STRONGA

Think Green

Discover the FlowDrya Range

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To make the most of your spare residual heat, you need a dryer that leads the way in versatility, performance and ease-of-operation.
Stronga FlowDrya allows you to go with the flow and stay productive, all of the time.

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The Green Revolution

Some materials require specific handling during the drying process while others require tight regulation of drying air temperature.
FlowDrya is the only drying solution offering the flexibility to cope with the varying properties of different wet materials.

Maximising System & Thermal Efficiencies

Stronga are leading advisers, designers, manufacturers and installers of high performance drying systems which match the clients' wet material and energy availability. Our team use their expertise to build client relationships, leading to designs which maximise system and thermal efficiencies.

Environmental Sustainability

Stronga FlowDrya offers clients the opportunity to efficiently convert residual heat into added value through drying and reusing wet by-products. Directing spare residual heat through wet materials in FlowDrya allows clients to contribute in their own small way to environmental sustainability and a greener future.

Quality. Reliability. Versatility.

With many years experience, Stronga's drying systems have developed a reputation for quality, reliability and versatility. Our skilled technicians and engineers have developed a wealth of knowledge about drying from testing our FlowDrya continuous dryer with various materials; in different countries and climates.

Stronga - Your Business Partner

Stronga offer a wide range of FlowDrya models and bespoke options while standing ready to support clients in selecting the optimal specification for their drying project. We strive for continuous improvement in the products and services we provide, building trust with customers by adding real value to their businesses.

Join The FlowDrya Family

FlowDrya **Overview**

What set's Stronga apart? Value-driven approach to projects ☑ Individual & communicable ☑

Reliable. Efficient. Well-proven.

FlowDrya is modern, energy-efficient, highly reliable and well-proven in drying a range of wet materials. FlowDrya features all the attributes our clients require from a modular, continuous-flow drying system:

- Versatility to dry a wide range of wet materials ☑
- Very long service life with stunning reliability ☑
- Unbeatable thermal and electrical efficiency ☑
- Extremely low service and maintenance costs ☑
- Intelligent control systems - easy to operate ☑
- Uniformly dry output with PulseWave™ mixing ☑
- Wide range of models and capacities available ☑
- High capacity infeed hopper – minimising labour ☑

Tailored to Your Needs

There are endless lists of wet materials that need to be dried so they can be further processed, stabilised and utilised. Some materials require specific handling during the drying process, others require tight regulation of drying air temperature and the value of others may be increased with minimal cost and by using waste heat only.

FlowDrya is one of the only continuous drying solutions available in the market offering the flexibility to cope with the varying properties of different wet materials.

Unlocking Value & Potential

With intelligent consideration of your unique material, location and available heat source, we are able to offer customers optimised solutions to maximise value from the flow drying process. The flexible FlowDrya system enables unlimited drying potential, leading to long term financial profitability and productivity.

FlowDrya owners should be aware that performance variations may occur if they choose to dry materials other than the one that was initially specified in the brief.

WASTE DISPOSAL & RECYCLING

FEED INDUSTRY

FUEL PELLET INDUSTRY

FlowDrya **Overview**

What set's Stronga apart? Practical, long life equipment ✓ Reliable & easy-to-use solutions ✓

Economic Drying Solutions

Low Capex – FlowDrya offers excellent value for money at point of purchase. The Stronga team consider the whole business case for each project to ensure we offer optimised drying solutions for maximum value.

Low Opex – When compared to the competition, FlowDrya offers the lowest energy cost per operating hour. Automatic mode controls (with moisture monitoring), automatic discharge and extended periods between refilling minimise expensive labour hours in dryer operation.

Low Ownership Costs – FlowDrya offers extremely low ownership costs from fully considered component quality which ensures maximum uptime, productivity and low service costs. Our reputation for quality-built equipment provides strong residual values and a low cost of ownership.

Harnessing Residual Energy

Our experience has taught us that there are many wasted heat sources from flue gases to process heat and CHP cooling. We believe that wasted heat should be fully utilised for both financial and environmental benefit. To make the most of your spare residual heat, you need a dryer that leads the way in versatility, durability and ease of operation. The following wasted residual heat sources can be harnessed by diverting spare heat via heat exchange into FlowDrya, adding value by drying available wet material:

- Gas engine thermal output from landfill & AD plants ✓
- Industrial heat from cement production & more ✓
- Residual heat from Organic Rankine Cycle units ✓
- Residual heat load from steam turbines and more ✓
- Other hot exhaust air and flue gas sources ✓

Effortless Drying Operations

Continuous FlowDrya operations are incredibly simple yet extremely effective. Processes can be fully-automated with conveying systems and augers regulating the flow of material into the dryer's hopper and away from the output end. This ensures energy-use efficiency is optimised and production is maximised while closely observing the required final moisture content of the dry output.

During the commissioning phase, Stronga work with the operator(s) to ensure they are fully trained with the flow dryer controls, safety, service and maintenance. The comprehensive training procedure ensures the operating team feel confident to take charge of the flow drying process.

Choose FlowDrya When There's No Time For Downtime

Unplanned downtime has impacts beyond cost, often extending to those dependent on your dry output. That's why we've built the most reliable drying solution in the market. No belts, chains and sprockets and powerful hydraulic components ensure excellent uptime and long service life.

Conversely, moving belt type dryers are complex with numerous parts moving and wearing out. The belt has to be frequently cleaned using air, water or brushes. It can slip, stretch and be damaged by certain objects, leading to costly and lengthy downtime. If you want a dryer that is cost-effective, purpose-built and reliable to run; look no further than FlowDrya.

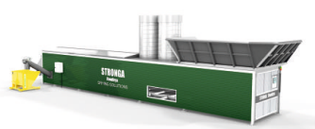
Purpose-Built Design

FlowDrya is specifically built for demanding markets with reliable operation up to 8000 hours per year. High capacity designs optimise thermal efficiency and performance, offering great value in the form of lowest cost per tonne dried.

Compared to other dryers in the market, FlowDrya has an extremely low electrical energy requirement, while ensuring efficient drying of wet materials into high value, stabilised dry output.

Simplicity is Paramount

Every Stronga product is designed to comply with our core principle of building simple, reliable and easy-to-operate machines. The FlowDrya continuous dryer positively moves wet materials from a hopper (end loaded or top deck), along a hydraulic-powered moving floor and over a flow of temperature-controlled drying quality air, fed from a variety of efficient, optimised heat sources. Simplicity is paramount with FlowDrya.



DryStation™ **Control System**

DryStation™ Control System

Stronga optimise drying outcomes through intuitive controls coupled with comprehensive operator training. FlowDrya is designed for continuous operation but drying conditions may change depending on the input material wet basis moisture content, ambient temperature and environment humidity. Some heat loads also fluctuate in the supply of thermal energy due to various factors.

The DryStation™ control system allows operators to configure set points, incorporating automatic modes which adjust operational factors in line with changing conditions. With the remote access option included, the entire DryStation™ control system can be monitored and controlled through digital technology using an iPad, iPhone, Android or desktop.

HMI Touchscreen Interface

The illuminated DryStation™ HMI touchscreen is the user's graphical interface between the PLC system and the dryer. DryStation™ enables instant access to controls, operating and safety parameters; incorporating the following equipment:

- High resolution wide-screen colour display ✓
- Extremely easy touchscreen usability ✓
- 3D imaging of your dryer with key parameter icons ✓
- Remote access potential (remote control or SCADA integration) ✓
- Energy-usage monitoring and display ✓
- Modern soft-start technology ✓
- Explanative fault-finding notifications built-in, on-screen ✓
- Time-stamped data recording for operational analysis ✓

Performance, Maintenance & Insight

FlowDrya operations are managed by a Programmable Logic Controller (PLC) which maximises efficiency and reliability while reducing time and management costs. Integrated within the dryer, the robust PLC has durable infrastructures designed to withstand local operating temperature variations. FlowDrya's programmable control systems also offer safe and secure data logging which enables users to analyse key factors and optimise drying results.

Next generation DryStation™ modern smart controls optimise drying processes securely and reliably.
FlowDrya controls give you peace of mind while helping to improve drying efficiency and project outcomes.

Success,

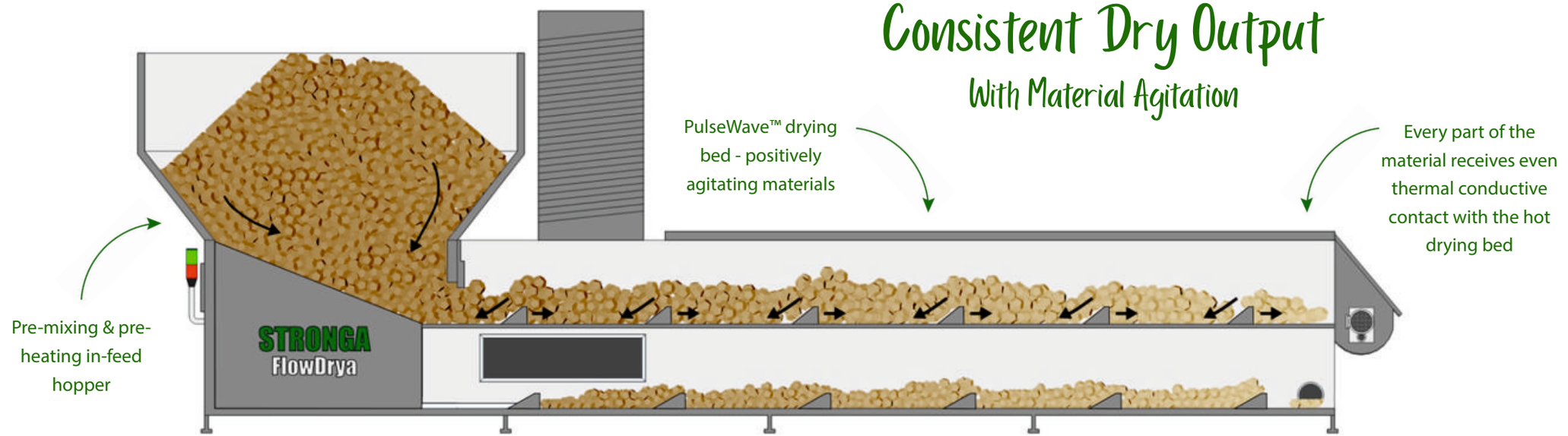
Only by Controlling

PulseWave™ **Mixing Motion**

PulseWave™ Material Agitation, Explained

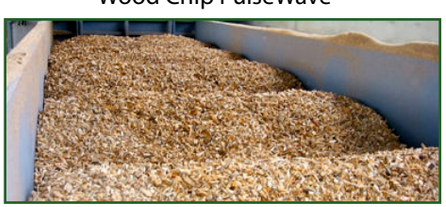
FlowDrya's unique selling point is PulseWave™ - the naturally-occurring, automatic agitation of materials as they are continuously tumbled along the hydraulically-powered moving floor. The main benefit of the PulseWave™ agitation motion is that it ensures every part of the material load receives even thermal conductive contact with the hot drying bed; this helps optimise uniformity of output dryness; a big benefit when compared to non-agitating belt dryers.

During the forward stroke of the moving floor, materials are tumbled forwards by the pushing blade face, causing a larger driving force low to the bed. The driving force is weaker above the pushing blade, causing materials at the wave's crest to lag and tumble backwards. In the return stroke, materials are lifted over the tilted axis of the blade to form another wave. As the crest height grows, the wave becomes unstable, causing materials to tumble forwards and backwards, ensuring full agitation on every single stroke. Each stroke, materials are displaced from their position which doesn't occur in belt drying situations; this means that each particle receives equal access to warm airflow and thermal conduction during the FlowDrya drying process. The graphic beneath visualises the PulseWave™ agitation motion.



Grass PulseWave™

Wood Chip PulseWave™



Grain PulseWave™

Hemp PulseWave™

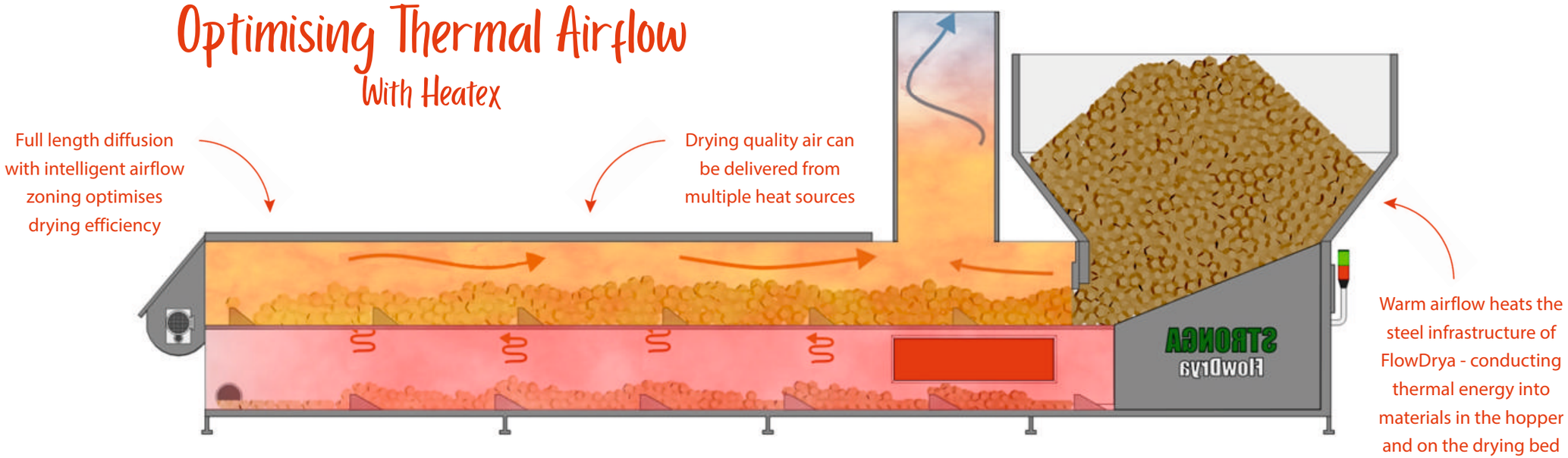
Heatex **Airflow Injection**

Drying using Warm Air & Thermal Conduction

FlowDrya is able to raise materials to an evaporative temperature quicker than any other dryer available in the market because drying occurs in two different ways; (1) air drying and; (2) thermal conduction. Injecting drying quality air through materials as they roll, tumble and flow along the hydraulically-powered bed optimises evaporative drying to evenly reduce moisture content to the client's individual requirements.

Learn more about the flow drying process:
(1) Drying quality air is delivered by the Heatex unit which can utilise multiple heat sources - low grade residual process heat; CHP engine heat; biomass boiler thermal output; & more.
(2) Warm airflow heats the insulated steel structure of the sub-floor plenum, conducting thermal energy directly into materials on the drying bed to supplement the air drying process.
(3) Warm air rises through the ventilated floor and through the material. Full length diffusion with intelligent airflow zoning optimises drying as the material changes state from wet to dry.
(4) Saturated exhaust air dissipates into the atmosphere via suitably-sized flue ducting, or alternatively, it can be re-circulated via clever, modern, well-designed energy-recovery systems.

Optimising Thermal Airflow With Heatex



Digestate Fibre PulseWave™

Manure PulseWave™

Paper Pulp PulseWave™

SRF PulseWave™

Wet Materials & **By-Products**


Alfalfa


Hemp


Herbs


Pumpkin Seeds

Unique Materials. Individual Needs. Special Solutions.

Stronga have a variety of drying solutions available to suit your wet material. We consider the available heat source while advising on the dryer scale and other factors which contribute to optimal drying outcomes. Our in-house technical team use years of experience to build bespoke drying systems designed to match the individual properties of the product, maximising system and thermal efficiencies. Our approach of matching modular, custom-built equipment to the specific needs of the client delivers the most efficient 'whole system' drying solution. To the right, see the various wet materials, by-products and sectors Stronga have had successful experience operating with and within.

Helping Businesses Achieve More

Stronga provide drying solutions for businesses from a wide range of sectors, including agriculture, forestry and recycling; and material groups such as biomass, biogas fibres and waste to energy fractions. These materials and by-products include digestate fibre, wood chip (all grades), SRF, RDF, grain, forage biomass, paper sludge, waste by-products and much more.

Utilising Multiple Heat Sources

FlowDrya utilises multiple heat sources such as low grade residual heat, CHP engine heat, flue gas heat, biomass boiler heat and more. Drying airflow is regulated through inverter-driven Heatex fans to achieve efficient, low temperature drying.

Drying Forage & Biomass

FlowDrya can be used to remove moisture from biomass, adding value and stabilising the product while reducing weight and preserving quality, as well as minimising storage and transport costs. Dried biomass can be used as an on-site plant nutrient, animal feed, sustainable fuel or CBD oil extraction in the case of hemp, helping you move towards the benefits of circular economy. Stronga consider the properties of the biomass to be dried, plus the other important variables to deliver optimised biomass drying solutions at lowest cost. Stronga has experience drying a wide range of biomass materials including forage biomass, hemp, lucerne, alfalfa and grass.

Drying Waste to Energy Fractions

FlowDrya can dry SRF down to the optimum moisture content for use in energy from waste plants, pyrolysis plants and cement kilns. Drying SRF to optimum moisture content is vital because cement works refuse out-of-specification material while waste to energy plants apply high cost-per-ton penalties. In addition to increasing calorific value, waste management facilities owning FlowDrya also benefit from:

- Significantly reduced landfill costs ✓
- Significantly reduced transport costs ✓
- Reduced Energy from Waste export costs ✓
- Improved processing productivity (baling fuel) ✓
- Meeting fuel calorific value requirements ✓


Sewage Sludge


Compost & Soil


Maize


Boiler Ash


SRF & RDF


MSW

Digestate Fibre

Poultry Manure

Oats

Paper Pulp

Rice

Straw

STRONGA

Drying Digestate Fibre

FlowDrya can use available process heat at biogas installations to dry digestate fibre from various feed-stocks, throughout the year. In the case of a biogas installation, Heatex replaces the waste heat cooler, utilising wasted heat into useful drying quality air. AD facilities require reliable, high-duty cycle equipment operating over 8000 hours a year; FlowDrya perfectly meets these requirements with simple, long life and energy-efficient operation. Dried, stabilised digestate fibre can be used as;

- Comfortable animal bedding ☑
- Stabilised organic fertiliser ☑
- Soil improver with landscaping potential ☑
- Biofuel & much more ☑

Drying Crops

Drying crops with FlowDrya prevents risk of expensive spoilage and losses by preserving the product. Where many dedicated grain dryers remain idle for much of the year, FlowDrya has a high utilisation factor, lowering costs, increasing output and adding value for owners. The moisture metre is a popular option for autonomous crop drying operations while equipment is also available for remote control via desktop or mobile. FlowDrya can be used for drying various crops, including;

- Cereal grain crops ☑
- Seeds (rapeseed, pumpkin seeds & more) ☑
- Pulses / grain legumes (beans & peas) ☑
- Maize / corn & much more ☑

Drying Woody Biomass

FlowDrya can be used throughout the year using residual heat for drying various forms of woody biomass including wood chips, wood shavings and sawdust. Drying woody biomass increases combustion value while stabilising the product and lowering storage costs. Drying is also frequently used as pre-treatment for wood gasification or for processing into briquettes, pellets and other value-added products. Failing to dry woody biomass can result in value loss through decomposition, degradation and other natural effects. FlowDrya is the ideal drying solution for woody materials due to the PulseWave™ motion, modern controls, reliable operation and high duty-cycle.

Activated Carbon

Peas & Beans

Sawdust

Coconut Husk

Wood Shavings

Wood Chips

FlowDrya **vs. The Other Guys**

Comparing FlowDrya against conventional belt drying systems

Comparing: **In-feed Hopper Capacity** 1

FlowDrya has several in-feed hopper arrangements available with capacities to the suit the material to be dried, customer's requirements, bulk density and moisture to be removed. Through thermal conduction, the in-feed hopper raises material towards evaporative temperature before they reach the drying bed while large cubic capacities maximise loading intervals. 'The Other Guys' require complex in-feed conveyor arrangements which make the process labour-intensive and expensive to maintain.

Comparing: **Dry Output Discharge** 2

FlowDrya actively pushes dry output from height at the end of the drying bed; this enables ample space for above-ground discharge onto conveyors, cross augers or bunkering into a suitably-sized dry store. Simple discharge arrangements aren't possible with belt dryers which generally discharge very low to the ground.

Comparing: **Electrical Energy Requirement** 3

FlowDrya requires 4-8X less electrical energy than a conventional belt dryer. This adds up to 10s of thousands of pounds / Euros saved every year in electrical energy only. With FlowDrya, the owner can normally use the on-site energy supply whereas belt dryers typically require an expensive extra energy supply to be installed. As well as the substantial extra electrical expense, this is all hassle and logistical hard-work.

4 Comparing: **Hydraulic Moving Bed vs Moving Belt**

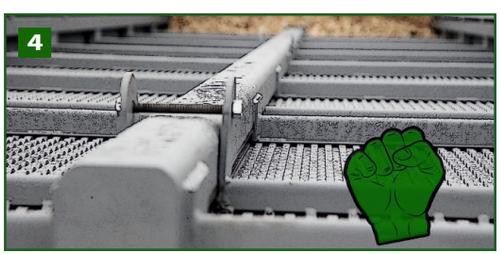
FlowDrya's powerful hydraulic moving floor pushes materials of all densities and moistures. Stronga create "airflow zones" to reduce back pressure and minimise dust which improves drying outcomes. In a moving belt situation, the belt has to be constantly cleaned using air, water or mechanical brushes. The belt can slip, stretch and be damaged by certain objects, leading to costly downtime. Air zoning is only possible by adding complexity, maintenance, energy and cost with even more fans.

5 Comparing: **Drying Efficiency**

Material in belt dryers is slower to reach evaporative temperature because air is the only method of drying while the belt provides high air resistance. FlowDrya offers both hot air and conductive drying via the warm stainless steel drying bed while drying is accelerated by PulseWave™ agitation. This means that FlowDrya accelerates material to the evaporation phase faster.

6 Comparing: **Material Agitation**

Fully agitating material during the drying process is vital for uniformity and optimisation of dry output. FlowDrya's PulseWave™ moving floor agitates material every single stroke without the costs associated with the belt dryer's agitation paddles. Each belt dryer paddle has a cost in capital and maintenance. They have bearings, shafts, gearboxes and motors which have extra electrical cost and all need replacing in high duty situations.



Standard **Specification**

Please refer to https://stronga.com/en/products/flowdrya-green-series/ for more information

Pre-Heating In-Feed Hopper

In-feed hoppers begin the drying process by pre-heating materials before they reach the drying bed. Two arrangements are available:

- Flared wet material end hopper, orientated for either side or end loading
- Top deck in-feed hopper

PulseWave™ Moving Bed

The ventilated drying bed evenly distributes hot Heatex airflow through the material for a consistently uniform dry output. PulseWave™ ensures even drying and thorough mixing. The drying bed's natural screen separates dust and dirt from the final dry output.

PLC & DryStation™ Controls

Programmable 7" DryStation™ touchscreen console offers enhanced command control for efficient and reliable control of important drying parameters and set points. The user is guaranteed easy navigation via the visual, high resolution touchscreen display.

Material Depth Control

Depth of material on the drying bed can be adjusted according to the density and composition of the wet material. Two types of depth control are available:

- Manually adjustable weir gate
- Depth control sensor

Fines Re-Circulation Auger

The fines re-circulation auger re-circulates small, heavy fines that fall through the drying floor back onto the upper tier PulseWave™ drying bed. Nothing is wasted and everything is gained in the FlowDrya dyring process.

Andon Operation Status Display

The highly visual Andon operation status display allows the operator to readily view the current status of the machine from distance. The Andon is well-protected and sheltered below the flared hopper to minimise risk of damage.

Full Insulation, All-Round

Steel-coated external insulated cladding (50mm) improves dryer u-values by up to 80%, preserving air temperature. Improving thermal efficiency leads to improved material drying performance and reduced energy consumption per cubic metre dried.

E-Stop Safety Shutdown

A simple pull on the full length cable-type e-stops immediately halts every electrical function for safety and security. The user can instantly stop machine operations with the FlowDrya e-stops which are compliant with current machinery directive requirements.

Optional **Equipment**

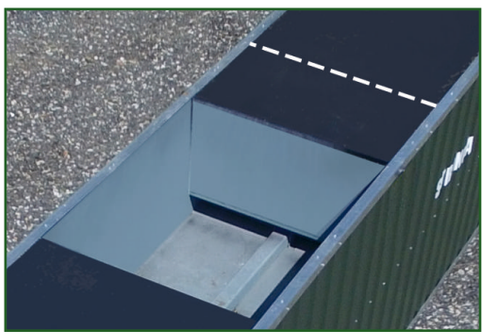
Please refer to https://stronga.com/en/products/flowdrya-green-series/ for more information

Extension End Hopper

Extend your loading intervals even further and reduce your labour hours with the ultra-high capacity extension hopper. The extension hopper comes fitted with brackets to accept greedy boards on the loading side. ** Capacity dependent on material to be dried.*

Extension Top Hopper

The top deck, moving floor in-feed system delivers the biggest wet material in-feed capacity available or the longest loading intervals, keeping labour costs to an absolute minimum. ** Capacity dependent on material to be dried.*



Hydraulic Opening Roof

The optional hydraulic opening roof is designed to allow the user easy access to the drying bed for any needed maintenance while evaporated moisture is allowed to naturally rise and exit all the way along the drying bed.

Material Moisture Sensor

Real time dry material moisture sensing is delivered via the MMS. Instant average moisture values allow the operator to quickly set the drying strokes/hr to achieve the required moisture content. This can be automated.

Enclosed Discharge Auger

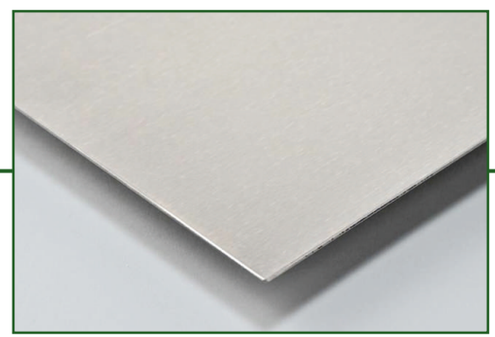
The highly reliable, well-proven, safe and secure cross-feed discharge auger module comes together with with a geared motor and inspection / access door. The auger module is fully integrated with DryStation™. Various sizes are available.

Inclined Discharge Auger

Optional onward discharge loading augers automatically transfer dry material from the end of the FlowDrya bed to dry material storage. Dry material can be elevated into stores and spread along bunkers or configured to suit client requirements.

Stainless Steel Package

The stainless steel drying floor and lining package is designed for clients drying corrosive materials. The stainless steel bundle ensures a long corrosion-resistant life for the equipment, minimising maintenance even in the harshest environments.



Remote Access

Remote access is available as a FlowDrya option via Ethernet to desktop, tablet or mobile phone. Various remote access packages are available such as viewing access, standalone control or SCADA integration. The choice is yours.

www.stronga.com

STRONGA

UK OFFICE

Stronga Ltd, Ashendene Farm, White Stubbs Lane,
Bayford, Hertfordshire, SG13 8PZ, UK
Tel: +44 (0)1992 519000
Email: info@stronga.co.uk

www.stronga.com

EUROPEAN OFFICE

UAB Stronga, Šerkšnėnai km, Šerkšnėnai sen,
Mažeikiai raj, LT-89366, Lithuania
Tel: +370 443 42587
Email: sales@stronga.lt