DRY PASTA PROCESSING Cutting edge technology developed by pioneers





PIONEERING RESEARCH

By travelling our own path and imagining the future, we got there before the others. We have developed futuristic technologies and continue to refine them

TOTAL VACUUM

Vacuum technology has been used on Pavan lines for over 60 years. A pioneering choice that has stood the test of time, developed and perfected to create the current solutions.

less time.

EXCELLENT PASTA FROM ANY TYPE OF RAW MATERIAL

The technology developed by Pavan facilitates the use of any type of ingredient. The percentage of protein present is fundamental to the quality of the pasta as it gives strength to its texture. By applying technologies such as TAS, climatic zones and vacuum, it is possible to make excellent end products even from flours with low protein contents. High temperatures are excellent for processing products made from weak flours and bread wheat flours with low protein contents because they facilitate coagulation and improve the quality of the pasta.

- WE KNOW-

We know how to handle every type of ingredient. Even flours with low gluten <u>contents can</u> be made into excellent products





TAS TECHNOLOGY

The Thermo Active System has revolutionised the way pasta is dried. An avant-garde system yelding higher quality pasta in

ADVANCED RESEARCH

We have our own area dedicated to R&D, with pilot plants, flexible production lines and analysis laboratories equipped with all the instruments required to carry out chemical, rheological and nutritional tests.

— WE KNOW —

The gluten matrix, fundamental to the quality of the pasta, is formed when the dough is mixed under ideal temperature and humidity conditions, avoiding all mechanical stress





WATER, FLOUR AND VACUUM: THE THREE INGREDIENTS

Pavan was the first company to extensively apply vacuum technology during the shaping stage, from pre-mixing to the exit of the extruded product

EACH STAGE UNDER VACUUM

This extensive application of vacuum technology provides many advantages for the finished product. The hydration of the semolina is more homogeneous and this reduces defects and white specs. The vacuum allows for the addition of a greater quantity of water during the mixing stage, which improves the formation of gluten. The evaporation effect caused by the vacuum lowers the temperature of the semolina during the mixing and extrusion stages; this prevents thermal stress and results in a pasta with better cooking performance.



THE FOUNDATIONS OF QUALITY

The gentle shaping stage results in pasta with brighter colours. The complete vacuum blocks the enzyme Poliphenol Oxidase, responsible for the oxidisation of the semolina pigments, thus preserving the amber yellow colours given by the carotenoids and flavonoids. The vacuum also deactivates the enzyme Lipoxygenase, responsible for turning colours grey and the development of unpleasant odours caused by the oxidation of the lipids. The partial deactivation of alpha and beta amylase leads to a reduced occurrence of the Maillard reaction, i.e. the pasta turning brown during drying.

- we know -

The vacuum process minimises the development of reducing sugars. This means less starch release during cooking and less stickiness



DOUGH —

The total vacuum affects the organoleptic properties of the pasta, also providing for brighter colours and a higher quality end product



PRESS — PHP

The press is the head of the line: the dough is formed here and the product is extruded and sent to the drying process

OPTIMUM DRYING

The drying stages are the most delicate and important phases in the production process, critical to achieving an excellent product

TAS - THERMO ACTIVE SYSTEM AND HIGH TEMPERATURES

TAS technology includes drying and stabilisation and the progressive temperature increase block stages. It maintains the product in a plastic and porous state throughout the process and keeps the development of the Maillard reaction under control. The rapid reduction in the water content of the pasta

the expansion of the starches and activate proteinic coagulation. The result is a product with improved colour and cooking performance.



HIGH PERFORMANCE TECHNOLOGY

Thanks to the integrated software that controls the duration of each individual stage according to the drying diagram settings, it is possible to keep the temperature and humidity conditions constant by transferring excess humidity from one zone to another. Without the need for external machinery, the integrated technology keeps the production process uniform, manages the humidity and temperature values and reduces power consumption, with drying times of less than two hours for short-cut pasta and less than five hours for long-cut pasta. Another added value of the high temperature process is that it eliminates the risk of contamination, for a hygienically safe product.

DRYERS — ____

These are made from stainless steel and anti-corrosion materials to provide decades of service



TAS

The drying stages in the modify the properties of the pasta such as cooking performance

THERMO ACTIVE SYSTEM

The process that changed the way pasta is dried



- AIR TEMPERATURE - RELATIVE HUMIDITY OF AIR - PASTA MOISTURE





Final status

After successive drying and stabilisation stages the ideal moisture concentration level is achieved, usually around 12.5%.



The drying diagram is completely customisable. This simplifies the changeover between pasta shapes with different drying requirements or different

DRYING SOLUTIONS

A system that is able to adapt to and react to all conditions

STRATEGIC AIR FLOWS

masses of hot and moist air are moved where required. The automated system recognises the temperature

The air flows inside the dryer are managed so that the and humidity conditions and reacts strategically, using them as operating tools.





Cross section of 11-tier short-cut pasta dryer Air flow circulation

HIGH PRODUCTIVITY, GREAT RESULTS

The TAS technology involves accelerated drying and allow for optimal drying of pasta, preserving the stabilisation stages that take place in physically product's properties and reducing process times. separate zones inside the dryer. These areas Excellent quality and maximum efficiency. provide temperature and humidity variations that



IMPROVED DRYING WITH CLIMATIC ZONES

The climatic zones are the technological core of the TAS drying process. They are comprised of physically-isolated independent sections in which the temperature and humidity are controlled in order to optimise the process and provide an excellent

finished product. Hot and moist air masses are used to accelerate or stabilise the drying process, using an intelligent ventilation system that provides ideal control over the conditions in each zone.

MAXIMUM THERMAL INSULATION

High performance insulation, a shield against energy waste







DRIVE SYSTEMS

A mechanical system designed to last

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The innovative concepts used in the mechanics of the moving parts, based on the high precision manufacture of the individual parts, ensures that the systems are fully mechanically reliable.

With the aim of minimising maintenance times and increasing efficiency, unique applications were designed such as heat exchangers in the main reducers to lengthen the life of the oils, the use of new generation lubricants and high service factors in the mechanical parts.



in the mechanics of the drive parts ensures

The chains are generously oversized with respect to the imposed standards and the Niploy surface treatment provides excellent resistance to corrosion.

Every mechanism is also equipped with electronic monitoring and redundant safety systems.







Protection against heat dispersion

0.8 bar

Made from a special VMQ compound which following a vulcanisation process at 200°C acquires excellent resistance to high temperatures, humidity and tearing. The internal chamber is pressurised with air at 0.8 bar, ensuring adhesion to the contact surface even in the

event of complex geometries.

This feature is essential from a technological point of view, as it allows the relative humidity of the air to be kept to maximum levels.

INTERNAL PRESSURE

To guarantee complete isolation between the outside and inside environments







The seals are resistant to wear and stress



PAVAN AUTOMATION & SUPERVISION SYSTEMS

Pass® is the integrated automation and supervision system developed by Pavan



EFFICIENCY

Increased system

efficiency

• Full automation

- Real time control
- Recipe management
- Historical data analysis

• Power consumption analysis

• Compatibility

QUALITY

Quality ensured in the end product

Standardised execution of best

practices

REPEATABILITY

SIMPLICITY

Simple to use, implement and configure

COMPATIBILITY The system integrates with all

the main operating systems



IMPROVED SUPERVISION

The entire plant is monitored in real time and the software system records every piece of data in order to measure efficiency and compare power consumption against historical data.

- High speed data archiving and retrieval
- Power consumption analysis
- Easy recipe management



Production plant The sensors detect an incoherent signal

ADAPTIVE ----**SYSTEMS**

The production systems are able to recognise problems and react by implementing the necessary measures

MOBILE READY -

PASS® has been developed to be accessible from all mobile devices

REMOTE ASSISTANCE

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Pavan's technological and software support service is available 24/7; it is also able to solve issues remotely.

Pripage

- Smart Alert System
- Flexible planning
- Compatible with mobile systems



Customer terminal The operator views the message and asks for help



Pavan Assistance Centre

Pavan technicians are able to connect to the system and provide support

A COMPLETE RANGE OF ADVANCED SOLUTIONS



SHORT-CUT PASTA LINE

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Dosage and Press

In the mixing tank the slowly rotating paddles mix the ingredients until optimal hydration is achieved, allowing the gluten matrix to form. The whole process from dosing to extrusion takes place under vacuum at a temperature of 40-45°C.

DRYER

This machine is divided into technologically independent areas for drying and stabilising the product. The entire structure is made of stainless steel. Each process zone is separated by panels and equipped with automatic heating and ventilation stations, heat exchangers and independent air extraction units in order to ensure accurate temperature and humidity control.



This machine is enhanced by TAS technology, and by a ventilation system designed to allow air to flow through the product layer. The dryer is completely isolated from the outside environment and all air inflow and outflow is strategically managed to improve the production process. The maximum temperature reached is residence time of 120-145 minutes.





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Cooler

This machine is equipped with automatic air cooling units that lower the temperature of the pasta to 20-25°C and prepare it for the packaging stage.

BELTS

Strong and secure: guaranteed long life

Pavan has chosen PEEK as the material for its dryer belts; a technical polymer with high levels of thermal and mechanical performance. The belt is not subject to any mechanical stress as it is never fully under tension. Resistant to high temperatures, humidity and wear, it is not subject to structural modifications or alterations. The geometry of the belt allows the air to permeate perfectly through the layers of pasta. The hot and humid air masses pass over the product in a controlled way without the obstacles typical of other systems.













MAXIMUM OPERATING TEMPERATURE

ABSORPTION

MOISTURE

2.5 times higher than the operating Environmental moisture temperature of the dryer

absorption almost nil



MULTI TIER LONG-CUT PASTA LINE

PASTA LINE The solution for producing high quantities of long-cut pasta in the smallest possible space

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TEN IT

Processo

LONG-CUT PASTA LINE **MULTI-TIER**

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Dosage and Press

Low-shear stainless steel compression screw. The variable pitch and broad diameter of the screw, combined with an ideal rotation speed, allow for gradual compression and a more homogeneous dough.



After the pre-drying stage the pasta enters the dryer, which has either three or five tiers. These tiers are physically separated from one another and house the technological core of the Thermo Active System. The pasta passes through accelerated drying and stabilisation zones in which the temperature and humidity parameters are programmed in order to achieve perfect drying.

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TAS HP dryer

The drying process is enhanced by thermoactive climatic zones. The structure is made up of physically separate process tiers for maximum humidity and temperature control at every point.





Cooler

This machine is equipped with automatic ventilation units with cold water heat exchangers that bring the pasta to an ideal temperature before the packaging stage.

Stripper saw unit

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Removes the pasta from the sticks and cuts it to the desired length.



The product conveyor sticks have an oval cross-section and offer excellent resistance to mechanical stress. They are made from AISI 304 stainless steel, which guarantees optimum process hygiene with respect to conventional aluminium sticks, which due to surface micro-porosity can capture particles of the product.



— AISI 304 — AL 6060

DEFORMATION INDEX

With equal loads and cylinder cross-sections, the deformation index of AISI 304 steel sticks is 1/3 that of AL6060 aluminium sticks

Made from high-strength extruded stainless steel rods, the ends of the rods are attached to conveyor chains.

Stainless steel sticks have a deformation trend of 1/3 that of conventional aluminium sticks with the same cross section; this translates into increased solidity.



1500mm - 2000mm - 2500mm



- single tier -LONG-CUT PASTA LINE

Effective technology for optimum results. The single tier solution

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LONG-CUT PASTA LINE

SINGLE TIER

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Dosage and Press

Stainless steel tank with dough level sensor. The process takes place under vacuum at low temperature. Thanks to the slow rotation of the mixing paddles, the gluten matrix is not subjected to mechanical stress and the product maintains excellent elasticity.



CROSS SECTION OF PRE-DRYER | Air circulation diagram

The production line is characterised by a single-tier dryer, expressing the full potential of TAS technology. After extrusion the pasta is pre-dried and then sent to the dryer. Following successive accelerated drying and stabilisation stages in the dryer, the product then arrives at the cooler with the correct humidity percentage and excellent organoleptic properties.

1 TAS HP dryer

Each section of this machine is equipped with ventilation units, heat exchangers and air extraction stations in order to ensure accurate temperature and humidity control at every point in the dryer.



the mixing tank.







Cooler

Lowers the temperature of the pasta before the packaging stage. It can be accessed from both sides to facilitate maintenance operations.

Stripper saw unit

This device removes the pasta from the sticks and cuts it to the desired length.





NEST-SHAPED PASTA LINE

CUPS & BELTS

This mixed system features a pre-drying stage in which the just-extruded nests are placed in cups where they remain until they exit the pre-dryer. They are then deposited onto belts that transport them through the entire drying process.



This area acts as a buffer with loading and unloading stages regulated by automatic sequences based on presets that can be programmed by the operator to adapt to different packaging requirements or to manage the production of different types of nests.

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Laminating roller unit positioned under the extrusion head; removable for the production of

directly extruded products. Nest making device

with 12 or 24 tubes installed directly under the

press die. With conveyor tubes in transparent

food grade material for checking the length of

the pasta strips.



place in alternating stabilisation and

bottom, these ensure breathability for improved drying



-CUPS LINE

The nests travel in cups from the beginning to the end of the process to prevent scraps

NEST-SHAPED PASTA LINE

NIDOMATIC

The "Nidomatic" solution employs a different method for conveying the nests during the drying stage. Following extrusion, the pasta is placed into cups where it remains until the end of the process. This system reduces scraps to zero and facilitates packaging in trays.



the pasta strips.



The data provided in this brochure may be subject to changes aimed at improving the solutions shown.

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