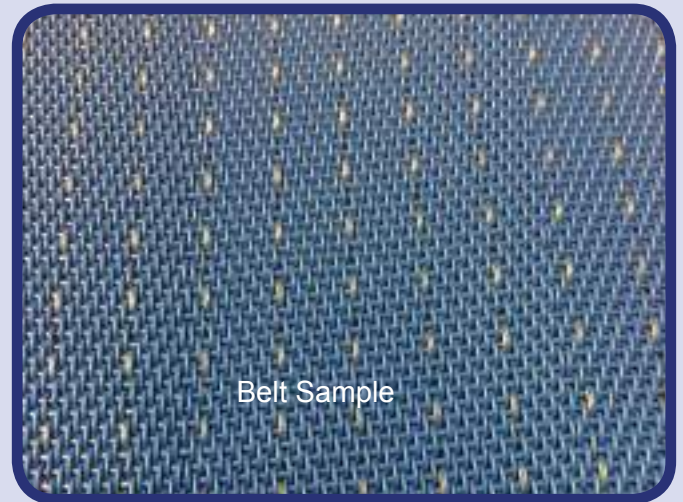
Moisture Content Probe

# BELTDRIER

## *Belt Information*

### Polymer Woven Belt (Standard)

- An anti-static synthetic / bronze weave mesh which is well suited to low temperature driers. Temperatures of up to 130°C.
- Best suited for smaller / finer products, or products which have a wide range of particle sizes such as woodchip.
- The woven in bronze wires permanently prevent electro-static charging of the belt.
- The mesh has a high level of air permeability.
- Two Separate tracking rollers and two rotary cleaning brushes (one at the drive end and one at the tail end).





# BELT DRIER

## Options

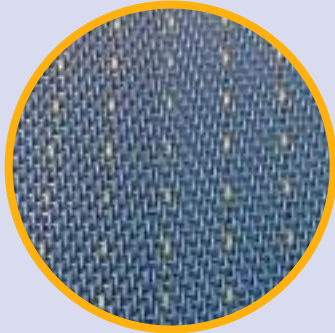
- Feeding hopper that can be used as a buffer hopper to help feed the product evenly over the belt. This feeding hopper will have a number of screw feeders dependant on the width of drier chosen. The hopper can be fed via dump loading, elevators, conveyors or screw conveyors.
- Drier panels can be insulated along the drying section to improve heat retention.
- A false floor option is available for a fully enclosed drier base.
- A complete enclosure can be built around the drier to house the heat exchangers and the fans. This is built with insulated wall panels and two access doors (one in the hot and one in the cold plenum).



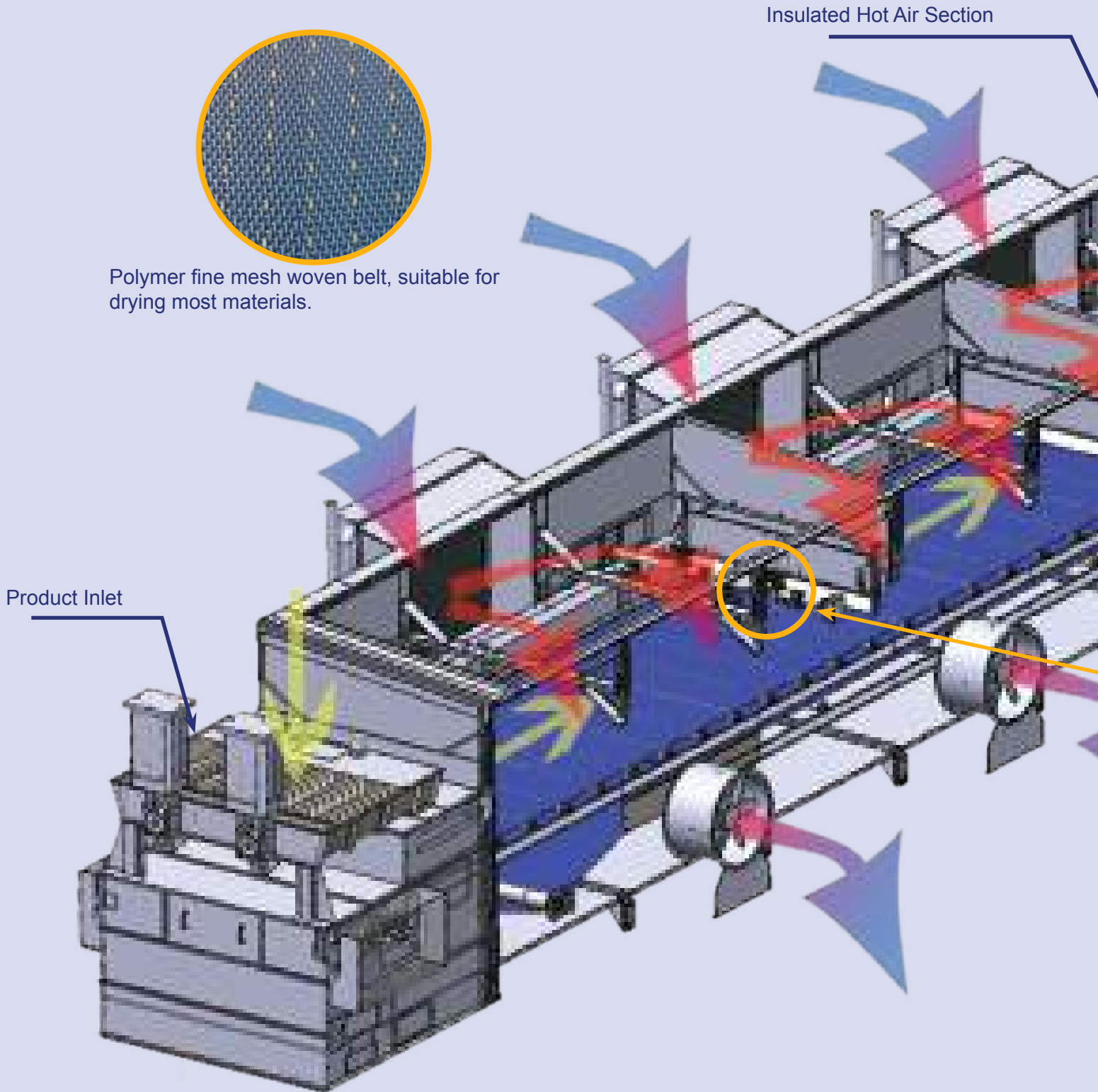
# Principle of Operation

Cold air is drawn through the heat exchangers where it is heated to the required temperature.  
The warm air is then drawn down through the product bed & belt and dispersed through the fans.

*If you would like to discuss how the Perry Belt Drier could be the solution you are looking for please contact us on +44 (0)1404 890300.*

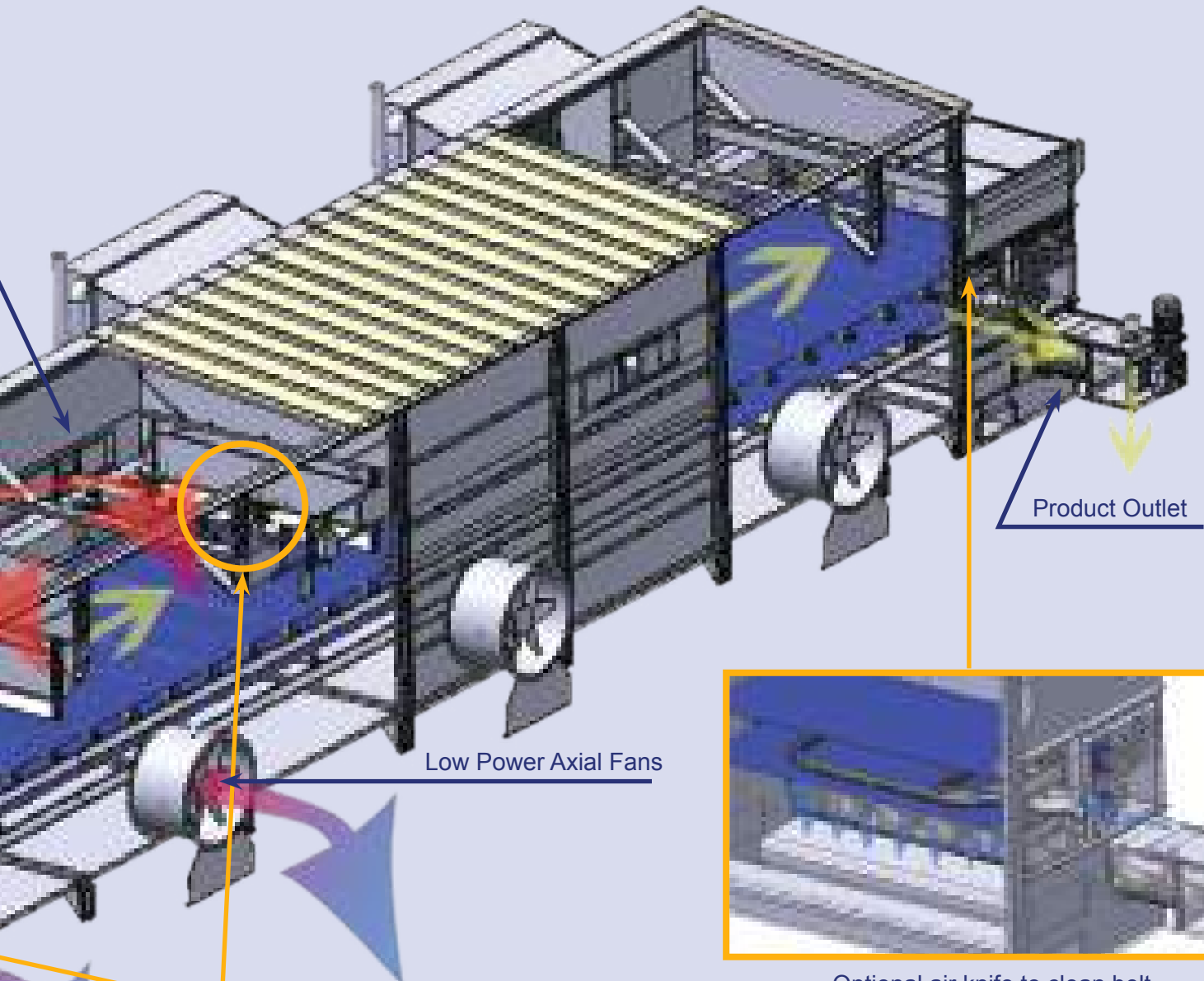


Polymer fine mesh woven belt, suitable for drying most materials.



Wood Chip - Wood Shavings - Sawdust - Straw - Paper Pulp - Grass - Digestate

# BELT DRIER

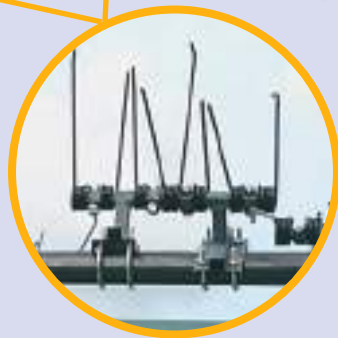


Low Power Axial Fans

Product Outlet



Optional air knife to clean belt.



Optional product agitators to aid even drying.



The UK's most experienced manufacturer of materials drying & handling equipment.

+44 (0)1404 890300 - [sales@perryoakley.co.uk](mailto:sales@perryoakley.co.uk)

Shredded Recycled Matter - Solid Shredded Waste - Granular & Shredded Plastic - Flaked Maize



To find out more about the Perry Belt Drier please call 01404 890300 or email [sales@perryoakley.co.uk](mailto:sales@perryoakley.co.uk). Alternatively you can visit [www.perrybiomassengineering.com](http://www.perrybiomassengineering.com).



Fully Enclosed (FE)



FE Fan Side

FE HEX Side

NE Inside

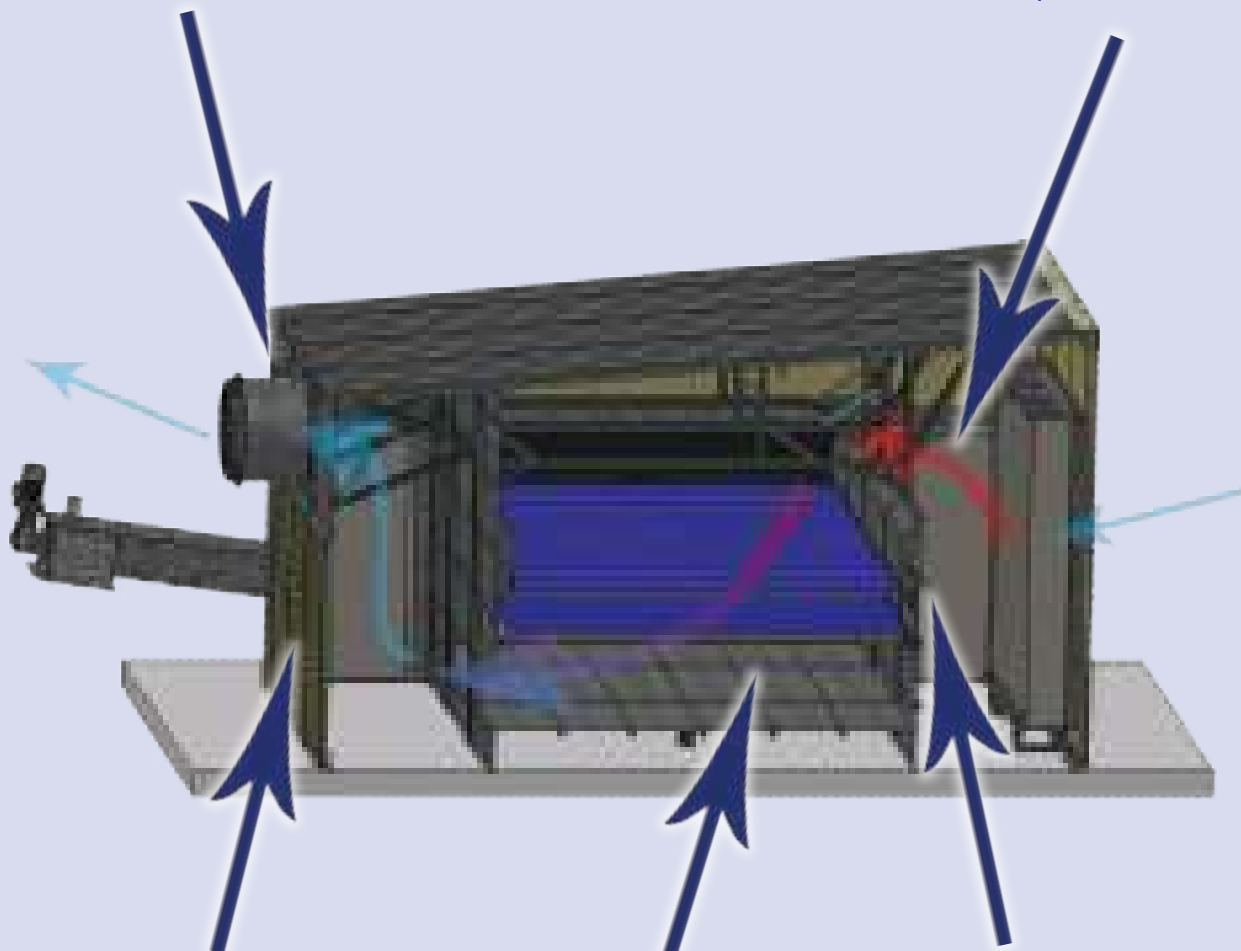


No Enclosure (NE)

# Kingspan Enclosure

Modular design allows for simple future extensions.

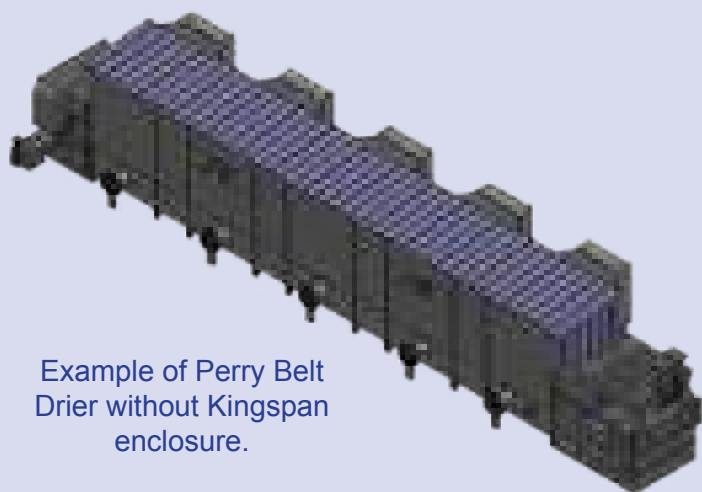
Hot air is directed over the divisions and down through the product bed.



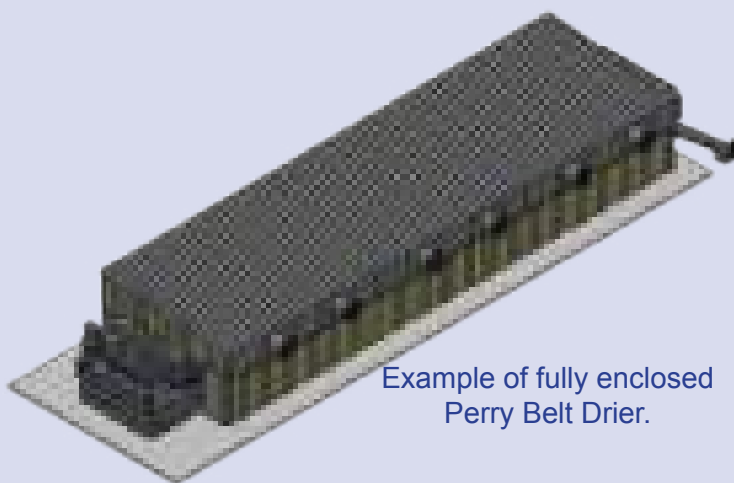
Variety of colours available to ensure your belt drier is aesthetically in-keeping with the rest of your plant.

Easy access for cleaning and maintenance, no need to remove side panels.

Easily clean out fines and dust that may have built up under the drying bed.



Example of Perry Belt Drier without Kingspan enclosure.



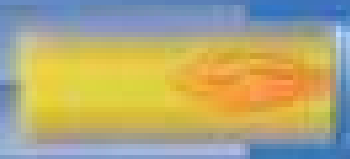
Example of fully enclosed Perry Belt Drier.



9.17

1700715

38.5 °C  
75.0 °C



0.0 MINR

10.0 °C



27.7 °C



50.0 °C

50.0 °C

DRY

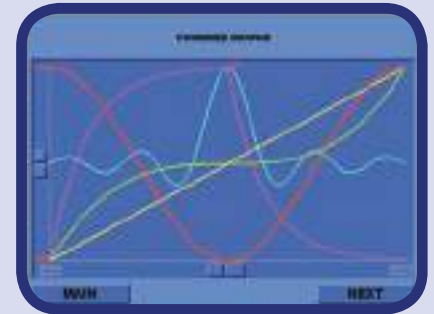
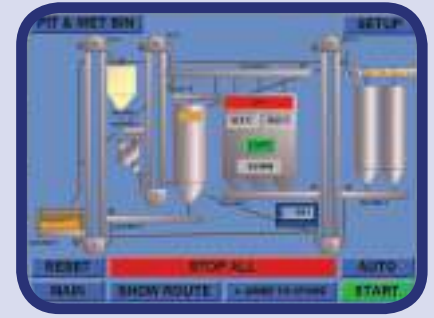
MENU

STOP

# PLC Control Panel

## Overview

- 12" touch screen.
- Simple operation.
- Plain language status alerts.
- Designed and programmed in house.
- Data logging of all readouts and alarms and drier status.
- Moisture contents can be entered during the day.
- Export all recorded drier conditions and moisture contents to a spreadsheet and automatically create daily record sheets.
- Fuel use calculator included for diesel applications.



## Internet Connectivity

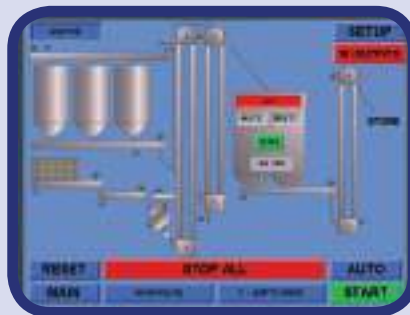
Connect your panel to the internet to:

- Allow status reports to be sent to selected mobile numbers and email addresses.
- Have the ability to control or monitor the drier remotely from any internet connected PC or tablet.
- Download all drier history and data logged records.
- Connect the drier to the internet and allow UK engineers to access the panel for diagnostics or adjustments while you watch the screen.
- Requires internet connection and modem for all features.



## Diagnostics

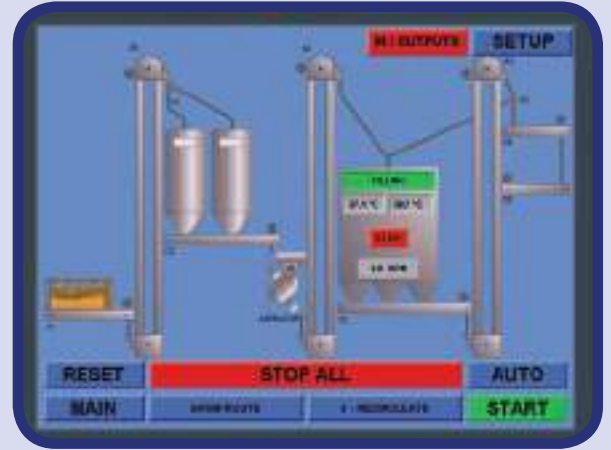
The drier history is recorded and input & output screens display current panel conditions to aid fault diagnostics.



# PLC Plant Control Panel

## Overview

- Additional cost option incorporated in your drier control panels.
- Switch simply between drier and plant control view.
- Can control up to twenty machines as standard.
- Unique mimic drawings for each installation.
- Manual or auto route selection modes.
- Drier operation can be seen whilst in plant control panel display.
- Possible to add routes on site without reprogramming.
- Larger control panels can be provided for large installations.



## Control Panel App

We are pleased to announce the launch of an app and remote desktop connection which allows you to connect to and control your Perry PLC control panel from any PC or IOS / Android mobile device.

The app allows users more flexibility when operating their driers, you can now operate the panel or check the status of your Perry equipment from wherever you happen to be.

**Full control of your drier from anywhere with a WiFi or 3G/4G connection!**

## Phone Application

Free app available from both Apple App Store and Google Play Store.

- Control your Perry PLC drier or plant panel from your phone.
- Two settings allowing you to either view or control the panel.
- Full zoom compatibility making the buttons and screen easier to read.
- Static IP and passwords mean the connection is secure.
- Multiple applications can be installed on different devices.
- Multiple panels can be installed on each application.





# Remote Connection

The remote desktop allows more in-depth analysis of your control panel. Status reports and alarm history have never been so easy to access.

**Sit at your computer while keeping a close eye on your drier!**

## Remote Desktop Operation

- Use the connection exactly the same way as the panel, the screen shows an exact mimic of your panel. Everything that can be done on the panel can be done in the remote connection.
- Static IP and password on the panel can be done in the remote support.
- Application can be installed on more than one device.
- Multiple panels can be connected to the application.

Your panel is connected to the internet which allows you to access the following within your drier panel:

- Status reports in email and text form to be sent to selected numbers and email addresses.
- Can download all alarm history and recorded drier conditions.
- Remote connection by Perry engineers to diagnose any faults.
- Moisture contents can be entered during the day.
- Can export all recorded drier conditions and moisture contents to excel and automatically create daily record sheets.
- Fuel use calculator included for gas and diesel applications.

\*Panel must be connected to the internet with a static IP address and port forwarding facility, no app currently available for Windows devices.



# Perry Belt Drier Key Points

Fitted with a universal belt, the Perry Belt Drier is suitable for all granular products, woodchip, shavings, sawdust, paper pulp, grass, herbs, vegetable slices, SRF, RDF, silica granules, sand, clay pellets and grain. This belt is tightly woven so very few product fines will pass through.



The air enters the top of the drier and is drawn down through the product and the belt. This makes our drier ideally suited for drying light crops as they are not blown off the bed by the air flow; they are consolidated onto it. This means more air gets through the product and allows for maximum drying efficiency. It is particularly good for sawdust, herbs and grasses.



The Perry Belt Drier does not have chains or slats; keeping it very clean. In driers with slats and chains, when products such as grass or herbs are being dried the residue left will decompose and the bacterial count inside the drier will increase. In the Perry Belt Drier there is less chance of damage as materials cannot get stuck in the slats and chains. As the product is fed onto the belt and is stationary during the drying process the Perry Belt Drier is very gentle to the product; there will be no damage caused by it being dragged through the drier over a metal bed by chains and slats.



Slow moving, and very few moving parts, so rates of wear are very slow and cheap to maintain.

Galvanised modular construction. 2m long standard sections. Drive, tail and tensioning section are sent to site pre built. The rest of the sections are sent to site in panel form. The drier can be extended after purchase at a later date very easily. This makes it easier to plan for the future and extending the drier instead of having to add another drier. Also, the galvanized construction is well suited to resisting corrosion caused by the damp air when drying.

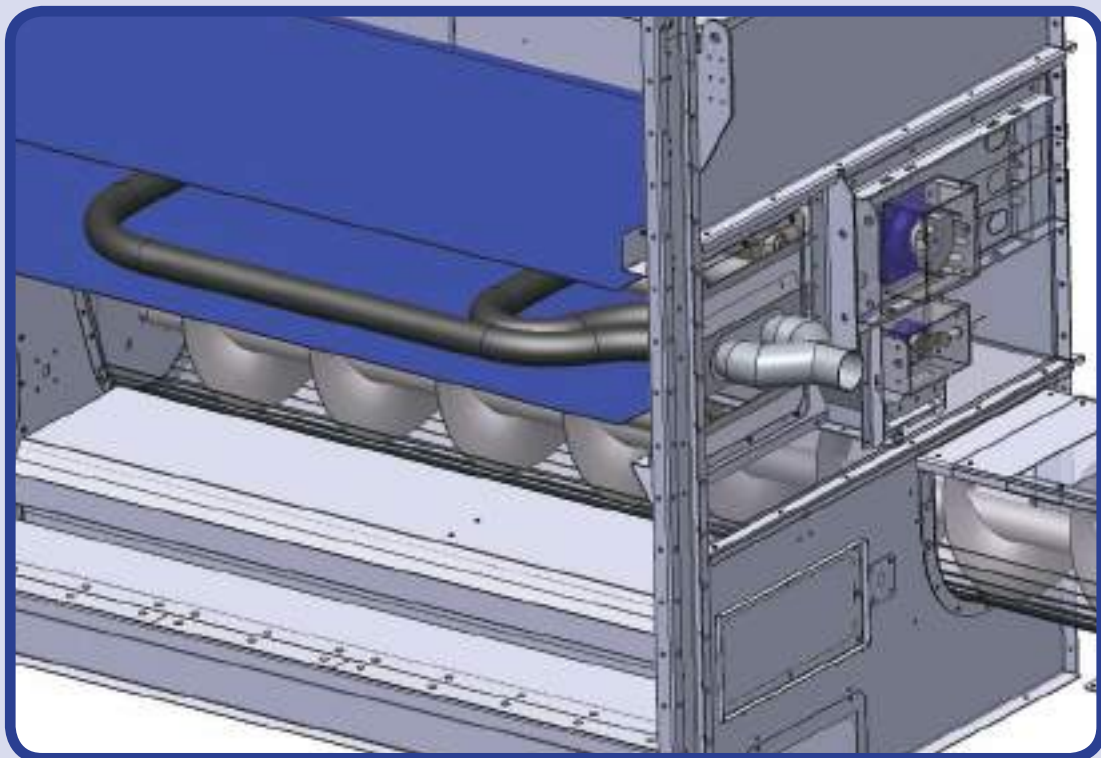


Because there is no louvre system or mesh material that the product is being moved over there are no air gaps to become clogged by small residue so the drier performance stays consistent all of the time and there is no perforations to clean in the drier body.

There is a rotary brush to clean the belt as standard and for usual biomass and granular products this should be satisfactory. Because we are cleaning the belt every piece of the belt is cleaned once per revolution automatically.



Alternative cleaning methods include an air knife, which can blow small particles out of the belt, or a high pressure water jet cleaning system for more sticky products. Both methods work after the drive drum to clean the belt before returning to the inlet.



The PLC screen is full colour. There is an SD card in the PLC and it logs data to this, which can then be plugged into a laptop and downloaded or if there is an internet connection with a fixed IP address you can connect remotely and download it. We can also connect from the office to the drier for diagnostic purposes. The internet connection allows remote control and monitoring of the drier using a laptop or mobile device.



Automatic control as standard is by measuring air temperature on the same principle as the grain drier. The way this works is to measure the air temperature above and below the belt at the inlet and outlet of the drier. When the temperature below the belt drops at the inlet this indicates damper chip entering the drier, the PLC will then slow the belt down to compensate. If the temperature below the belt at the outlet end increases this will indicate that the chip is getting over dried so the PLC will speed the belt back up a little. An extra cost alternative will be a system using microwave moisture sensors to actually measure the moisture and control the speed from these readings. With the moisture sensors the actual moisture is measured but the PLC program makes the adjustments in the same way.

Sealing for product leakage and air leakage is done using a soft rubber side skirt. This is adjustable as it wears to help maintain an efficient seal, they are a slow wearing part.



We have an automatic belt tracking device which works using a sensor at the side of the belt to sense if the belt wanders to one side. If the sensor is touched then an electric actuator changes the angle of the tracking roller which sends the belt across to the opposite side.



For large scale applications enclosing the drier in a Kingspan composite panel structure is a good alternative. This means that the main galvanized body is completely covered by the insulated panels apart from the drive and tail end of the drier. This means the HEX can easily be mounted on the vertical side of the structure and the fans can be either mounted on the roof or top of the vertical side of the cold plenum. The drier can be made to blend in with its surroundings. It is more expensive than standard galvanized finish.



Everything you see in the brochure we design and manufacture in house, in our UK based factory.

Optional cooling section.



For products that can be mixed during the drying operation we have rotary agitators positioned along the drier.



For smaller applications there is a mobile option.



# Perry Belt Drier Case Study

## Pontypool - Dordtech

- The drier uses 1.2MW of heat from a large gasifier plant and has been specifically designed to have a low power consumption.
- This drier is the 2.2m wide Perry Belt Drier.
- This installation features our new polymer woven belt that is an anti-static synthetic / bronze weave mesh which is well suited to both low and high temperature driers. Because the belt is tightly woven it makes it suitable for products with a wide range of particle sizes such as woodchip and sawdust, the design itself allows for a high level of air permeability.
- The drier has been designed with a complete insulated enclosure which will house the heat exchangers and the fans.
- The drier is mainly being used for G50 / 76G30 woodchip.
- The reclaimed heat used to dry the woodchip allows them to claim an RHI (renewable heat incentive) grant.





# Example Driers



## New Zealand - Broad Leaf Grass

- Throughput capacity of 660kg per hour on clean broad leaf grass.
- Drying temperature: 90 degree Celcius.
- Moisture reduction of 77% (82% down to 5%).
- Overall drier length of 25m.
- Belt width: 2.13m.
- Heat source: hot water - 1.2 MW.



## Cumbria - Lucerne

- Throughput capacity of 1,400kg per hour on lucerne.
- Drying temperature: 110 degree Celcius.
- Moisture reduction of 77% (85% down to 8%).
- Overall drier length of 19m.
- Belt Width: 2.13m.
- Heat source: hot water - 2MW.



## Exeter - Woodchip



- Throughput capacity of 7,800kg per hour on G50 forestry woodchip.
- Drying temperature: 90 degree Celcius.
- Moisture reduction of 30% (50% down to 20%).
- Overall drier length of 32m.
- Belt width: 3.14m.
- Heat source: hot water - 4MW.



## Winchester - Arboretal Waste

- Throughput capacity of 4,300kg per hour on G50 forestry woodchip.
- Drying temperature: 90 degree Celcius.
- Moisture reduction of 30% (50% down to 20%).
- Overall drier length of 27m.
- Belt width: 2.13m.
- Heat source: hot water - 3MW.





### *Hull - Short Chopped Grass*

- Throughput capacity of 1,400kg per hour on forage grass.
- Drying temperature: 80 degree Celcius.
- Moisture reduction of 40% (50% down to 10%).
- Overall drier length of 19m.
- Belt width: 1.6m.
- Heat source: hot water - 1MW.

### *Bridgwater - SRF*

- Throughput capacity of 3,400kg per hour on SRF.
- Drying temperature: 90 degree Celcius.
- Moisture reduction of 9% (17% down to 8%).
- Overall drier length of 14m.
- Belt width: 1.6m.
- Heat source: diesel burner - 1.5MW.



### *Taunton - Woodchip*

- Throughput capacity of 5,600kg per hour on G50 forestry woodchip.
- Drying temperature: 90 degree Celcius.
- Moisture reduction of 30% (50% down to 20%).
- Overall drier length of 31m.
- Belt width: 2.14m.
- Heat source: hot water - 4MW.



### *Saudi Arabia - Flaked Maize*

- Throughput capacity of 10,000kg per hour.
- Drying temperature: 90 degree Celcius.
- Moisture reduction of 11% based on flaked maize.
- Overall drier length of 15m.
- Belt width: 1.6m.
- Heat source - diesel burner - 1MW.

## *Doncaster - Short Cut Grass*

- Throughput capacity of 3,900kg per hour.
- Drying temperature: 100 degree Celcius.
- Moisture reduction of 60%.
- Overall drier length of 31m.
- Belt width: 2.14m.
- Heat source: hot water - 4MW.



## *Petersfield - Short Cut Grass*

- Throughput capacity of 6,600kg per hour.
- Drying temperature: 100 degree Celcius.
- Moisture reduction of 20%.
- Overall drier length of 28m.
- Belt width: 3.14m.
- Heat source: hot water - 3MW.

## *Exeter - Woodchip*

- Throughput capacity of 5,600kg per hour on G50 forestry woodchip.
- Drying temperature: 90 degree Celcius.
- Moisture reduction of 30% (50% down to 20%).
- Overall drier length of 31m.
- Belt width: 2.13m.
- Heat source: hot water - 4MW.



## *Pontypool - Woodchip*

- Throughput capacity of 3,100kg per hour.
- Drying temperature: 60 degree Celcius.
- Moisture reduction of 30%.
- Overall drier length of 29m.
- Belt width: 2.13m.
- Heat source: hot water - 2.3MW.


### *Aberdeen - Woodchip*

- Throughput capacity of 3,280 kg per hour on G50 forestry woodchip.
- Drying temperature: 95 degree Celcius.
- Moisture reduction of 50%.
- Overall drier length of 24m.
- Belt width: 3.14m.
- Heat source: hot water - 3.4MW.



### *Runcorn - Woodchip*

- Throughput capacity of 3000 kg per hour.
- Drying temperature: 80 degree Celcius.
- Moisture reduction of 20%.
- Overall drier length of 16m.
- Belt width: 2.13m.
- Heat source: hot water - 1.2MW.



Twin Trace Conveyors

Belt & Bucket Elevators

Belt conveyor



# BIOHANDLING

Perry's can provide a complete handling and storage solution to enable the belt driers to be fed with wet product and to take the dried product to store - including belt conveyors, screw and tubular conveyors, bucket elevators, chain and flight conveyors & twin trace conveyors.

## BIOBIN

To use a biomass boiler you need a place to store your biomass fuel and a mechanism to consistently deliver the fuel into your boiler system. This has traditionally been provided by an existing storage area. We challenged ourselves to design a storage solution for those facilities that required bulk storage of biomass fuels but lacked an existing suitable storage area for them. The Perry Biobin is a storage silo built from pre-galvanised panels that can be quickly and easily assembled to provide significant onsite biomass storage.



## BIOINTAKE

The delivery of biomass fuels has traditionally been serviced by noisy specialist delivery trucks which have proved to be unpopular due to their expense, noise pollution and the lack of speed to the actual delivery process. The biomass boiler systems run smoothly once the fuel is in the storage area. Our challenge was to engineer a delivery solution that would take the effort, expense and noise out of the fuel delivery process.

The Perry Biointake combines a reception hopper with a vertical auger to seamlessly move the biomass fuel from the point of delivery by a standard tipper truck into the Biomass storage area, at the push of a button. The hopper comes fitted with an easy to operate winched lid, which, when open, acts as a splash back to minimise the spill of the fuel during the tipper truck delivery. Any blockages during the delivery can be easily remedied as the construction of the Biointake is tubular allowing for the removal of side panels. It has been designed to require two hand operation of the safety switch to ensure the operator is in the view of the tipping pit at all times. The Biointake has been designed to operate at less than 60db, making it one of the quietest biomass delivery systems available on the market.



# Biomass Handling Case Study

## Crediton Leisure Centre

- 199kw ETA boiler.
- 60 cubic M capacity Biobin woodchip storage silo.
- 60 cubic M per hour Biointake woodchip intake system.
- Fuel delivery by tipping trucks - one delivery every two weeks.
- Biobin is a fully galvanised flat bottomed storage silo. It comes in simple to erect kit form and can be plain galvanised finish or clad with timber or box profile sheeting. Sight glasses fitted and two access doors.
- Biointake operates less than 60db.
- Very high specification 10mm thick auger flighting.
- Full safety switch system.
- Bin full probes and blockage probes.
- Pre-wired "plug & play" to minimise site costs.



# Perry of Oakley since 1947

Perry of Oakley was founded in 1947 by Tom Perry, a farmer's son, who offered a mobile repair and manufacturing service to local farmers and businesses in the Oakley, Basingstoke area of Hampshire.

Working from home he converted an Austin 12 car into a mobile workshop; the back seat was replaced by a bench and welder. He travelled all over the country, sleeping in a tent if away from home, repairing farm machinery, (tubing traction engine boilers, welding combines & binders) in the field.

In 1949 Tom Perry designed and built our very first belt and bucket elevator with a capacity of 5tph. 1949 also saw the introduction of our first grain cleaners. These early cleaners were equipped with mechanical sieves and aspiration to lift off dust and light rubbish.

During the early 1950s many new farm mechanisation aids were designed by Tom Perry and manufactured in Oakley. These included tractor mounted buck rakes, trailers, dust reduction systems for

combine harvesters and jog trough grain conveyors driven by petrol engines or electric motors. These conveyors had capacities of up to 5tph, as capacity requirements increased the first chain and flight conveyors were developed. These conveyors were the fore runners of the conveyors that Perry's currently design and manufacture with capacities up to 650tph.

In 1952 the first factory was built in Oakley it measured 60 foot x 40 foot.

In 1955 our first continuous flow grain drier was manufactured also with a capacity of 5tph.

The business steadily developed based on its reputation of delivering reliable, well engineered conveyors and bucket elevators during the early 1950s. Export sales of Perry's

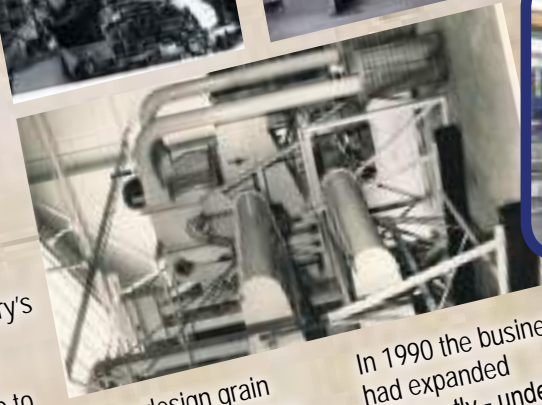
own design grain driers developed as well as adding dust extraction equipment and weighing hoppers to the range. The conveyor range was expanded to include curved & inclined conveyors and flow & return types.

In 1974 a brand new purpose built manufacturing facility was built in Oakley, Basingstoke.

During the next 16 years the business continued to grow.

In 1990 the business had expanded sufficiently - under the direction of Tom's son Nigel Perry - to require larger premises and a relocation move to Honiton, in Devon, was made.

The following year Nigel's son, David, joined the business - having achieved a First Class Honors degree in engineering.



Since October 2007 when David Perry took over as managing director, Perry's have continued to expand and plan for the future. Investing in the very latest CAD CAM technology, including three dimensional design facilities and the latest fully automated punching and forming machinery.

All Perry of Oakley Ltd. products are designed and manufactured in the purpose built facility in the West Country using a depth of knowledge acquired during more than of business.

We have a large engineering and design department and have a very active research and development program. We provide expert technical support for our machinery worldwide and we stock one of the most comprehensive spare parts inventories in the trade.



To find out more about the Perry Belt Drier please call 01404 890300 or email [sales@perryoakley.co.uk](mailto:sales@perryoakley.co.uk). Alternatively you can visit [www.perrybiomassengineering.com](http://www.perrybiomassengineering.com).



SHAPA's 2017 'Exporter of the Year' award winners &  
2018 DIT Export Champions.

# Perry of Oakley Ltd.

Dunkeswell Airfield,  
Dunkeswell,  
Honiton,  
Devon,  
EX14 4LF

Phone

Sales: +44 (0)1404 890 300  
Support: +44 (0)1404 890 305

Web

E-mail: [sales@perrybiomassengineering.co.uk](mailto:sales@perrybiomassengineering.co.uk)  
Web: [www.perrybiomassengineering.co.uk](http://www.perrybiomassengineering.co.uk)

