ROQUETTE

Offering the best of nature™

Bonding Solutions for the Corrugating Industry

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Roquette Group

Roquette, a French family group with an international dimension, processes renewable raw materials: maize, wheat, potatoes, peas and micro-algae.

Since it was founded in 1933, the group has based its development on an industrial strategy that prioritizes along-term outlook, innovation and respect for the environment.

With more than 3 billion euros in revenue and industrial, sales and agent locations in more than 100 countries, Roquette is one of the five world leaders in the starch industry. The Group's development is focused on the nutrition-health and plant-based solutions sectors.

Roquette employs more than 7,800 people worldwide and it has production units in France, Italy, Spain, Great Britain, Germany, Romania, the USA, China and South Korea.

Together, these process more than 7 million tons of grain each year.

Roquette manufactures more than 700 products: as the global leader in polyols (sorbitol, mannitol, maltitol and xylitol), Roquette also produces both native

and modified starches, glucose syrups, maltodextrins, dextrose, fermentation products, functionalized natural polymers, etc.

These products are used in five major application fields:

- Human Nutrition
- Animal Nutrition
- Pharmacy and cosmetology
- Paper and Board
- Chemistry and Bio-industry

This constantly evolving range of high-quality products embodies the group's spirit of innovation and the desire of its teams to adapt to the needs of its customers.

The main Research and Development facility, located in Lestrem, France, counts more than 300 people dedicated to R&D. 25 to 30 patents are filed each year, expanding the group's technology portfolio. Close contacts are kept with universities and laboratories throughout the world thanks to numerous research contracts.

The Roquette Group enjoys a stable and solid financial structure, allowing it to focus on continuous development and long-term objectives.

Its mission: "Serving men and woman by offering the best of nature" ■

Providing solutions to the corrugated

Corrugating, a World of Diversity

The Corrugating Industry produces a very wide range of boxes made from a variety of board types which go from lightweight micro-flute to multi-wall heavy duty. The boxes provide low-cost, high-performance solutions for packing every imaginable product including machinery, electrical goods and fruit and vegetables as well as being a medium for providing information and advertising for the contents.

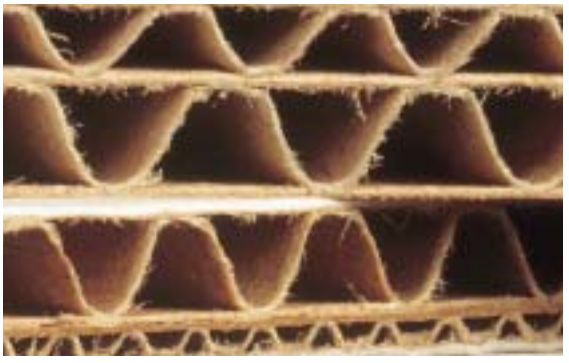
These fundamentals place multiple demands on a corrugated case and it all starts with the production of a strong, flat board on the corrugator ■

Simple and Versatile Adhesive Solutions

While the combination of papers chosen is critical, the adhesive and its application play a vital role in obtaining the best board at the end of the corrugating machine.

Glues must be versatile while maintaining high quality bond and high productivity through the whole range of boards produced.

A simple, easily adaptable recipe is required for optimum performance ■



board industry

On site technical support

Delivering solutions to our customers means delivering a combination of products, technical support for glue formulation and application as well as supplying equipment for adhesive preparation. Working in partnership with our customers, we engage in continuous improvement projects to improve performance and reduce cost-in-use.

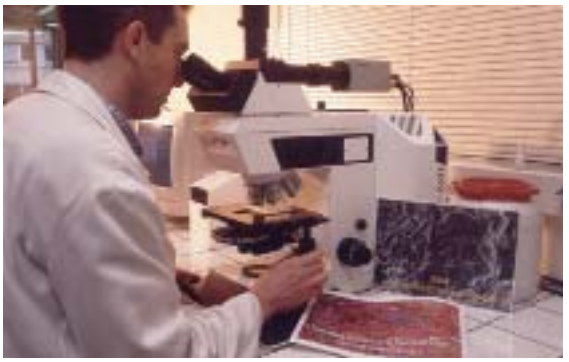
A team of specialists are dedicated to corrugating industry technical support worldwide, some of the services they provide to our customers include:

- Regular service visits
- Optimisation of the adhesive to follow changing requirements
- Assistance with problem solving on the corrugator
- Participation in continuous improvement projects ■

Problem solving and new solutions

Problem solving and creating new solutions are the tasks of our Corrugating Application Laboratory. Based on a long experience of corrugating and working closely with the technical support team, the Corrugating Application Laboratory formulates and characterises adhesives, evaluates their potential bonding speed and measures final bond strength. This ensures that safe and efficient solutions are proposed to our customers.

This is backed up by the Functional Properties Laboratory where investigations are carried out on glue, papers and corrugated board samples. The techniques used include: state of the art rheology characterisation, contact angle and absorption speed of papers measurement, microscopy and other tests where appropriate ■



From starch powder to corrugating adhesive

Powder starch, technical support and laboratories are not sufficient to create a complete solution for the Corrugating Industry. Our Customer Engineering Department designs, installs and commissions efficient and reliable automatic adhesive preparation plants. Based on our extensive knowledge of corrugating glues and operations, these installations provide stable and high performance glues from day one ■

Corrugating adhesives

Adhesive plays a pivotal role in corrugated board production and the quality of the final converted products.

The glue itself constitutes a very small proportion of the corrugated board, but has a disproportionate influence on both the productivity of the corrugator and the quality of the final board.

Adhesive preparation

All starch adhesives are based on a special property of starch: when subject to heat, starch slurry undergoes an extremely rapid increase in viscosity as the starch granules gel.
This high viscosity, developed at a critical temperature, leads to the phenomenon of tack.
In order to prepare a starch adhesive that has all the properties necessary for good bonding, easy application and stable handling, a number of different preparation processes have been developed including: Stein-Hall, Pristim, No-Carrier and its derivative Minocar ■

Stein-Hall

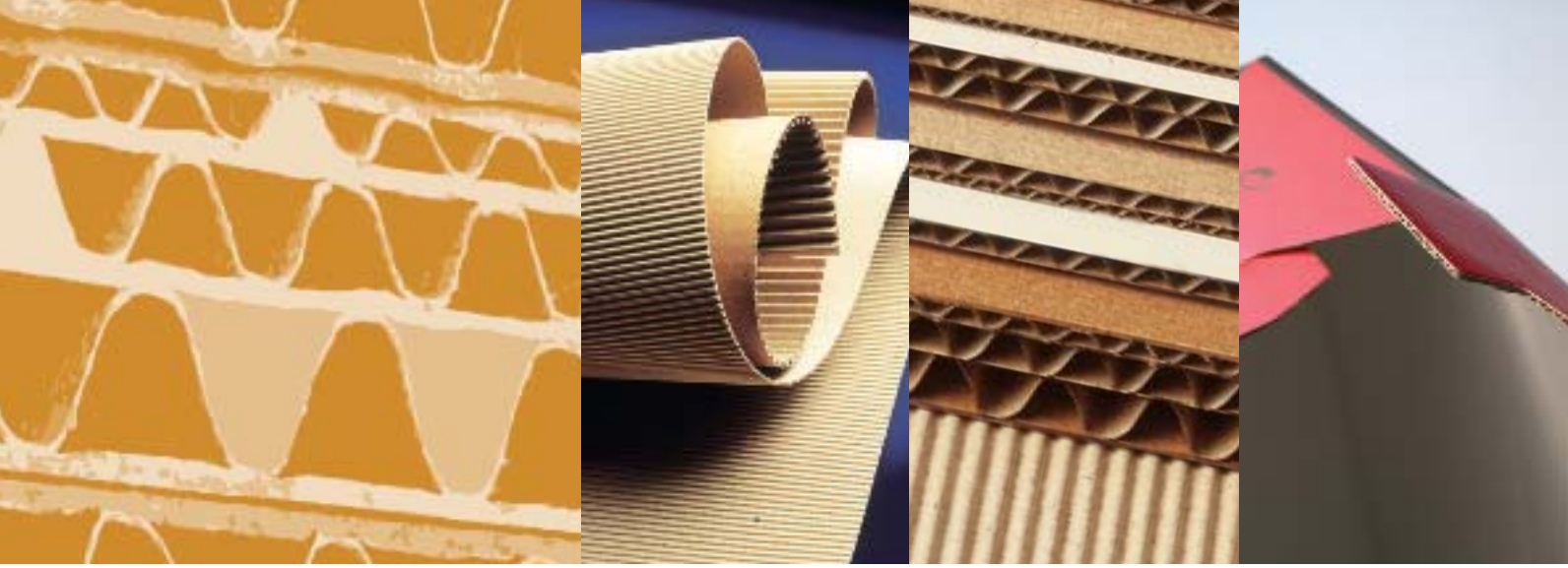
The Stein-Hall process gives a two-phase adhesive consisting of a starch solution made with the primary starch, called a carrier, in which uncooked raw starch, secondary starch, is suspended. The carrier is prepared by the combined action of heat and caustic soda on a starch slurry. This gives the required viscosity, holding the water necessary for the gelatinisation of the secondary starch and controls the absorption into the papers as well as the initial tack strength ■

Pristim

The Pristim process, developed by Roquette, gives a two-phase adhesive consisting of a carrier solution and secondary starch. The carrier is prepared at a controlled temperature by heating with steam alone or in the presence of a small amount of caustic soda. Most of the caustic soda is added at the end of the process to adjust the gelatinisation temperature of the glue ■

No-Carrier and Minocar

No-Carrier process gives a single phase adhesive. Most of the starch granules are partially swollen so that the mixture is viscous enough



to prevent sedimentation.
The starch slurry swells progressively when subjected to precise heat and alkali conditions and swelling reaction is stopped at the required viscosity using boric acid.

The Minocar process is a development of the No-Carrier process and gives a two phase adhesive consisting of a primary portion where most of the granules are partially swollen, in which is suspended uncooked raw starch ■

Process Summary

Process	Adhesive texture	Operating Temperature	Suitable Starch	Formulation Flexibility	Process operation
STEIN-HALL	Long	30 – 35 °C	Native, and modified standard & speciality maize, wheat, potato and pea	Each parameter can be adjusted independently	Simple
NO-CARRIER	Short	40 – 43 °C	Selected maize	Adjustment of one parameter interferes with others	Needs good control and supervision
MINOCAR	Short	32 – 38 °C	Selected maize	Adjustment of one parameter interferes with others	Needs good control and supervision
PRISTIM	Short & adjustable	40 – 50 °C	Native and modified maize and wheat	Each parameter can be adjusted independently	Simple

The Stein-Hall process is by far the most widely used process on the market, thanks to its simplicity and ease of use. The characteristics of the adhesive are easily adapted by modifying the variable concerned, without needing to adjust the other components of the recipe.

Minocar keeps some flexibility and gives an adhesive made with native starch a short texture. However modifying the formulation and fine tuning is more complicated with several parameters needing to be adjusted at the same time.

No-Carrier is declining in popularity because of its solids and raw material limitations.

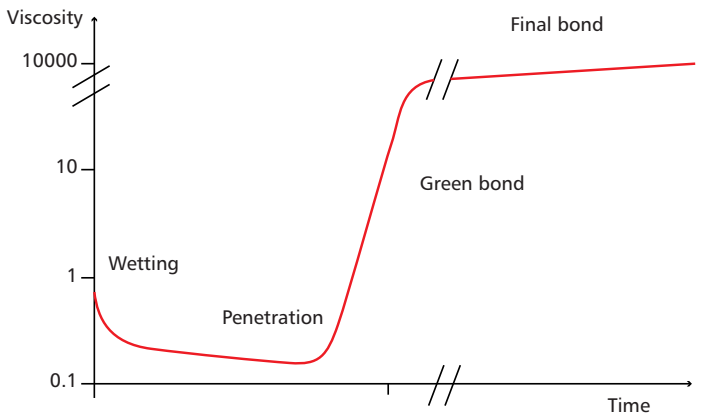
Pristim gives the same flexibility as Stein-Hall with the bonus of an adjustable glue texture ■

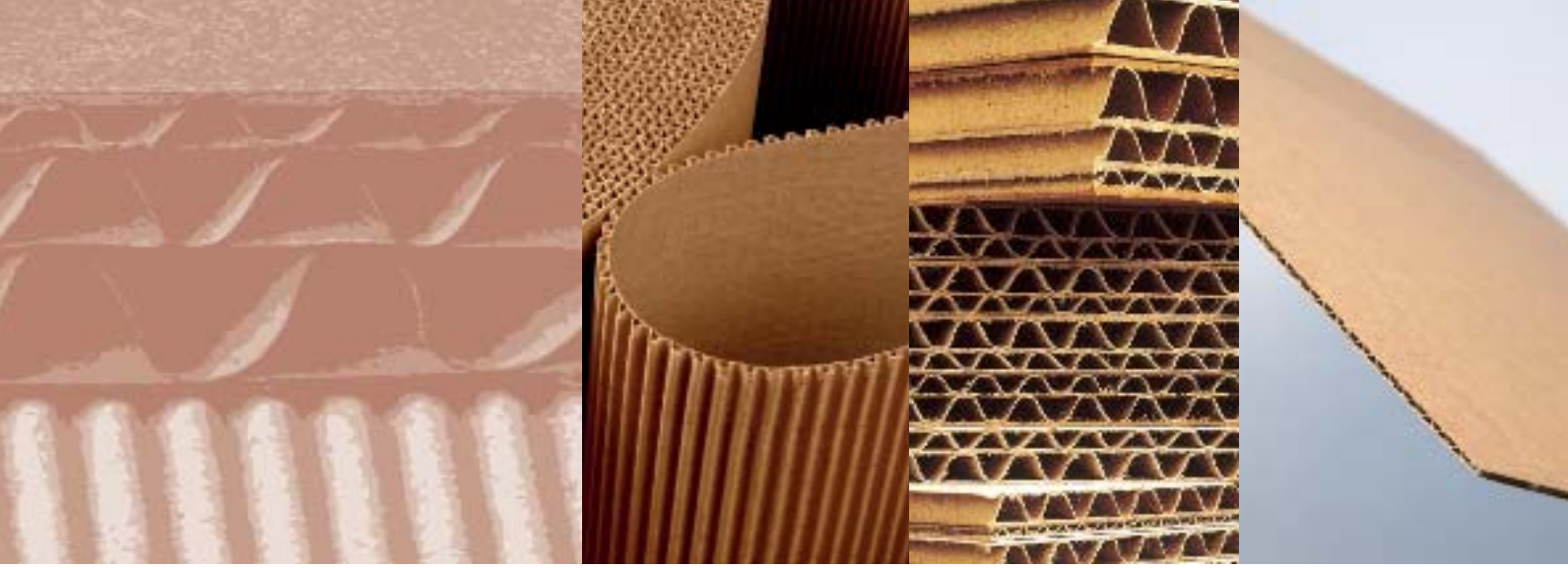
Bonding process

For all types of corrugating glues the phases of the bonding process are the same and identical in principle on the single facer and the double backer. On the single-facer the gelatinisation time is very short, roughly one tenth of a second at 300 m/min. With the double-backer, the bonding process is more progressive and a full second is needed to obtain the starch gelatinisation at the same speed.

Graph 1 illustrates the viscosity evolution of a starch-based glue after it has been applied onto the flute tips and brought into contact with the liner.

Graph 1: ***Viscosity development on the corrugator***

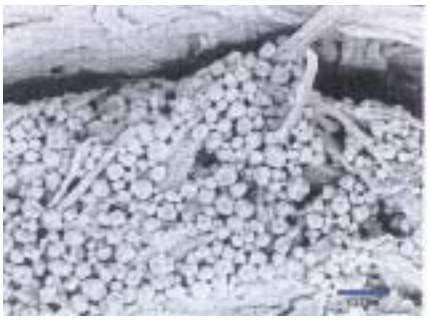




The process can be divided into four stages:

Wetting

The glue is sheared between the doctor and application rolls and applied to the fluting; the glue texture plays an important role in centring the adhesive on the flute tips. During this step, the glue is warmed by the preheated fluting and the combination of this and the previous shearing of the glue reduces the glue viscosity which facilitates the wetting of the paper surfaces ■

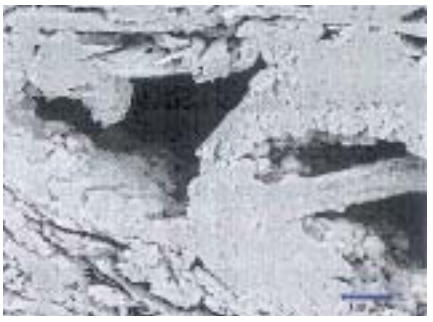


Penetration

Liner and fluting are brought together under pressure; high on the single-facer lower at the double-backer. The glue penetrates into the liner and fluting, giving a fragile initial bond ■

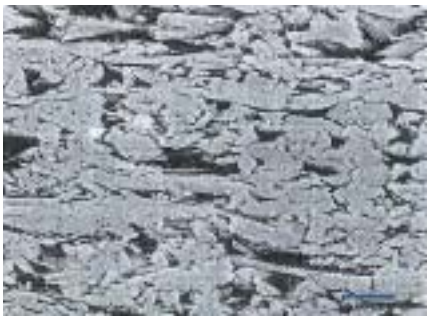
Green bond

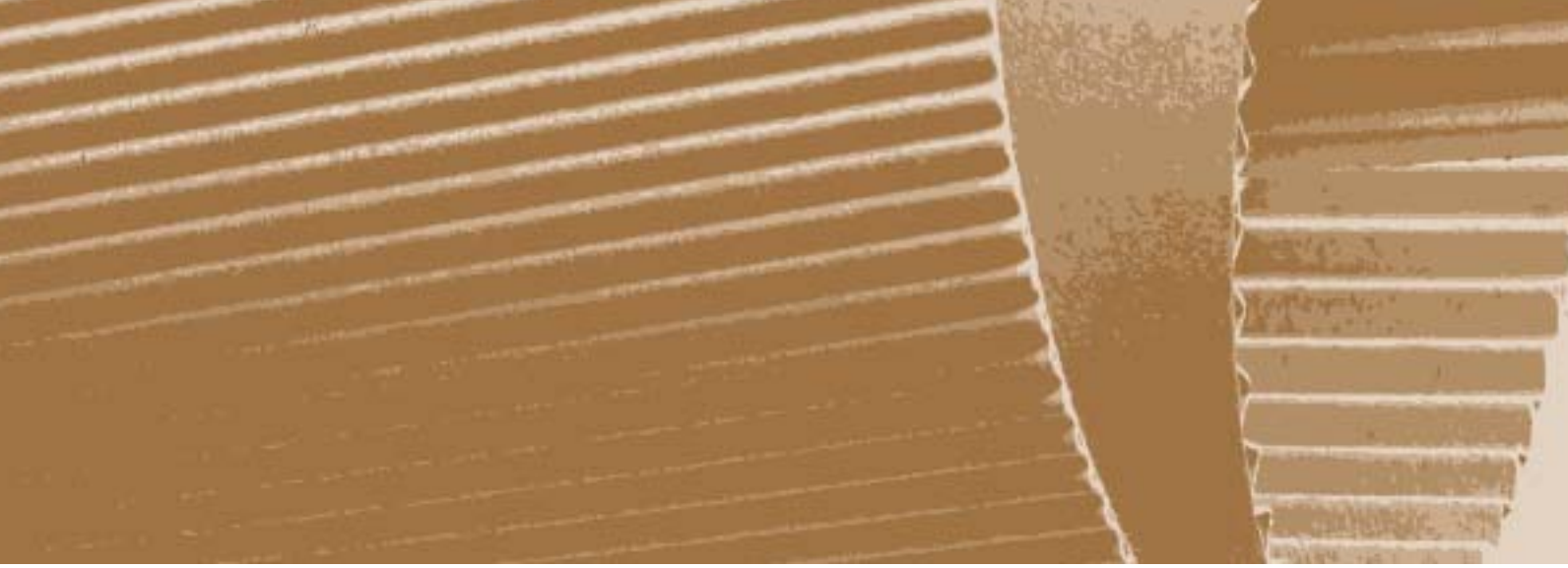
Heat transfer through the papers to the adhesive gives a rapid increase in viscosity as the starch granules swell and solubilise. This provides a "green bond" which must be strong enough to withstand the subsequent mechanical forces encountered during the rest of the process. The double-backer green bond must be strong enough to hold the board together as it passes through the slitter-scorer ■



Final bond

As the board dries out the bond matures, this starts on the corrugator and continues in the stack. Faster bond maturation enables the storage time before conversion to be reduced ■





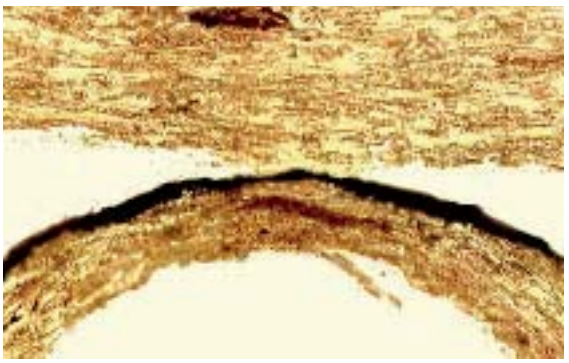
Bond quality

Superficial or Brittle bond

Superficial bonding happens when starch glue gels before it penetrates into the papers. This type of bond is fragile and can open up at the slitter-scorer as well as during conversion. The glue lines have a shiny, glass-like appearance ■

White bond

White bond occurs when starch adhesive is not completely cooked. This can be caused either by a lack of heat or the liquid phase of the glue being soaked up by the papers too quickly, leaving insufficient water present to cook the secondary starch.
The glue lines look white because of the presence of ungelatinised starch ■



Superficial bond

White bond

Correct bond

Correct bonding is obtained by having the right parameters both for the corrugator and for the starch adhesive. To have a strong bond it is necessary to balance the penetration and gelatinisation of the glue. Part of the adhesive must penetrate into the papers and some will remain between the papers and ensure a continuous cohesion of the assembly ■

Bond centring

In addition to the proper balance of the penetration and gelatinisation processes, good positioning of the bond is necessary to achieve the maximum strength as shown in the picture of the correct bond. A non-centred bond will be stronger in one direction and weaker in the other. (see picture below)

Bond centring can be achieved with a correct corrugator set up, using a short-textured adhesive will also help adhesive centring ■

Correct bond - Centred bond

Non centred bond

Adhesive raw materials

With the invention of the Stein-Hall process, starch completely replaced sodium silicate for corrugating glues. Starch-based adhesives give:

- **Faster bonding, leading to increased corrugator speeds and output. With sodium silicate speeds were limited to a maximum of 50 m/min.**
- **Improved board quality because the glue lines are less prominent.**
- **Low cost, less than 2% of the production cost of the board.**

There are five main types of starch for used for preparing corrugating adhesive:

Maize Starch

Maize is the most widely grown cereal in the world, is readily available and maize starch has become the reference for corrugating industry. It is almost the only starch used in North and South America, the leader in Europe, with two thirds of the market, and is also the leader in Asia ■

Wheat starch

Wheat starch has proved to be suitable for corrugating and is used mainly in Australia and Northern Europe. It is subject brittle bonding at low speeds, especially at the single-facer. Because of crop-yield fluctuations and demand for food, availability can sometimes be a problem ■

Tapioca Starch

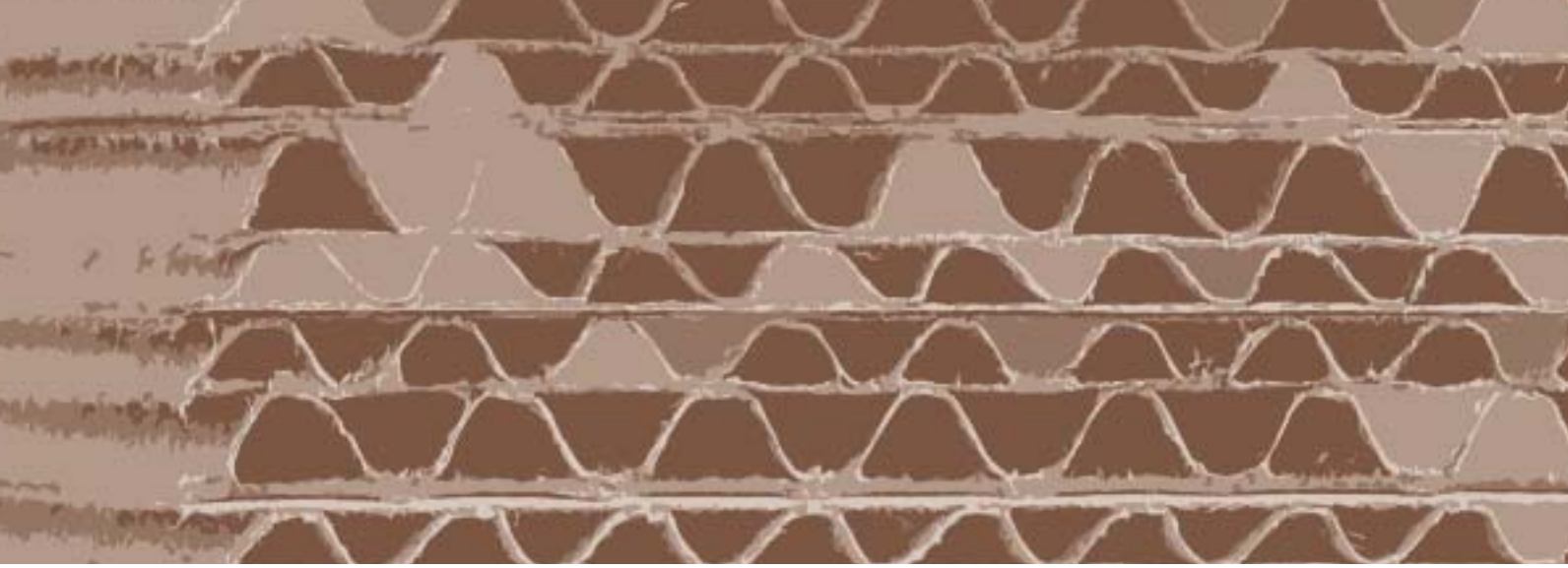
Tapioca starch is used in Asia but is not regularly available in Europe ■

Potato starch

Potato starch is a European speciality and allows the production rates of heavyweight board grades to be increased significantly. Recent changes in the European Common Agricultural Policy (CAP) will have a significant impact on its price and availability ■

Pea starch

Pea starch is the newest entrant to the market. As a speciality starch it has proved to be better than potato starch for heavyweight boards and is also used for the production of micro and nano-flute grades ■

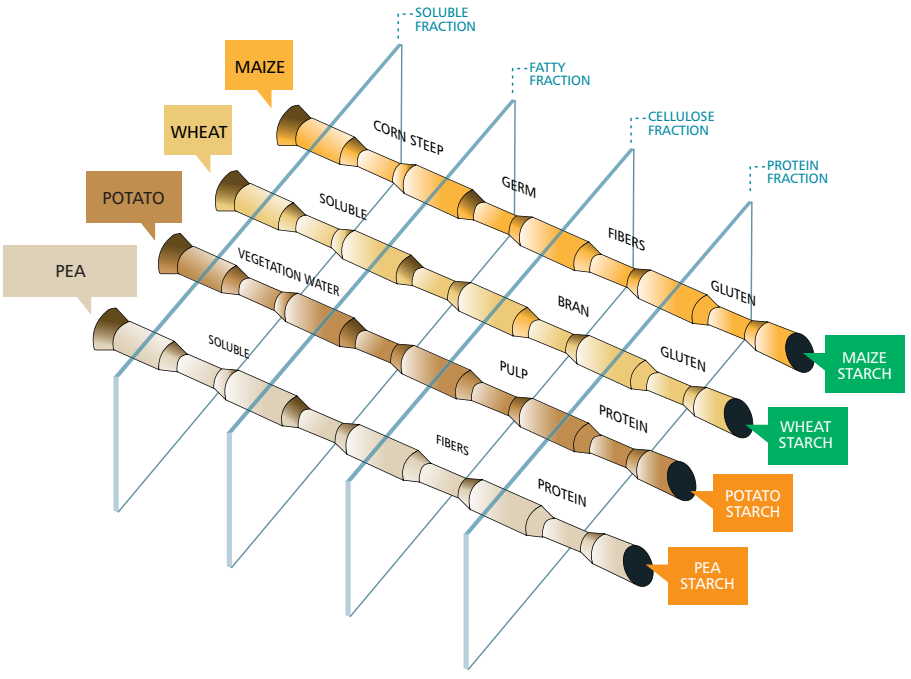


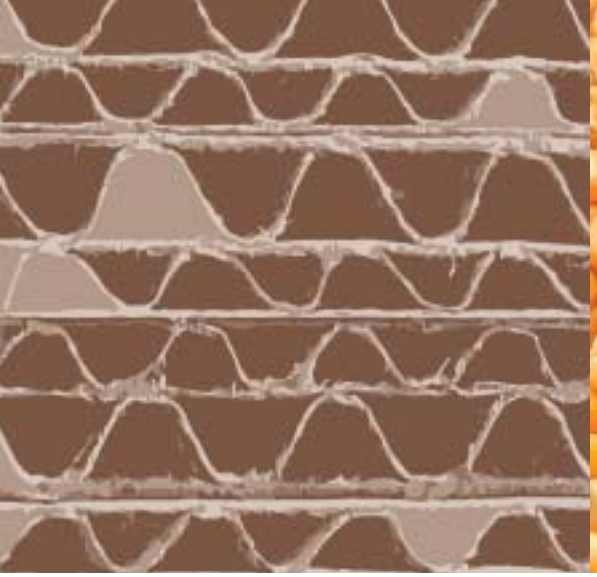
Product range for bonding

Starch is an abundant, renewable raw material. Different plant sources give starches with subtly different characteristics.

Roquette exploits to the full the possibilities inherent in the different starch types by manufacturing a wide range of starches based on maize, wheat, potato and pea.
Roquette also supplies wet strength resins for use together with starch to impart water resistance.

Each corrugated board manufacturer has specific requirements depending on the corrugator, the papers used and the products made. The extent of Roquette's range means we can provide an answer to every requirement.






solutions

Roquette Products

Native starches	
AMIDON N-HV, N-HVI, N-TCF	Maize starch. The standard for gluing performance and reliability. A selected product suitable for the various processes used in adhesive preparation.
AMIDON N-AB	Wheat starch. More sensitive to heat than maize starch, wheat starch has advantages for fast corrugators with few order changes.
Specialty starches	
VECTOR® N-735, N-7152, N-7070	Pea-based range of products for high speed heavy duty and agricultural board production with reduced waste levels. Achieves similar benefits for micro- flute manufacture.
Modified starches	
AMIDON M-L004, AMIDON M-I333	Give a short texture to glues produced using the Stein-Hall process, reducing glue splashing.
One-Bag Mixes	
AMIDON M-PA 120, 125, 03525P, 70726P	Ready to use starches (one bag mixes). Designed for simplicity and versatility in use.
VECTOR® M-PA 726P	Specialty one-bag mix for heavyweight board production.
Resins and additives	
Résine RH 3678	Wet strength resin.
VECTOR® SB 254	High amylose solution for boosting water resistance and productivity.

Corrugating starch functionalities

In Europe there are starches based on maize, wheat, potato and pea as raw materials, available as natives, modified and one bag mixes. All these starches are in the Roquette range and we can help our Corrugating Industry customers to select the best starch for their corrugator and product mix.

Native Starches

The properties of the various starches used by the European corrugating industry depend on the raw material used for starch production and are listed in the table shown.

Property	units	Maize	Wheat	Potato	Pea
Moisture	%	13	14	20	14
Protein	%	0.3	0.2	0.06	0.2
Lipids (oils)	%	0.7	0.8	0.05	0.03
Amylose	%	26	26	21	35
Crystallinity	type	A	A	B	C (A+B)

Maize starch is the most widely used starch because of its availability and versatility.
It can be used in all glue processes and gives a very 'forgiving' glue, allowing for a less than perfect control of the corrugator and reducing the amount of delamination caused by brittle bonding when the corrugator slows down.

Wheat starch gives improved double-wall performance but requires more care to avoid brittle bonding.

Potato starch has been, for many years, the best product to use on the top-tray to improve heavyweight double and triple wall board productivity. Today pea starch has overtaken potato starch for heavyweight board thanks to its increased heat sensitivity and lower energy requirements. This increased sensitivity also enables pea starch to be used to optimise the quality of micro-flute boards.

The functionalities of the various starches are summarised in the table below:

Starch Functionality	Maize	Wheat	Potato	Pea
Glue Process	All	Stein-Hall Minocar	Stein-Hall	Stein-Hall Minocar
Speed	OK	15% > maize for DW	25% > maize for DW	+50% > maize for heavyweight boards
Glue consumption		~maize	~maize	10 % < maize
Energy consumption	high	medium	medium/low	low
Amount of resin needed for FEFCO 9	6% on starch	6% on starch	6% on starch	4% on starch

Modified starches

For corrugating glues, reticulated starch is the main type of modified starch used. This starch was developed to give a short texture when using the Stein-Hall process. The No-Carrier, Minocar and Pristim processes can produce short-textured glues with a native starch.

A short-textured glue allows a better positioning of the glue on the flute tip and limits the amount of splashing or stringing which can occur on certain corrugators. However many modern corrugators now have metering and application systems which give good glue positioning and limited splashing even with long-textured glues.

In terms of speed and bond quality, modification changes the base starch performance slightly. If reticulated starches are used in the secondary portion of the glue, the bonding speed can be reduced ■

One-Bag Mix

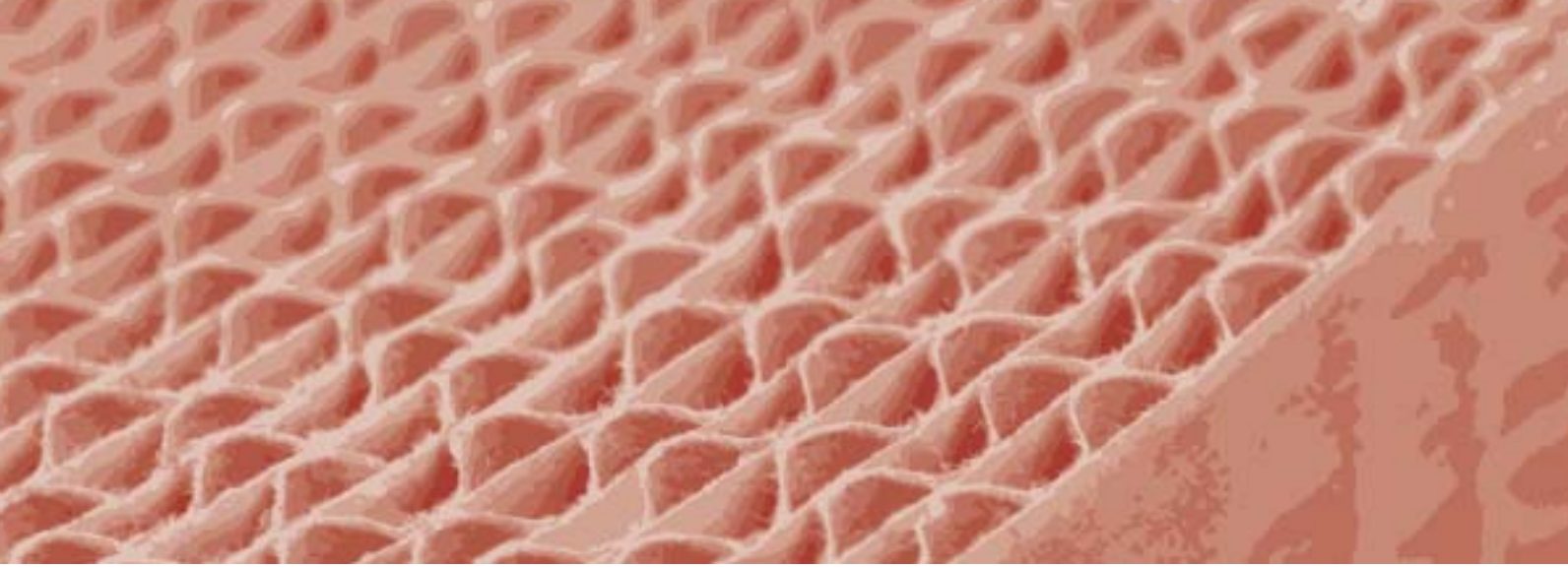
Ready to use One-Bag Mix (OBM) starch is a blend of several components which, when mixed with water, form a Stein-Hall glue.

The main components are:

- Pre-gelled (cooked and dried) starch which dissolves in the water to form the primary, carrier, component of the glue.
- Uncooked native starch, which is the secondary starch portion of the glue.
- A mixture of calcium hydroxide and sodium carbonate, forming sodium hydroxide (caustic soda) when dissolved in water.
- Borax powder.

The principal reason for using OBM is its ease of use, especially in situations where preparation facilities are limited.

The performance, speed and bond strength, of an OBM is determined by the starch it is based on ■



Flexible and effective solutions

The main factor determining production efficiency is the good management of the corrugator in terms of maintenance and operation.

A corrugator can be making many different types of board using a variety of papers and can be changing grade up to twenty times an hour. This requires a very flexible approach to adapt to the changing conditions while, at the same time, remaining profitable.

The starch selected determines the glue performance and ease of use and contributes both to the corrugator productivity and final product quality.

Roquette has concentrated its efforts in developing solutions combining starch, technical support and engineering:

Maize starch

for its ready availability and versatility.
It is the most forgiving starch, ensuring good performances and bonding for most of the productions ■

Pea starch

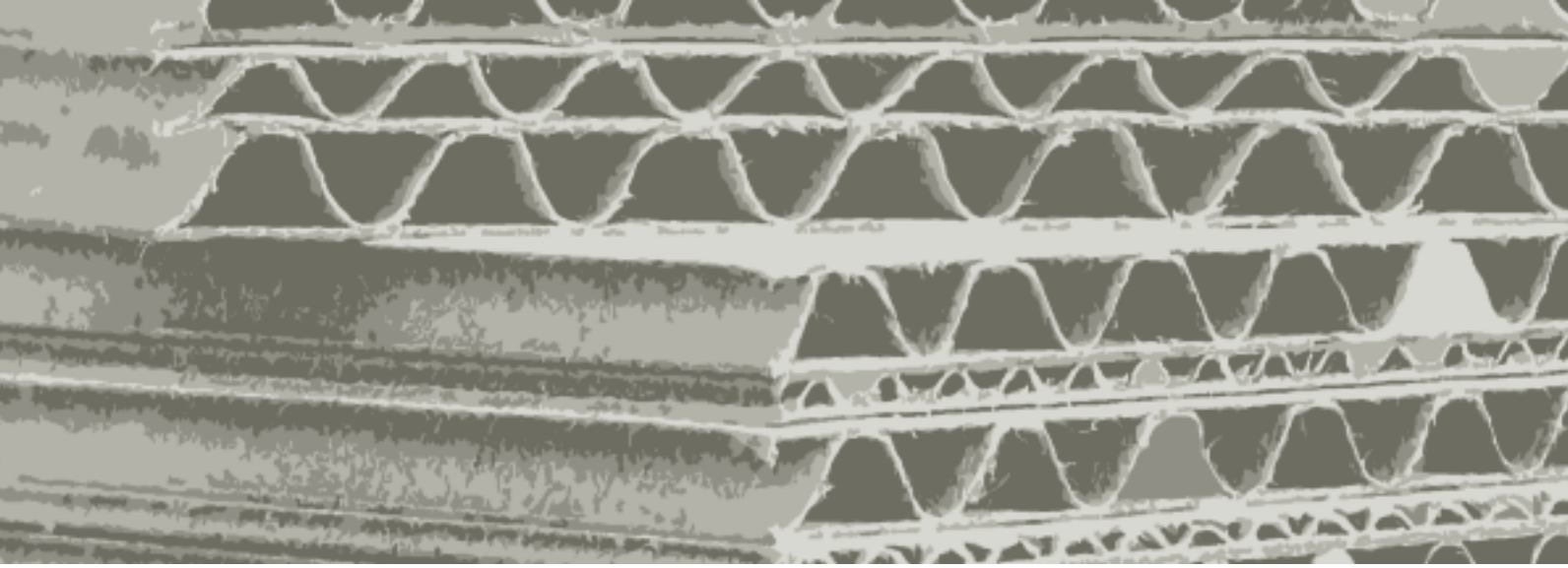
where the corrugator is producing a significant proportion of heavyweight double and triple-wall. Pea starch also gives significant advantages when producing microflute grades ■

A modern automatic glue kitchen

which can use any of the main processes available (Stein-Hall, No-carrier, Minocar and Pristim) to produce glues using native maize and pea starches, allowing the combination of flexibility and efficiency required ■

A technical support team

for fine tuning the glues formulations and application as well as training operators on the glue kitchen, formulations and process understanding ■



OBM and modified starches

With specific exceptions Roquette would not normally recommend the use of either modified starch or One Bag Mix for the reasons listed below:

Modified starch

- Reticulation changes the rheology of the glue but has no impact on the bonding rate or the final bond strength. The correct placing of the glue line and a reduction in splashing can also be achieved by improved regulation of the corrugator.
- The modification process imposes an additional cost onto the starch ■

One Bag Mix

- The manufacturing cost is higher.
- Adaptability to changes in production is limited since the glue characteristics are fixed.
- The knowledge of the glue making process and bonding is lost to the corrugator operatives ■

use

There are of course exceptions were these products would be beneficial and these include, among others:

- A glue kitchen which can only produce a Stein-Hall glue and a short-textured glue is required for the corrugator,
- Lack of reliability of the glue kitchen,
- The annual volume of glue used does not justify an investment in a glue kitchen ■

In addition to our range of native starches Roquette supplies wheat and maize modified starches and high-performance one-bag mixes, to answer any existing situation ■

Satisfying our customers

Every day, Roquette focuses on customer satisfaction

Roquette builds loyalty among its customers giving them innovative concepts providing solutions to their problems and is committed to supporting its customers through every phase of their production: product formulation, the manufacturing process, technical support and training.
The relationships formed are built on active partnership based on constructive dialogue.

Our quality policy is the cornerstone of the development strategy

Mobilising skills to define, refine and test the best possible solutions to meet the needs of the customer.
Roquette's capacity for innovative research, its high-level operational technical teams its industrial strength, and substantial investment programme, allows it to keep its commitments to customers in all the sectors here it is active: human nutrition, paper and board, animal nutrition, the pharmaceutical and cosmetics industry, chemicals and bio-industries.

Roquette is committed

To the quality of its products

Quality is an integral part of Roquette's production process:

- Fully traceable renewable raw materials,
- Production techniques that comply with the highest standards on processing, purity and environmental protection,
- Ingredients of irreproachable quality.

This approach involves guaranteeing the same level of security, supply and service in every country where the Roquette is present. It is achieved through certification and control processes applied at every level, from harvesting in the fields to production, purchasing and delivery of the finished product ■

To the quality of its services

Roquette guarantees that its products comply with pharmaceutical and food safety standards.

In addition to following ISO 9001 and ISO 2000 for quality management, the factory processes respect specific industrial directives, sector-specific codes for animal feed and best practices for manufacturing pharmaceutical products.

All raw materials are checked before use to ensure that they comply with internal standards-more than one million analyses are performed each year.
The central laboratory at Lestrem, which is responsible for analytical control, is accredited by the COFRAC* for testing for chemical and microbiological contaminants in raw materials and finished products ■

With strict compliance to high quality standards, a precise research and development approach and its ability to adapt to changing needs, Roquette prides itself on its culture of professionalism and a highly developed sense of service to its customers.

To guarantee this quality of service, Roquette applies certified management systems across its various sectors.
These systems are implemented with training at every level and are regularly evaluated and validated by independent auditors and by our customers ■

*French Committee for Accreditation

A strong commitment

To local service

Within the paper and corrugating sector are teams of local field application engineers who ensure that solutions are applied at their best. Geographical proximity and partnership- working method are major advantages for the Roquette's customers, who obviously share the Roquette's philosophy in innovation, diversification, and adaptation ■

To its customers' development

Roquette is proud of the capacity for progress that it shares with its customers through a simple, motivating method: bringing together people who strive to satisfy customer needs with customers who wish to continually improve their level of excellence and creativity. To achieve this, the Roquette provides its customers with cutting-edge skills in innovation, high-level technical support and industrial facilities that are constantly modernised. Reliability, expertise, innovation, anticipation of technological and marketing needs, quality of service and competitive rates are the foundation of its offering ■




The company's strategy is based on research and industrial growth that respects the environment.

Roquette's experts actively participate in the various forums to present innovative concepts to customers. Our Applications Laboratories are an essential tool for development, and work to perfect the products and processes that result from innovation ■

Roquette's business – converting renewable raw materials and carrying out research programs in plant-based chemistry – naturally encourages the company to emphasise the environment as the core of its approach. Most of its products are naturally biodegradable and offer no threat to the environment. In a context of sustainable development, Roquette is committed to respecting the environment throughout the entire manufacturing process, and it advises its customers on how they can address this issue as well ■

Logistics

ROQUETTE can guarantee complete control of its supply chain to be at your service in both quality and time.

Our logistic operation is built on four pillars:

- A spirit of customer service
- Expertise and innovation
- Flexibility and responsiveness
- A global approach

A spirit of customer service

A customer-focussed logistics team

Listening to your expectations and needs, our multi-disciplinary team manages your order from reception to delivery.

They organise the chartering of transport, as well as taking charge of contractual, documentary & customs requirements.

A question? A need? Don't hesitate to contact your logistics correspondent.

Permanently at your disposal, they keep you informed your order's progress and can rapidly answer your demands, for example, concerning the kind of transport, delivery date, customs procedures, and so forth ■

Expertise & innovation

A constant search to improve our means and methods to serve the customer

➢ *Our expertise*

Our teams are all experts in their respective fields:

- Packaging
- Stock control
- Order registration
- Chartering
- Dispatch preparations
- Transport organization
- Customer's documentation process
- Networking & associated systems

Thanks to this expertise, they are able to provide each customer with a quality service, fulfilling our commitments and the customer's needs.

➢ *Innovation*

Constantly alert to the market in relation to the techniques and logistics technologies our SUPPLY CHAIN specialists stay tuned to your needs to define the current best solutions and to study tomorrow's innovations ■

Flexibility & Responsiveness

➢ *Our flexibility*

The customer service teams are at your disposal to keep you informed and execute your demands for the delivery of our products right to their destination. Thanks to our relationships with transport professionals, our logistics team can propose the best transport mode for each customer and every order.

An unexpected event… a question… a modification — our customer service will do everything possible to serve you as best as possible.

➢ *Our Responsiveness*

The methods we use to handle orders make it possible the follow the progress of every order at any time. Our logistic contacts are always available to respond to the evolution of any situation, assuring the link between the customer, transporter, and the internal logistic teams (packaging services, stocking, preparation of the dispatch, etc.)

When technical conditions permit, EDI (Electronic Data Interchange) connections allow dialogue between our information system and our customers and transporters. The efficiency gains linked with this solution give an additional benefit in reducing the risk of error.

➢ *A Global and Local approach*

With homogenous, coherent methods in place globally, and efficient, optimised tools, each customer is supported by a professional logistic contact.
"Each customer, no matter where he is located, is served with the same level of reliability and quality."

Faced with the demands of a globalised economy which is constantly changing, and dedicated to serving its customers in the best possible way, Roquette has established industrial facilities on three continents, spreading its Supply Chain over the whole planet. Our logistic contact registers your requirements, manages your orders and guaranties optimal delivery conditions taking into consideration regional characteristics and the available resources. Roquette knows how to adapt complex transport chains in order to meet the customers' needs: for example multi-modal in Europe, railroads in the USA, short sea shipping in Asia, etc ■

An ambitious environnemental

The Roquette's environmental policy applies throughout the production process. It is described in terms of general objectives that are implemented within the factories and workshops and are regularly audited.

These efforts focus on improving efficiency to produce more while limiting the use of resources. In Europe, each site complies with the European directive on Integrated Pollution Prevention and Control (IPPC) and with Best Available Technology (BAT) references.

Optimising water use

Roquette has opted to use river water where possible for its circuits and to reduce the potable water required on its sites. Water is treated internally and then returned to the river. In Lestrem, for example, even when the site tripled in size, pumping from the river was cut by half thanks to recycling. Investing in internal purification plants made it possible to substantially reduce the effluent discharged into the water.
Pollution by the Lestrem factory (measured by COD [Chemical Oxygen Demand] discharged) has dropped by a factor of 50 since 1973, even as production has increased four-fold ■

Preserving air quality

The location of the factories – in areas well served by road, rail and waterways - helps to optimise logistics for raw materials and finished products while also limiting CO2 emissions. To reduce these emissions, Roquette has optimised its energy consumption. Roquette is expanding its use of natural gas and electricity/steam cogeneration using natural gas. Projects to use geothermal power and biofuel are in development. Finally, the particles released during the various phases of production are put through highly effective filters to prevent their release to the atmosphere ■

policy

Odours

To reduce odour pollution fumes from the grain driers and other atmospheric emissions are sent through a further combustion process ■

Noise

Noise control is taken into account when facilities are designed. Using a specific software application, Roquette forecasts and manages the sound impact of all of its factories ■

Waste

By their nature Roquette's processes generate very little waste and the material which is generated can be composted and used as fertiliser. For traditional waste (paper, wood, metal, etc.), recycling processes are applied after selective sorting in the factory ■

Industrial risks

Security is an integral part of Roquette's strategy, and the company is committed to reducing industrial risks, fires, explosions etc., by planning and prevention ■

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