Multiple Skills & Expertise

Biomaterial, paper pulp, couscous, flat bread, metallurgy...
Exploring the versatility of Clextral technology
Summary

p 1 Editorial

p 2 Multiple skills & expertise
Chemical, plastics and cellulose pulp technology unit

p 3 Vincent Alligier,
Paper production engineer

p 4 The Twin-screw and flax :
A lasting alchemy

p 5 Investment
in the Danish subsidiary KAL

p 6 Extruded bread in Belarus

p 7 A short history of extruded flatbread

p 8 Cotton linters for paper making

p 10 An Evolum HT 25 extruder

p 11 The cutting edge
of snack food processing

p 12 Dari :
Ever more pasta and couscous !

p 13 Couscous,
The tradition and modernity of an ancient grain

p 14 Clextral International
Editorial

Clextral is driven by innovation and our service to international markets, and we wanted to illustrate this in the pages of this newsletter dedicated to our teams’ many intersecting areas of expertise.

Clextral has been a forerunner in the plastic transformation industry since the 1950s; and expanded its focus to become a leader in food extrusion, then successfully designed a process for turning plant fibres into paper pulp using a twin-screw machine. A world leader and pioneer in production lines for the industrial manufacture of couscous, in this area too, our expertise is based on innovation, especially in the technique of drying.

Clextral’s significant expertise covers many aspects of the food industry, of course, but also chemistry – cellulose pulp, thermics, mechanics, metallurgy – and much more. This deliberate decision to embrace very diverse disciplines means that we can anticipate customer needs and give them total support in their quest for innovation.

The roots of this multidisciplinary approach lie in the process at the heart of Clextral’s development: twin-screw extrusion. Known as “intensifying” technology, it meets the requirements linked to sustainable development, thereby opening many outlets in the bio-sourced raw ingredient transformation sector for a wide range of food and non-food applications, such as the production of reinforced polymers using natural fibres.

Clextrusion no. 19 illustrates the different facets of Clextral and presents our recent achievements around the world. We hope you enjoy reading this issue.

Gilles Maller,
Vice President Development of Technologies
17 years experience at Clextral
Starting with its understanding of twin-screw plastic extrusion, Clextral began, early on, to innovate and deploy this technology in other industrial sectors. R&D is organised into food industry and chemicals-plastics-cellulose pulp units, the latter covering all non-food applications, including bio-materials.

Twin-screw extrusion is a key innovation of recent decades and it is often presented as a model of scientific and technical transfer between branches of industry. Historically, Clextral has played a decisive role in driving this technology in three major sectors: plastics and chemicals, food processing and paper pulp industries. Clextral began its twin-screw extrusion activity (using two co-rotation screws) in 1956, in the field of plastics. The twin-screw extruder’s thermomechanical fusion process and macro-mixing functions continuously produced mixes that were used to manufacture plastic materials. At the same time, the chemical industry adopted the technology and used the twin-screw extruder’s micromixing capacity to handle chemical reactions.

In the 1970s, having successfully transferred this technology to the food processing industry (see page 7), Clextral’s teams embarked on initial trials to transform wood shavings in a twin-screw machine. These very conclusive trials showed that the “Twin-screw” was capable of mechanically and mechanically/chemically producing cellulose pulp. A first patent was approved in 1975 and trials commenced with the “Centre Technique du Papier” (CTP), a partner in these developments. The “Twin-screw” process is based on the extruder’s capacity to continuously perform several single process functions – defibering of the wood-cellulose raw material, impregnation of the substrate with chemical agents, bleaching and washing – while reducing the consumption of water, chemicals and energy. Cellulosic material fractionation uses two generic functions: chemical reaction on-line and solid flash liquid fractionation by mechanical shearing.

Today, Clextral’s teams are innovating in the transformation of agricultural resources via twin-screw extrusion. This new area of research is based on the knowledge acquired in the other domains and meets the needs of manufacturers who are looking for more economical, less wasteful technologies and processes and more compact, reliable units. Extrusion is an intensifying technology that meets the requirements linked to sustainable development, which should lead to its continued growth.
Vincent Alligier, Paper production engineer

Vincent has been a paper production engineer in the chemical, plastics and cellulose pulp technology unit for the last two years. He is the youngest member of the team of experts in the fields of cellulose pulp, chemicals-plastics and biomaterials.

Vincent, what are your responsibilities at Clextral?
I work on developing new processes for the manufacture of paper pulp. In particular, I’m responsible for running trials on the pilot twin-screw machines available in our R&D facility. I also travel to customers’ premises to oversee the on-site start-up of machines and full production lines for paper-making applications.

What was your training background?
I am a 2008 graduate of the International School of Paper-making, printed communication and Biomaterials in Grenoble (formerly known as the EFPG –French School of Paper-making and the Graphics Industries). The school is one of the world’s leading training and research centres for the paper industry: wood chemistry, paper-making process engineering, paper physics, printing processes, digital flow management, colorimetry, printed electronics, material synthesis and products made from the plant biomass. The training has given me a better understanding of the special features and advantages of paper pulp manufacturing processes that use the Clextral twin-screw machine.

And apart from paper?
I regularly assist with trials linked to applications other than paper pulp, especially in the field of chemistry and biomaterials. There are similarities, for example in the use of plant materials for applications other than paper-making, and also for other, less similar applications. These complementary experiences are very useful as they present opportunities to share the knowledge acquired in previous developments over the years and, more personally, to open my mind to other subjects.
The Twin-screw and flax: A lasting alchemy

At a time when sustainable development is a worldwide concern, a large number of studies and research projects are in progress concerning the use of materials made with natural fibres and particularly plant fibres. Clextral is working on flax.

In 2005, during a meeting between Philippe Penel (Clextral) and Edouard Philippe (Dehondt) at a symposium on Biomaterials, an alchemy occurred when a passion for the TWIN-SCREW and a passion for FLAX converged, resulting in a desire to share ideas and expertise to develop composite materials made with natural fibres.

Plant fibres: the material of the future

“A composite material is defined as an arrangement of fibres – continuous or not – of a resistant material (reinforcement), drowned in a matrix, the mechanical resistance of which is much weaker. The matrix (binding agent) maintains the reinforcement’s geometric layout and passes on to it the stresses that are placed on the part.”

A composite material therefore combines the properties of several materials to offer a level of performance not found in a single material (lightweight, stress rigidity, etc.). The fibre most frequently used in the world today is glass fibre, which significantly improves the mechanical properties of composites. Due mainly to their superior mechanical strength, the main applications of these materials are in air, sea and rail transport, construction, aerospace, as well as sports and leisure activities. According to the FAO statistics quoted at the 2nd Polymer & Natural Fibre Composites conference (October 2008), 4.5 to 5 million tonnes of plant fibres (excluding cotton and wood) are produced worldwide, representing 8.5% of all fibres. The natural fibres most used include jute, sisal, coconut, and kenaf, which are known as tropical fibres, and flax and hemp, which are known as European fibres.

The use of these plant fibres as a reinforcement for plastic materials is interesting from a number of viewpoints, particularly for their low impact on the environment.

Flax fibre to reinforce plastic materials

The Clextral-Dehondt partnership, initiated after the meeting in 2005, didn’t occur by chance. Dehondt, based in Normandy (Europe’s leading producer of flax), is the leader in the design, manufacture and marketing of industrial equipment for harvesting, processing and packing plant fibres. Clextral already possessed expertise in the extraction of wood-cellulose fibres and the production of LFT (Long Fibre Thermoplastic). It was a natural step for the company to embark on research into materials reinforced with natural fibres. The partnership with Dehondt encouraged our engineers to direct their research towards flax fibre.

Interest in flax-based composite materials is not totally new. The aviation, automobile and leisure industries (e.g. bicycles) are eager to utilize this natural resource. Since 2006, Clextral and Dehondt have worked as partners with a goal of producing plastic materials reinforced with flax fibres using twin-screw extrusion. A number of scientific and technological obstacles needed to be considered, such as the difficulties linked to feeding the extruder, the non-agglomeration of the fibres, maintaining the correct fibre length during transformation, fibre-matrix compatibility and the fibres’ sensitivity to humidity and temperature.
Today, Clextral has significant experience in compounding different resins, including Arkema’s PA11, with flax fibre.

Over the last year, Clextral also conducted research with the “Centre for material forming” (CEMEF) as part of the post-master’s degree in Bioplastics, with the aim of gaining a clearer understanding of fibre-matrix interactions, which is one of the keys to obtaining a material with outstanding mechanical properties. Today, the first test markets are seeing these natural fibres utilized in electrical and water sport equipment industries. It was natural for Clextral to be a co-founder/member, with five other partner manufacturers (Arkema, Dedienne Multiplasturgy®, Group, Dehond® Group, Terre de Lin and Institut technique du Lin), of the Fibres Materials Flax Association [FiMaLin®] to promote an industrial sector dedicated to the technical applications of flax as an ecological substitute for glass fibre.

The association’s aim is to “set up and structure a “technical flax” industry dedicated to the development of eco-designed products that incorporate high-performance flax fibres. The light weight and performance of these flax-based composites makes them suitable for a wide range of applications, e.g.: vehicles, building, water sports, sport & leisure, rail industry, etc.”*

« Founding of the Fibres Materials Flax Association [ FiMaLin® ] to promote an industrial sector dedicated to the technical applications of flax »

www.fimalin.fr

A brief history:

The history of flax spans thousands of years… The oldest accounts of its use were found in the remains of lakeside settlements in Switzerland, 8000 years BC. However, we are not certain where it originated. A traveller who had journeyed across the world since its origin would certainly have seen flax on the great plateau of Central Asia. He would then have come across it in the East, in India and China. But it would have been in Egypt and, finally, Europe that flax would have settled comfortably into his memory.* (taken from the “Institut Technique du Lin” website www.lin-itl.com)

With the acquisition of KAL in Denmark in April 2008, Clextral established a base in Scandinavia and added to its metallurgy expertise, especially in the field of refurbishing twin-screw extruder screws and cylinders. The technique consists of reconstructing a worn part by welding an alloy onto the peak of the threads so the refurbished part can be reused in production. This operation can be carried out several times on the same part, which helps to reduce production costs.

KAL is proficient in the process, which it initially provided to the plastics industry for many years before offering it for food industry applications, in particular, for animal feeds. The Danish team also uses special metal-working techniques to extend the life of worn parts.

2010 has seen new investment in Denmark, with the installation of new pre-heating, correcting and surface treatment machines, the aim being to offer an identical level of quality between the mother company and its Scandinavian subsidiary, particularly for refurbishment.

* An extract from “Natural fibres as a reinforcement for composite materials” by Christophe BALEY, Doctor of the University and Central School of Nantes, Lecturer and Researcher at the University of Southern Brittany.
To meet the needs of the Belarus market, Clextral installs a production line for extruded crisp flatbread in Polotsk.

The Polotsk bread factory has practically doubled its extruded flatbread production, increasing from just over 10 tons a month at the start of the year to 18 tons since April. The director of the company, Sergei Leichenko, chose Clextral extrusion technology to accompany the development of his products in Belarus.

Nearly 760 tons of flatbread were imported into Belarus in 2008. In response to the product’s popularity, the management of the Polotsk factory decided in late 2009 to invest in a modern production line for extruded flatbread with a capacity of 100 to 140 kg/h. The line’s flexibility means that it can process a range of products with diverse shapes, sizes and recipes. For example, it can make square and rectangular flatbreads and fruit-filled products, and can incorporate many raw ingredients. The entire production line is automated, which makes it easy to operate, change recipes and ensure consistent product quality.

“The plan to increase and optimise production spanned three years. First, bakery product manufacture (bread, confectionery and croutons) was concentrated on one site. A second 1,500 sqm site was planned for the manufacture of extruded flatbread to replace imported products. We chose Clextral for its mastery of the technology. The company currently offers 12 different types of flatbread under the “Slaventskie” brand name,” said factory director Sergei Leichenko.

**The extrusion line is made up of three main units:**

- **The raw mix preparation unit:**
  
  the raw ingredients are prepared according to the formulation required by the end product and introduced into a batch blender to obtain a homogeneous cereal mix, ready to be processed. Then the mix is transferred to a surge hopper and fed continuously and evenly into the extruder.

- **The extrusion and shaping/texturing unit:**
  
  the process consists in extrusion-cooking the cereal mix in a corotative twin-screw extruder. Water is added to achieve the appropriate moisture level. The extruder is equipped with a high shear screw profile, which combined with the screw speed variable allows to fine tune the extent of the thermomechanical cooking of starch component. The time-temperature-shear combination in the screw-barrel assembly determines the degree of expansion on emerging from the die and the resulting product’s texture quality. The last section of the extruder barrel effectively cools the cooked melt in order to control the product’s temperature at the die outlet. The cooked melt is extruded through a twin-slot die (depending on the width of the product) to obtain expanded flat shape ropes which are guided towards the flattening unit.

- **The cutting and toasting unit:**
  
  the flatbread is cut by a pinching cutter which pinches the ropes according to the targeted length. The flat bread width and thickness are determined by the size of the dies and the expansion ratio. The pinched ropes are dried and toasted to eliminate excess moisture in the product and give it a brown colour on the surface, thanks to the Maillard reaction. The finished product is thus very crisp. The pinched, toasted ropes are then separated by a brushing system that divides the products into individual flatbreads ready for stacking and packaging.

  The temperature and moisture level of the ingredients and all the unit-based operations are automatically controlled by a supervision system.

  The Polotsk bakery factory was founded in 1933 and specialises in bakery products, flatbreads and rusks, confectionery, sauces and mustard. The product range is very extensive with nearly 70 references, 30 to 40% of which are renewed every year. The company employs 240 people.
A short history of extruded flatbread

The invention of flatbread coincides with the use of twin-screw extrusion in the food-processing industry, spurred on by Clextral and its company and research centre partners. Let’s take a look at the history of this invention, which goes back to the ’70s.

It all started in 1971, when after a study trip to the United States, Mr. de La Gueriviere, from the “Biscuit Industry Federation Technical Centre” (CTU) and Mme Mercier, a scientist specialising in starch at the “National Institute for Agricultural Research” (INRA), advised Creusot Loire (Clextral’s former name) about the potential for extruding machines in maize flour transformation.

“Putting flour in a machine designed for plastic didn’t go down very well with a lot of people, especially the mechanical engineers,” said Guy Feré, who was working in the test centre at the time. But the management was interested in the challenge so a small team set to work on extrusion cooking of starch flours using a BC45 twin-screw extruder. The machine, which was designed to extrude plastic, was modified and adapted with great ingenuity and much trial and error to the new challenge. Trials were run and the technical problems were resolved one by one … and there were plenty of them!

Once the first trials proved conclusive, the CTU set up the same machine and continued the experiments to analyse the transformation of starch. Then, one day, a Clextral technician, Georges Bugnazeret, had an idea: “Why not try to make a flat biscuit?” A die was cobbled together during the day, fresh trials were run and after more trial and error, a new product was invented: a flat biscuit with a honeycomb texture that was initially called “croque-pain”, or crispbread. The invention of this “crisp flatbread” was a real innovation that showed this technology was well suited to the extrusion cooking of cereals. It should be emphasised that the product could only be obtained by extrusion cooking, which thus became a valuable technology for creating new products.

Jacquemaire, which later became BSN (Danone) placed an order for a BC72 twin-screw extruder to continue perfecting the “Cracotte”, and the new product was placed on the market for the first time in 1978.

Nowadays an extensive range of crisp flatbreads are on the market, from the traditional crispbread (made with wheat, rice, etc.) to the diet flatbread (fibre-rich, multi-grain, etc.) and the co-extruded filled flatbread with a variety of raw ingredients, sizes and types of nutrients added to the recipe. The texture of this particularly crispy product is due to a very airy honeycomb structure that makes it so crunchy to the bite.

As a result of this innovation by Clextral, extrusion cooking in a co-rotating twin-screw extruder has created new products, new market segments, and new ideas… and it’s not over yet!

Aïda Rochas, Marketing & communication manager of Clextral since 2007. Started at Afrem in 1990. 20 years experience in the field.
More than thirty years ago, Clextral developed a continuous automated process for making paper pulp from cotton fibres, using Twin-Screw technology, also called as BIVIS technology.

Since the industrial revolution, the paper industry has mainly used wood and recycled fibres as its raw materials. Before this, paper was made almost exclusively with plant fibres such as flax or cotton. Some experts say cotton fibres were used to make paper in China for two thousand years.

However, cotton fibres are now greatly valued by paper manufacturers and are mainly used for high end specialty papers. The absence of lignin and the physical and mechanical properties of cellulose provide greater durability and suitability for special applications.

Cotton linters for paper making

The most successful continuous process for making paper pulp from cotton fibres

Cotton linters

Cotton linters are agricultural residues from the cotton crop. It is a particularly interesting source of raw material to be recovered and used in the manufacture of high-quality paper in cotton-producing countries without sufficient wood resources. Yet it is estimated that only 20% of the available cotton linters resource is used by manufacturers.

Bleached cotton linters pulp is used on its own or mixed with other pulps for applications such as technical papers, security papers, insulation paper, filter paper, certain papers for domestic use and high-quality papers such as art papers. Certain high end printing/writing papers are also made from cotton linters pulp.

A continuous process for making paper pulp from cotton linters.

In the late 1980s, Clextral developed a continuous automated process for making paper pulp from cotton fibres using BIVIS technology. Since then, eleven production lines have been sold for this operation worldwide, including three for the processing of cotton linters.

This technology offers decisive advantages compared to traditional processes that are discontinuous and heavy consumers of water and energy.

The process using BIVIS technology for the production of paper pulp from cotton linters includes the following stages (see diagram opposite):

- Handling the bales of cotton and dry cleaning

After the bales of cotton have been opened, the cotton fibres are dry-cleaned. The equipment used to dry-clean the cotton includes a cyclone separator to remove the largest heaviest contaminants, then a beater-cleaner that removes dust and other foreign particles bodies, and finally a detector/extractor that eliminates metals. The cleaned fibres are conveyed to a feeder system for cooking stage.

- Fibres impregnating and cooking

After clean or recycled water and sodium hydroxide have been added, the fibres are baked and simultaneously pre-cut. Cooking takes place at a high consistency (35%) with a temperature at the BIVIS machine outlet of over 90°C. It is not necessary to add steam at this stage in the cooking as the conversion of electrical energy into heat during the treatment fulfils the conditions required to dissolve the waxes and fats and break down any residual contaminants.

The treatment of the cotton fibres is completed in a retention unit, which consists of a hermetically sealed belt, where the fibres stand for 60 minutes.
- Washing and bleaching the pulp:

The unbleached pulp that emerges from the retention unit is conveyed to a second BIVIS machine that washes and cuts the fibres and bleaches the pulp. The pulp is washed using 3 compression/cutting sections in the BIVIS machine, the extruding cylinder of which is fitted with filters. Direct washing process is generally used, however a counter courant pulp washing process can be applied. The fibres are cut during washing stage. They are bleached by injecting a solution of hydrogen peroxide and a solution of sodium hydroxide. No chelating agent or hydrogen peroxide stabiliser is required. The washing water and chemicals are injected using volumetric pumps. Pulp consistency as it emerges from the BIVIS machine is between 35 and 40%. The bleaching reaction is completed in a second retention unit, where the fibres stand for 90 minutes.

- Washing the bleached pulp:

The bleached pulp is diluted to 3.5% and then thickened in a screw-press to obtain a bleached pulp at a 35% consistency. The pulp is then diluted in a dilution tank and its concentration is adjusted down to 3 – 3.5 %. The pulp’s pH is adjusted to the required value in the tank, using a solution of sulphuric acid before being transferred to a storage chest. The bleached cotton linters pulp is then refined and screened.

Operating parameters

Based on 1 Bone Dry Metric Ton of bleached dry cotton linters pulp produced via the above process, the main operating parameters are:

- Cotton linters consumption, based on material at 94% and depending on the linters quality: 1.14 T to 1.27 T,
- Cotton linters and dust waste from the dry-cleaning section: 60 to 210 kg, depending on the linters quality
- Electricity consumption: 1000 to 1100 kWh.
- Steam consumption: 0
- Consumption of chemicals:
  - Caustic soda (active product): 60 to 65 kg,
  - Hydrogen peroxide (active product): 45 to 55 kg,
  - Sulphuric acid: 5 to 10 kg, depending on the pH of the clean or recycled water.
- Water consumption:
  - Consumption of clean water for cooling the motors: 11 m³, which may then be recycled into the pulp production process
  - Consumption of fresh water and/or recycled water: 24 m³,
- Volume and pollution level of effluents:
  - Volume: 33 m³,
  - BOD5: 28 kg,
  - COD: 97 kg,
  - Suspended solids: 45 kg.

The BIVIS process has conclusive advantages such as:

- The ability to treat cotton linters of widely varying quality, especially cotton linters of poor quality, which may contain over 30% impurities,
- It obtains a high, consistent pulp quality with a small number of operatives,
- It obtains a pulp quality that can be used for making writing & printing papers that meet the highest international standards,
- A reduction in chemical agents: the savings may be as much as 20 to 30 %,
- The quality of the environment is preserved as the bleaching process uses only hydrogen peroxide as a bleaching agent to obtain a bleached pulp, i.e. a pulp said to be TCF (Total Chlorine Free),

To summarise, the BIVIS process for manufacturing paper pulp from cotton fibres offers dual advantages: lower investment and particularly attractive operating costs.

Cotton linters pulping process for writing and printing papers, tissue and special grades

- Bale opener
- Cyclone
- Boilier cleaner
- Metal detector
- Metal extractor and waste storage
- Densifier
- BIVIS machine 1
- Dwell unit 1
- Air filtration unit
- Raw cotton linters
- Bleaching effluents
- Washed linters
- BOD5
- COD
- Suspended solids
- Cleaning air
- No OH
- H2O2
- Bleaching effluents
- White water or black water
- Effluents from BIVIS 2
- Effluents from static filter
- Washing effluents
- Static filter
- BIVIS machine 2
- Dwell unit 2
- Dilution tank 1
- Scove press
- Effluent tank
- Dilution tank 2

To storage

Philippe Combette
Sales manager cellulose, pulp & paper equipment
37 years experience in the field.

Clextral october 2010 - n°19
An Evolum HT 25 extruder
“Renewable carbon chemistry” research

The National School of Chemical and Technological Engineers and the European Innovative Processes Centre in Toulouse have acquired a Clextral Evolum HT 25 twin-screw extruder in order to develop innovative products.

In July 2010, the Toulouse National Polytechnic Institute (INPT) acquired a Clextral Evolum HT 25 twin-screw extruder as part of the project entitled “Accompanying the Cancer-Organic-Health competitive cluster – A different approach to chemistry”. The machine is already in service performing contract operations over the short term, and will be used for research operations (modelling studies, kinetics, reactivity, etc.) over the longer term.

The aim is to provide a tool for the academic and industrial community to develop innovative products under clean, safe conditions.

The Evolum HT 25 is fitted with a range of controlled introduction systems and enables data to be collected during operation. In this configuration, the equipment will be dedicated to feasibility studies for industrial clients, and will also be accessible to companies. It will be used to carry out plant matter fractionating and pretreatment, reactive extrusion, continuous formulation (aggregates, compounds) and reformulation operations. For example, fractionating of plant matter to obtain components and molecules of interest to fine chemistry, the pretreatment of agricultural coproducts with a view to improving the production of 2nd-generation biofuels, the decontamination of downgraded seeds, the transformation of fibres to manufacture new materials, and the implementation of continuous esterification reactions to obtain bio-solvents, etc.

The equipment is installed at the Toulouse National School of Chemical and Technological Engineers (ENSIACET) in an ATEX environment and is utilized for joint studies between two of the research laboratories on the site, the Chemical Engineering Laboratory (LGC) and the Agro-industrial Chemistry Laboratory (LCA) with their respective regional centres for innovation and technology transfer (CRITT). In addition, as part of an agreement signed in July 2010 between INPT and the European Innovative Processes Centre (MEPI), an industrial demonstration platform, the extruder will be used for work on “Renewable carbon chemistry”. Here, the Evolum HT 25 is added to the existing range – the BC 45 and BC 21 – already installed at the LCA, and the Evolum 53 installed in the AGROMAT agro-materials demonstration hall. With this new acquisition, the site now has a broad and varied fleet of extruders capable of fulfilling a wide range of operations.

Christophe Gourdon, Professor INP Ensiacet
Scientific adviser at the MEPI
One year ago, it was a grassy field in central Ohio, USA. But on August 13, 2010, this site hosted a momentous event—for Shearer’s Foods, the snack food industry, and for the environment, as Shearer’s celebrated the completion of the first LEED Platinum snack food manufacturing plant in the world.

“We knew from the start that building a sustainable facility was right for the community, our employees, our customers, and the planet,” said Bob Shearer, CEO of Shearer’s Foods, Inc. “This new facility gave us an incredible opportunity to prove to ourselves, and to other companies, that you can operate a manufacturing plant in a sustainable manner.”

LEED (Leadership in Energy and Environmental Design) standards are set by the US Green Building Council and govern site sustainability, water efficiency, energy strategies, materials and resources, and indoor environmental quality. For office buildings, these factors are established, but in a manufacturing plant, this was uncharted territory. “Snack manufacturing is very energy intensive, and our processes generate heat and use water resources,” explained Shearer. “For example, our ovens generate 600 degree steam heat, but our plant recycles this steam to heat potable water for our other processes.” The company set a target of 14% energy reduction from industry standards, but has achieved a 30% reduction. From the ground up, the plant is designed for sustainability, from the shop floor control system that optimizes water and energy usage to the windows and skylights that provide ambient lighting. It took hard work and dedication to achieve LEED Platinum, the highest certification. Local USGBC representative Alexander Bagne commented, “we worked closely with Shearer’s Foods and are very pleased to confirm their platinum certification.”

Achieving high standards is everyday business at Shearer’s, whose slogan is Shearer Perfection in Every Bag. The 36-year-old company produces 220 million pounds of snacks annually, which are sold under branded, contract packaged and private label banners. Clextral twin screw extruders are among their production equipment, and essential to their continuing quest to stay on the forefront of snack innovation.

Also a leading corporate citizen, Shearer’s has an in-house Caring and Sharing program that reaches out to help people with special needs. “We ‘teach by example’ the importance of helping each other and the community,” said Shearer. Employees from manufacturing to management are included on the Caring and Sharing Committee, and yearly fundraising events support their mission.

Shearer’s next goal? They plan to achieve LEED certification for all their manufacturing and distribution facilities, and work with the Snack Food Association to help other companies follow their example. “While there are certainly financial rewards, we don’t look at it that way,” stated Shearer. “We know the world’s resources are finite, and we’re doing what we can to preserve them.”
When it was founded in 1995, Dari’s production capacity was 6,000 tonnes a year: it is now up to nearly 52,000 tonnes as a result of recent investment in the new factory, known as “Dari II”. All using Clextral equipment.

In just two years, three new production lines have been installed and started up in the new building: the first couscous line, with a capacity of 1500 kg/hr, was joined in late 2009 by a second couscous line and a pasta line, each with capacity of 1800 kg/h. With the three lines in operation in the first factory, a total of six production units are making pasta and couscous under the “Dari” brand. Clextral supplied all this equipment, from the first line that was purchased when Dari was founded in 1995.

Mr. Mohamed Khalil, CEO and founder of Dari

Having worked in the pasta and couscous industry for nearly 30 years, he decided to launch his own company at the age of 54, when some people are already thinking about retirement. As an expert in the field, he knew that success depended on the quality of his products, which he decided to call “Dari”, which means “Home”. The company became public in 2005, but the Khalil family still has a 70% holding. And the future is assured as his three children all work for the company.

Mr. Khalil, you were Sales Director, then Managing Director, for pasta and couscous manufacturers in Morocco and Mauritania. Did you already know about Clextral equipment at that time, and what made you opt for this equipment when you founded Dari?

I’ve known Afrem equipment (now Afrem-Clextral) for over 25 years. In 1985, when I took over Famo Mauritania, I restructured the company and repositioned it in the market; one of the development strategies that we chose was to launch the manufacturing of high-quality couscous on an industrial scale in Mauritania. This was when I first observed Afrem equipment. Its leading-edge features and innovative process, especially high-temperature drying in a rotary dryer gave us complete satisfaction. I also appreciated the skill and professionalism of the Afrem teams. All these strengths, backed up by a particularly responsive, efficient after-sales service, led us to choose Afrem equipment when we set Dari
Couscous is a mix of cereal grains that are rolled and mixed together, then pre-cooked and dried: for consumption it is rehydrated in hot or cold water. A traditional dish that originated in North Africa, its manufacture was industrialised in the 60s to meet growing demand, particularly in France.

There is little agreement about the date when couscous first appeared, but it is said to have existed among the Berbers in North Africa from the development of wheat farming introduced by the Romans. It is believed that the Berbers invented the method of cooking with steam, which preserved the nutritional qualities of the grain. The product appeared in Europe in the 17th Century, and a variation on couscous, made with maize, can still be found in Brazil where it was introduced in the 16th Century. Mass consumption in France dates from the arrival of repatriated settlers from Algeria in 1962. Since then, couscous has become France’s second favourite dish, according to a recent survey. Today, it is largely industrialised and comes in tins, frozen packs and Dow packs to be heated in the microwave.

Couscous is traditionally made from durum wheat, but today it may contain a wide variety of raw ingredients: maize, barley, pearl millet, millet, sorghum and even rice... The traditional ethnic dish, also known as “couscous”, varies from one region to another and may include vegetables, meat or fish. Sweet preparations are also very popular. The early 90s saw a significant growth in demand for fresh salads made with couscous grain and “flavoured” couscous (Asian-style, spicy, etc.). The famous “tabouleh” (couscous salad) is a highly popular dish.

Couscous is produced industrially not only in the Maghreb, from where it originates, and in France, which adopted and adapted it, but also in other countries in southern Europe, North America and Africa. Clextral’s industrial process reproduces the traditional method: mixing and rolling, steaming, drying in a rotary dryer (see Clextrusion no. 13 and no. 18) then sifting and storing. Couscous has different grain sizes: fine and medium, which vary according to the region. To ensure consistent grain size in industrial production, sifting and recycling circuits on the Clextral lines allow products deemed too fine or too large to be separated and re-used.

The couscous production lines are fully automated and capacity varies from 500 kg/h (the small-capacity line recently launched by Clextral) to 1200 kg/h, 1800 kg/h and up to 3600 kg/h (the largest capacity in the world installed by Clextral). Today, Clextral is the world leader in industrial couscous production lines, with technology and expertise based on the process knowledge that was originally developed by the French company Bassano, a pioneer in industrial couscous manufacture.
Clextral’s new man in Casablanca

With a fleet of 3.5 couscous and pasta production lines and twin-screw extruders installed among the food industry market leaders in Morocco, Clextral reinforced its presence in Morocco by opening an office in Casablanca in December 2009. Zakariae Benjelloun, who has worked for over 14 years on the couscous and pasta production lines, is the manager of this office.

The Clextral Chile team expands

Established in 2002 by the current director, José Coelho, Clextral’s Chilean subsidiary has expanded with the arrival this year of Victor Naverete as after-sales service and process technician and Nicolas Swiderski, an expert in engineering and quality control. The subsidiary has also moved into more spacious premises to better accommodate the needs of our customers. The address remains unchanged, with an office at no. 302.

Clextral Inc seminars

There was a record attendance for the seminar on extrusion and drying in Spanish at Clextral Inc. in Tampa, FL.

More than 50 food industry professionals travelled from Chile, Venezuela, Colombia, Argentina, Peru, Mexico and the Dominican Republic to attend «Transforme sus materias primas en productos extruidos de alto valor agregado», an intensive 2-day training course focusing on new product development and twin-screw extrusion.

A wide variety of applications were presented: snacks (directly or indirectly expanded), breakfast cereals, flakes, co-extruded products, flatbreads and functional ingredients. The course included a theory section in the morning, run by Anne Sophie Le Corre, new product development manager at Clextral, and practical demonstrations in the afternoon, conducted on twin-screw extruders and the drier installed in Clextral’s R&D center. Clextral Inc. offers two seminars a year that are open to professionals: one in English, the other in Spanish, and dedicated seminars are also regularly offered customers with specific requests.

Events

Meet our teams at the upcoming events :

- **FOODTEC INDIA**
  - Mumbai, India
  - 30 September - 3 October 2010
  - **Hall 1**
  - **Stand D22**

- **PET SOUTH AMERICA**
  - Sao Paulo, Brazil
  - 6-8 October 2010
  - **Stand 60**

- **AGROPRODMASH**
  - Moscow, Russia
  - 11-15 October 2010
  - **Pav. 8, Hall 1**
  - **Stand B25**

- **IPA International Food Process**
  - Paris, France
  - 17-21 October 2010
  - **Hall 7**
  - **Stand D038** (Adepta)

- **AQUASUR 2010**
  - Puerto Montt, Chile
  - 20-23 October 2010
  - **Stand A 228.**

- **PAPFOR**
  - Saint-Petersburg, Russia
  - 8-11 November 2010
  - **Stand 7141**

- **IAOM Africa & Middle east millers conference**
  - Cape town, South Africa
  - 22-25 November 2010
  - **Stand 48**

- **SNAPO**
  - Orlando (FL), USA
  - 21-23 March 2011
  - **Stand 500**

- **VICTAM 2011**
  - Koln, Germany
  - 3-5 May 2011
  - **Stand D30**

- **INTERPACK 2011**
  - Dusseldorf, Germany
  - 12 -18 May 2011

- **IFT 2011**
  - New Orleans, USA
  - 11-14 June 2011