The CANNON GROUP at UTECH North America 2007

Cannon will be exhibiting several innovative solutions at the North American edition of the classic event of the Polyurethane Industry, UTECH North America 2007, held in partnership with the API Conference in Orlando, FL, from September 24 to 26, 2007.

Cannon will "digitally" present the entire range of machines and dedicated technologies: it will be possible to discuss with local personnel and view dedicated DVDs regarding the following equipment:

- The new "A-Basic" high-pressure pump-driven economical metering unit, featuring a number of advanced technological solutions and controls, will be on display at Cannon's booth.
- The new Cannon JL mixing head, an innovative "L-shaped" head without injectors, for simpler use and wide range of outputs.
- The range of low-pressure "B" machines and multi-component low-output mixing head "BI-Multi": they include dedicated models for Gasketing (continuous seals with PUR and Silicone, which can advantageously replace die-cut strip, extruded and molded gasket) and Poring (for electronic components encapsulated with PUR and Epoxy resins).
- Latest solutions for continuous and single-block production of flexible slabstock foams (conventional and visco-elastic), including the latest versions of CatDo™, C-Max and Single Block foaming machines.
- The range of dedicated plants for the continuous production of sandwich panels, insulated with PUR, PIR and Phenolic rigid, low density foams, as well as a version able to handle at the same time mineral wool. Special solutions for the mass production of curved panels will also be shown.
- The developments of the co-injection and reinforced spray technologies, for an increasingly wider number of industrial applications, and of SolStream for dosing fillers and solids directly into the mixing heads.

Four papers will be presented by the Cannon Group at the Technical Conference, regarding:

- Refrigerated trucks: dedicated foaming solutions for extra-large insulated panels.
- Control of the mixing pressure for enhanced mixing efficiency: recent Cannon achievements for multi-component variable-output foaming applications.

Stop in at Cannon booth # 501 to see how our experienced staff can assist you with your Polyurethane processing needs!

Cannon JL: 
no jets, no troubles!

The Cannon JL is a new family of high pressure L-shaped mix heads. The acronym JL stands for “Jet Less” to say that the mixing of the two reactive liquids is not obtained by two injectors. The high turbulence - formed and maintained in a relatively narrow mixing chamber in which a stream of the two components is delivered - does the trick. The liquid components are metered in a common chamber and then flow to the mixing chamber trough variable restrictions where they acquire the necessary energy. At the end of the mixing chamber an L-shaped geometry deviates the flow into a much larger delivery chamber, slows down its turbulence and permits the delivery of the mixed blend with a very laminar flow.

Refrigerated trucks: 
XL is better!

Large insulated panels are increasingly needed for manufacturing huge insulated trucks. A variety of insulating media can be used for this demanding application, and Polyurethanes provide the most flexible solution. Cannon have matured significant experiences in the past ten years in the challenging task of automating the production of these large elements. One of the latest achievements is a complete plant for the production of extra long (XL size) panels, installed this year in Germany for a leader of this field, who will be able to produce two complete trucks per hour. High-pressure high-output metering equipment, large polymerization presses, impressive panel-handling systems are illustrated in this article.
Another example of a winning approach, through the coordinated action of Cannon USA and Cannon Tecnos, the Group’s Automotive Technologies Division. Providing a dedicated solution which brings substantial benefits to the customer, they were awarded a significant order for a complex sound-proofing part for automotive.

The Customer
Based in USA, they are a supplier of the Automotive industry providing over forty years of superior noise control solutions. They design and produce simple and complex laminates in various shapes, thickness and weights, based on three types of noise control applications: sound barriers, sound absorbers and vibration dampers. They provide their customers with everything from custom-engineered rolls and die-cuts to molded and cast-in-place materials. The most typical applications for their products include floor systems, dash and front of dash barriers, HVAC (Heating, Ventilation and Air Conditioning) elements, interior trim panels.

Project Background
One of their most successful products is a series of acoustic side shield for engines, providing a substantial reduction of the noise generated by the motors conventionally installed on vehicles. These parts have a two-part foam: a semi-rigid filled part and a back foamed part with flexible foam. They used to produce them with a classic, logical sequence of manual operations: the production of the skin included tool cleaning, spraying of release agent in the tool, positioning of inserts, manual open-mold pouring of a filled Polyurethane formulation, a curing phase of approx. 3-4 minutes, manual unloading of part and a skin’s roughing to eliminate release agent in order to achieve a good adhesion between skin and foam. The back-foaming operations included the loading of the previously made part in another tool, manual open mold pouring with a soft foam Polyurethane formulation, a curing of approx. 2 minutes, the unloading of the finished part and its final manual trimming, tool cleaning and manual spraying of release agent prepared the second tool for the next cycle. A labor-intensive sequence of operations, prone to errors and to intensive handling of unfinished items.

In view of a new large order, coming from a major engine manufacturer, the customer’s procurement had already chosen a process solution and an equipment supplier, but gave Cannon USA the chance to present a completely different way of production.

The Cannon Solution
Cannon have more than forty years of experience focused on providing an innovation value to the customer. Reducing labor costs via automation. Producing parts at a faster rate to increase capacity. Reducing the amount of steps required to produce a part. Improving part quality while reducing the overall cost of the part. Allowing for future expansion of capacity. This recipe worked fine for so many projects, why not apply it again in this case? The process was analyzed by Cannon Tecnos process specialists, and an integrated solution was developed, which included:

- Traction drive carousel with Pit-stop feature, to handle a number of tools flexibly and independently
- Dedicated mold carriers, designed for one fixed lower mold half and a for double upper mold, rotating 180° to allow for a sequence of two different foaming operations, to manufacture a two-layer piece
- Cannon patented Foam & Film technology, to eliminate the release agent and all the tool’s cleaning operations, to be applied on the three surfaces of the tool: the common lower plates and the two faces of the upper mold half.
- One “HE” cylinder machine and one “N” pump machine to dispense the two different formulations
- Two 6-axis robots to perform the open-mold pouring operations
- Automated part unloading
- Only one manual operation was foreseen in the new process – the positioning of some nuts in the lower tool – while the rest was totally automated. Final inspection of the trimmed parts was, of course, left to the skilled eyes of the customer’s staff.

The key of the proposed solution relies on the patented Cannon Foam & Film system: by applying over the molds a thin plastic film prior to foaming, a number of substantial advantages can be achieved:

- Reducing cycle time, due to an automated application of the film
- Eliminating the scuffing process, necessary to promote the adhesion of the second layer over the first
- Eliminating the application of release agent, with all the associated benefits in terms of air suction, equipment, etc.
- Eliminating in-mold paint through use of colored film, with the same induced benefits seen above
- Applying a high grade of automation, that provides intrinsic benefits in terms of quality
- Reducing the overall manufacturing costs
- Improving the adhesion between the skin and the foam layer

The process was analyzed by Cannon Tecnos process specialists, and an integrated solution was developed, which included:

- Traction drive carousel with Pit-stop feature, to handle a number of tools flexibly and independently
- Dedicated mold carriers, designed for one fixed lower mold half and a for double upper mold, rotating 180° to allow for a sequence of two different foaming operations, to manufacture a two-layer piece
- Cannon patented Foam & Film technology, to eliminate the release agent and all the tool’s cleaning operations, to be applied on the three surfaces of the tool: the common lower plates and the two faces of the upper mold half.
- One “HE” cylinder machine and one “N” pump machine to dispense the two different formulations
- Two 6-axis robots to perform the open-mold pouring operations
- Automated part unloading
- Only one manual operation was foreseen in the new process – the positioning of some nuts in the lower tool – while the rest was totally automated. Final inspection of the trimmed parts was, of course, left to the skilled eyes of the customer’s staff.

The key of the proposed solution relies on the patented Cannon Foam & Film system: by applying over the molds a thin plastic film prior to foaming, a number of substantial advantages can be achieved:

- Reducing cycle time, due to an automated application of the film
- Eliminating the scuffing process, necessary to promote the adhesion of the second layer over the first
- Eliminating the application of release agent, with all the associated benefits in terms of air suction, equipment, etc.
- Eliminating in-mold paint through use of colored film, with the same induced benefits seen above
- Applying a high grade of automation, that provides intrinsic benefits in terms of quality
- Reducing the overall manufacturing costs
- Improving the adhesion between the skin and the foam layer

The plant is in full production and the customer is looking forward to increase their capacity by simply adding additional presses to the existing line. The foaming and pouring equipment, as well as the unloading and the Foam & Film stations, are fully capable of serving more clamps and tools.

The Customer’s Added Value
What did Cannon achieve for the customer? A lot: a cycle time reduction of approx. 20%, with a reduction of 35% versus the original cost. Their capacity increased due to shorter cycle times, decreasing their staff. Quality of their parts highly improved for high standard adhesion and at the same time they were able to eliminate several manual process steps.

The Cannon approach once more provided a win-win solution. The customer produces quality parts with a substantial saving and Cannon supplied another innovative production system.

Have a complex project in mind? Talk to Cannon: They Know How.
A walk-in PUR encapsulation press has been fully designed and manufactured by Cannon in the USA for a key supplier of low volume and aftermarket encapsulants. A solution providing unique and very clever features.

The huge dimensions of a windshield demand unique technical solutions when applying a continuous encapsulation in Polyurethane, mostly for the difficulties deriving from the manipulation of a large glass part: Cannon have supplied for more than 20 years complete solutions for glass encapsulation based on vertical pressers holding the mold horizontally.

The solution is ideal for medium and small windows, while it might present some handling difficulties with the larger and heavier front and rear screens.

Properly stimulated by a key supplier of low volume and aftermarket encapsulated windshields and backlights, Cannon USA have responded to the request of a more rational solution, designing and supplying an innovative horizontal polymerization press, where the mold opens sidewise via ball screws placed on opposite corners of each plate.

A dedicated glass encapsulation plant "made in USA" by Cannon.

This design allows the operator to freely walk in and out the 1.8 m high press, where the 70 Tons clamping force is achieved using air bags. The rational design and ample operating space is ideal for all the service operations and allows for easy mold change, using a conventional forklift.

Says Mike West, of the Automotive Division of Cannon USA: "Another great feature of this press is that it can be designed to book-up with a thermostatic injection unit and shot by FV C, the fastest growing material in this market. This is a common injection molding equipment typically used to press the injection unit. For a small shot you get small injection unit and small press!"

The requirement for those applications is small shot and the injection molding guys do not offer a machine off the shelf for a small shot large press. It is more economic to just buy a thermostatic injection unit from the market and a ball screw press from us!"

Productive, cleverly designed, reliable, safe: made in Cannon USA! See us on www.cannonmusma.com

Innovation from Cannon USA for glass encapsulation

Cannon HF the "Plug & Play" hybrid solution

A abrasive or heavily filled Polyol on one side, standard Isocyanate on the other. Quite a common situation today, in the Polyurethane industry. Demand is growing for reinforced and filled formulations, for higher modulus (i.e. stiffer) parts, or simply to reduce their cost! Cannon have for many years supplied their HF model, filler-capable machines able to provide a wide variety of polymerization press, where the mold opens sidewise via ball screws placed on opposite corners of each plate.

For interiors and exteriors, structural parts.

The A-Compact confirms its reliability and quality

The new Cannon "A-Compact" has been developed to give a superstar response to the truck brigade. A solution properly expressed by the users: simplicity of management, high technical and quality standards, efficiency and reliability, keeping the investment costs down.

Even since its initial presentation, the "A-Compact" series has aroused great interest on the market and has quickly become commercially successful. Apart from particular types of application which use charged materials, the "A-Compact" models are now widespread and used to produce a wide range of Polyurethane foams in the most varied applications from rigid low-density Polyurethane for thermal insulation to flexible foams exploiting the car interior and furnishings, from wood imitation to manufactured products in integral skin.

The "A-Compact" high-pressure models are often the ideal solution for those customers wishing to replace low-pressure machines with a more modern technology with low environmental impact. This series is the tangible result of Cannon’s commitment to developing and designing its machines using the most sophisticated technologies available.

Based on the design of the well-known Cannon "A-System", the new "A-Compact" series can, for all purposes, be considered a compact version of it, adopting the same components.

The rational design means that all the machine modules – tanks, metering and electric panel - can be positioned on a single base, while the open structure allows excellent accessibility to all the parts for their easy maintenance and cleaning.

Easy to transport, requiring less room for installation, improved suitability for production – a "Plug & Play" unit – the "A-Compact" has been a hit on the market.

Controls and Operator Interface

All the machine functions are monitored and controlled in real time by a PLC interfaced to a dedicated control panel, based on Siemens “Touch Screen” technology.

All the main process data can be set means of a keypad and displayed on the screen so that the operator can easily manage the process parameters.

Mixheads

The "A-Compact" metering machines can be equipped with two models of high-pressure mixheads:

- Cannon FPL with an "L-shaped" mixing chamber for low and high-output laminar flows, suitable for open-mold pouring and for all formulations. Its reliability, compactness and low maintenance costs make this component to obtain high-quality products.

- Cannon LN with a straight mixing chamber, simple and economical, suitable for applications with rigid foam at low density, at low and high output levels.

All the "A-Compact" versions are equipped with a hardware package and software for the independent calibration of the components through the mixing head.

Technical Manual on CD-ROM

All the "A-Compact" metering machines come with a CD-ROM containing the machine’s technical manual in electronic format. The manual, including Maintenance and Spare Parts sections, is very user-friendly and easy to be consulted also by non skilled operators.

AVAILABLE VERSIONS

Variable output pumps

Model equipped with variable-output high pressure pump and with no frequency control devices. The output is adjusted manually by means of the hand wheel on the metering pumps.

Fixed output pumps

These units are equipped with fixed-output pumps and devices to control the motor speed frequency. The motor turning speed is adjusted by means of the output control in open loop while a special frequency control keeps any speed variation constant. With this solution, the pump output can also be set from the operator control panel by setting the frequency required.

Closed Loop

Independently of the pumps type installed, the machine circuit is completed with flow transducers positioned on the component lines, for the automatic closed-loop control of the output and ratio. In this system the value set for these parameters are constantly compared with those measured in real time by the control devices. Whenever deviations beyond the tolerances allowed are recorded, the control system adjusts the values, alternating the motor speed to guarantee that the ratio between the components is kept stable. The self-adjustment function is guaranteed by the combined action of the flow transducers and the frequency checks, which manage the turning speed of the metering pump motors. The accuracy and precision of the closed loop control developed by Cannon has been statistically proven in that it has passed the most severe tests with the most critical working conditions.

The A-Compact machine is available in many versions.

The A-Compact confirms its reliability and quality
The Cannons JL is a new family of high pressure L-shaped mix heads. The acronym JL stands for “Jet Less” to say that the mixing of the two reactive liquids is not obtained by two injectors. The high turbulence - formed and maintained in a relatively narrow mixing chamber in which a stream of the two components is delivered – does the trick. The liquid components are metered in a common chamber and then flow to the mixing chamber through variable restrictions where they acquire the necessary energy. At the end of the mixing chamber an L-shaped geometry deviates the flow into a much larger delivery chamber, slows down its turbulence and permits the delivery of the mixed blend with a very laminar flow.

Three decades of direct experiences in high pressure mixing taught Cannons that the reduction of the diameter of the mixing chamber is important in improving and maintaining the turbulence, to ensure a very high mixing efficiency. On the other side it is also known that small diameters of the mixing chamber do not maintain turbulent flows due to the high rate of damping of turbulence caused by the effect of the viscosity: the turbulence of a liquid flowing into a small diameter bore decreases proportionally to the distance from the axis of the chamber, to reach a quasi-laminar flow on its periphery.

How Does It Work?

The mixing of at least two fluids is normally performed through turbulence. There are many ways to create or maintain turbulence: static mixers, dynamic mixers, high speed of the streams and jets, impingement of jets and streams. All of them try a different way to maintain a high level of energy dissipation throughout the process into the fluid.

The well-known problem of static and dynamic mixers is the need to clean them by proper flushing with solvent. The other two ways can be performed using a proper mixing chamber and a spool piston that cleans the mixing chamber and controls the transients at the start and the end of pouring.

Now imagine to decrease the size of the mixing chamber enough to generate a flow speed of 1000 meters per second and to use the front shape of the spool (the cylindrical piston which seals the mixing chamber) to create high shear restrictions: the result is the Jet Less head, a mixing head whose L-shape geometry permits as usual to reduce the turbulence of the flow existing from the mixing chamber and to pour it in laminar form. In the JL the mixing is performed by the combination of two co-axial chambers: in a first annular chamber the (at least) two reactive liquids are delivered in common by proper metering devices. A large spool with a V-shaped front fills the annular mixing chamber. Grooves carved on the spool surface provide the re-circulation of the liquid components back to the tanks when the head is not operating. By hydraulically driving the spool backwards we create the annular mixing chamber: a hollow cylinder with V-shaped top and bottom faces.

The components flow into the chamber at the same pressure. The size of the V-shaped common chamber and of the related spool can be set as wished. What is important is the size of the cylindrical mixing chamber, which has the same center line of the spool and of the related cleaning pin. This has cylindrical shape and slides free along the central line of the mentioned spool. The pin front - combined with the V-shaped faces - forms two twin restrictions. The components flow throughout these restrictions and reach in twin streams the mixing chamber where they mix at high speed. The sharp-edged shape and the component’s pressure originate and improve the mixing turbulence, which is combined and maintained along the mixing chamber.

The discharge duct and the self-cleaning rod have specific features:

• the duct is formed by a long bushing that can be replaced easily with other models with different length and diameters,
• the self-cleaning rod has a dual diameter: a longer former, whose diameter matches precisely the duct to strip it from the residual film of foam during its cleaning stroke, and a rear part with a reduced diameter, connected with the control piston.

Cannon JL: no jets, no troubles!

The up and down movement of the rod - for opening and closing the duct - removes and pushes out the foam residuals still in the pouring chamber, stripping out the reacted film from the walls. In the mean time the rod is acting like a pump for flushing and re-circulating a small quantity of lubricant oil, contained in a small spacer chamber built behind it. The relatively small sliding surface of the rod prevents the sticking of the surfaces and permits the use of a thin cylinder so the size and weight of the mix head are reduced, to be ergonomically handled also for manual operations.

The three hydraulically-driven movements are controlled by three valves installed directly on the mixhead. This allows to replace the standard mixheads with the JL without modifications of the control system. The mixing system, the mixhead itself and the cleaning system are patented.

Cannon JL 24 / 6 Long Stroke

The first Cannon JL head available on the market is the model JL 24/6, featuring a 200 mm long discharge duct, with an internal diameter of 24 mm and a mixing chamber diameter of 6 mm. This head – whose total output ranges from 300 to 2000 cc/sec - initially works with two components but more streams can be easily added. The most interesting operating feature is its working pressure: from 70 to 210 bar, allowing for a simplification of the dosing unit (pump type, filters, hoses, etc.).

These heads have been industrially tested with rigid and flexible foam for more than one year and with frequent shots (up to 60,000 in one month), with full satisfaction.
The new Cannon JL head delivers several advantages:

- a mixing method much more efficient than the traditional technology: when you desire the best possible mixing efficiency in a Polyurethane process depends on several factors: total output, viscosity of components, their content in solid fillers, size of the desired shot, you name it… But one thing is clear: when you are faced with difficult formulations to be dispersed at a very high output, the choice is quite limited! Cannon found a way, many years ago.

- a wide range of flow rates can be handled by the same mixing chamber: the maximum output can be five times higher than the minimum.

- it does not demand skilled operators to set the head’s injection conditions: an easy setting of the central needle suits a variety of flow rates; pre-positioning of different values can be done manually or in automatic mode.

- a very long discharge duct (patented) can enter pouring holes very difficult to access, and guarantees a laminar flow even at high flow rates; perfectly suitable for discontinuous insulation panels and for pipe-in-pipe insulation.

- the use of the thin and long cleaning rod is mostly appreciated when using very sticky formulations.

- the internal geometry allows for a better handling of foams expanded with high-frosting blowing agents – HFCs and liquid CO₂.

With the new JL series Cannon have again introduced new concepts in the art of mixing Polyurethanes. Not simple evolution of existing models and scaling up or down of existing sizes, but true innovation, which comes from theoretical study and advanced research.

New sizes and models are now being prepared for future applications, in addition to those mentioned before; if you like the advantages, contact the nearest Cannon office for your next high-pressure mixhead. It might definitely be a Cannon JL.

OptiMix
the hybrid head for very special needs!

The selection of the most appropriate metering technology when you desire the best possible mixing efficiency in a Polyurethane process depends on several factors: total output, viscosity of components, their content in solid fillers, size of the desired shot, you name it… But one thing is clear: when you are faced with difficult formulations to be dispersed at a very high output, the choice is quite limited! Cannon found a way, many years ago.
Cannon turn-key packages

Cannon have for many years supplied dedicated plants for various specialized applications. The positive experiences that the Group have built over the time allowed Cannon to group the available solutions under four lines of products, which can be proposed to the interested Customers as Turn Key packages. Adapt for processing DCPD (Di Cyclo Penta Diene) formulations, for manufacturing Industrial Air Filters, Domestic Entrance Doors and large Water Heaters, these plants are manufactured by Cannon Solutions (UK), distributed and assisted worldwide by the Cannon network, which is available to provide more information on the complete range of solutions.

The Market

Large to very large parts, with excellent combination of stiffness and resistance to impact up to -40°C, in small and medium series of production, are the best way to identify the ideal end uses of DCPD-based molded items. Large body parts for heavy-duty trucks, earth moving and mining vehicles, tractors, snowmobiles; technical parts showing excellent chemical resistance to acids and bases, operating in hostile environments, such as chemical containers, large valves and filtering elements, or water treatment units; spacing from videogames casings to SOS columns for highways, from special computer-enclosing sea bases - for control of navigation and of seismic activities - to specialized pallets, from elements of modular swimming pools to large garbage containers for mechanized collection... the list could be endless!

Various degrees of fitting can be achieved to mold DCPD-based formulations.

Processing DCPD: what is required?

DCPD (the acronym stands for Di Cyclo Penta Diene) is a liquid monomer that, processed with the RIM technology in combination with other comonomers, activators and catalysts, forms a solid, strong polymer via a ROMP (Ring Opening Metathesis Polymerization) reaction. Used for many years to mould large, stiff parts, the various DCPD-based formulations have found a number of industrial applications that have, in recent times, significantly increased their utilization. Intrinsically not difficult to be handled, these formulations - commercially available as Telene and Metton - require a package of processing equipment that include the metering unit, the mixing head, some prepress, a good ventilation system and some project management to ensure a successful set up of the various items. Shopping for individual items - especially trying to adapt plain Polyurethane equipment to this technology - is a common mistake, which leads to minor economic savings and major headache when facing the small existing differences in chemistry, reactivity and processing.

Metering Unit

Materials are quite easy to mix, and feeding them to the head is not a major problem. A standard high pressure metering unit, such as the Cannon “A-Compact” is a good starting point. But it must be provided with the proper accessories (CWS for the control of output and ratio, a special “bubbler pot” on the feeding line, diaphragm pumps, etc).

Press and Auxiliaries

The dimensions of the molded parts can reach a few square meters; the only limitation is the cross section of the wall's, that can be a limit to the capacity of the liquid to perfectly fill every corner of the mould. Temperature control of the tools is fundamental to promote a fast and complete reaction of the injected liquid and to achieve quality and reproducibility in the molded parts. The material is usually self-demoulding, without any need for release agents but the design of the mould must be studied carefully, due to the high modulus of the polymer which does not allow for major undercuts in the mould. The material is often quite difficult to remove, and we all know that a strip of microcellular Polyurethane keeps in the right shape a folded foil of special paper which keeps in the right shape a folded foil of special paper which can only be removed by special tools. Cannon have both factors available. Around 2 bar or more, to ensure complete evacuation of air from the mould the clamp is required to tilt fully. This leads to bulky – but not necessarily too heavy – mouldcarriers. Cannon have matured significant experiences in the supply of these presses, equipped with all the relevant safety barriers, efficient ventilation systems to remove any smell or vapour from the moulds, during the curing phase, and any other ancillary demanded by this technology.

Large Filters: a Special World!

We’re all familiar with the standard air filters fitted in our cars, and we all know that a strip of microcellular Polyurethane keeps in the right shape a folded foil of special paper which lets the air pass while it blocks the dust. Many solutions are available for these rather economic filters, but when the size, the shape and the complexity of these items grows, the offer of a suitable package suddenly shrinks. Manufacturers of radial or panel-type industrial or heavy-duty filters typically require production rates of 500 per hour and sizes from 50 to 350 mm diameter, up to 600mm long, with both ends of the filter foamed and metal or plastic end caps. The quality of these products demands for special equipment: a typical package includes two Cannon low pressure machines with either two or multiple components, head manipulators for rectangular or square filters, cutting ovens and conveyors, filter holders, automatic wax release stations, clamping stations, pouring table, filter moulds etc. CanoMoulds can be designed with conveyors of irregular path, suitable to accommodate manufacturing environments. Other solutions are based on round turntables with clamps and simpler mixing head holders for round filters. Price is always an important factor, as well as the need to ensure the highest production reliability and control: Cannon have both factors available.
Some smart ideas have simplified the required equipment, reducing the price tag without affecting the output and the required quality. These filters are light and bulky, it makes sense to produce them close to the point of use rather than shipping them over lengthy distances! Cannon Service is locally available in many countries, to assist Customers located in developed and developing areas.

Domestic Entry Doors: the Market is Getting Sophisticated!

Entrance doors for houses made with a core of Polyurethane foam represent a growing market in most developed countries. Typically built with two decorative facings, a strong surrounding frame and a core of insulating rigid foam, these doors are replacing wooden doors at a constant pace. More freedom in style, colors and in combination of facings materials, the possibility to insert anti-burglar steel wire-mesh in the foamed core, the flexibility in size allowed by the foaming processes opens a variety of options to the end users and to the door’s manufacturers.

Various Cannon production solutions depend upon the quantity and the product mix required. From a multi-layer vertical press able to produce a dozen doors in a row, to single-cavity presses enabling to prepare the doors in horizontal position and then to foam them vertically, for optimum filling results, Cannon have supplied many different plants for this specialized field of the construction industry. Presses, cassette-systems, high-pressure dosing units featuring automated or manual injection methods, ancillary working areas, thermoforming machines for producing plastic facings, CNC routers to cut precise holes in the foamed doors to position glasses or decorative elements… a wide range of solutions has been applied and is operating in several countries. Knowing this market also means being able to understand why there is a growing demand for Polyurethane-insulated cylindrical hot water tanks (also called “domestic boilers” in some countries). Generally they are built with a inner steel tank and an outer nice wall (mostly – but not only – made out of thin painted steel) with a core of Polyurethane in between. Their degree of insulation is by far superior to that provided by old-fashioned glass-wool lined containers, not to mention their look and the facility of installation and safety. Low-density rigid foams of the same type used for insulating domestic refrigerators are the common choice: manufacturing-wise, while the foaming equipment is rather traditional – medium-low output high-pressure equipment, self-cleaning mixheads, automated injection – the moulding and polymerization lines can be very peculiar.

Water Heaters

A demographic change in family-building habits has created in many countries the demand for a different type of housing – moving single people from large individual houses to apartments: this has had an impact in the demand for different types of householdings (more microwave ovens, smaller fridges and washing machines, for instance) and for “different” electrical water heaters. Different in terms of aesthetics (they must be shown without shame in a kitchen or in a bathroom) and in functionality - instantly-available hot water is better than waiting a half hour for it to warm up, right? Add the growing use of solar panels to produce hot water for sanitary and house-heating purposes, and you’ll understand why there is a growing demand for Polyurethane-insulated cylindrical hot water tanks (also called “domestic boilers” in some countries). Generally they are built with an inner steel tank and an outer nice wall (mostly – but not only – made out of thin painted steel) with a core of Polyurethane in between. Their degree of insulation is by far superior to that provided by old-fashioned glass-wool lined containers, not to mention their look and the facility of installation and safety. Low-density rigid foams of the same type used for insulating domestic refrigerators are the common choice: manufacturing-wise, while the foaming equipment is rather traditional – medium-low output high-pressure equipment, self-cleaning mixheads, automated injection – the moulding and polymerization lines can be very peculiar.

Depending on dimensions, production mix and desired output, one can choose between a carousel type with curing oven, turntables, fixed foaming stations with polymerization parking stations, etc. Being cylinders, these objects would not need a mould or clamp to ensure that the expanding foam remains in the annular space between the steel tank and the cylinder during its rise and polymerisation: the round cross section of the mantel would be enough to contrast the pressure exerted by the foam. But the upper and lower circular lids enclosing the boiler – that are not anymore welded to the cylinder as it used to be many years ago – do require a contrasting force, to avoid foam leaks: a very important deciding factor for the type of polymerization equipment is therefore defined by the desired mix of diameters and heights of the various models. To adapt the contrasting tools to the different heights and to manipulate properly the different diameters of boilers one can choose among different solutions. Cannon have them all, industrially proven, tested and available. Look at the pictures in this page, and figure out if one of these solutions could be suitable for your own range of hot water boilers.

Then call the nearest Cannon office and see what’s the latest available version or the most appropriate for your own range of hot water boilers, and to the door’s manufacturers.

Different in terms of aesthetics (they must be shown without shame in a kitchen or in a bathroom) and in functionality - instantly-available hot water is better than waiting a half hour for it to warm up, right? Add the growing use of solar panels to produce hot water for sanitary and house-heating purposes, and you’ll understand why there is a growing demand for Polyurethane-insulated cylindrical hot water tanks (also called “domestic boilers” in some countries). Generally they are built with an inner steel tank and an outer nice wall (mostly – but not only – made out of thin painted steel) with a core of Polyurethane in between. Their degree of insulation is by far superior to that provided by old-fashioned glass-wool lined containers, not to mention their look and the facility of installation and safety. Low-density rigid foams of the same type used for insulating domestic refrigerators are the common choice: manufacturing-wise, while the foaming equipment is rather traditional – medium-low output high-pressure equipment, self-cleaning mixheads, automated injection – the moulding and polymerization lines can be very peculiar.

Depending on dimensions, production mix and desired output, one can choose between a carousel type with curing oven, turntables, fixed foaming stations with polymerization parking stations, etc. Being cylinders, these objects would not need a mould or clamp to ensure that the expanding foam remains in the annular space between the steel tank and the cylinder during its rise and polymerisation: the round cross section of the mantel would be enough to contrast the pressure exerted by the foam. But the upper and lower circular lids enclosing the boiler – that are not anymore welded to the cylinder as it used to be many years ago – do require a contrasting force, to avoid foam leaks: a very important deciding factor for the type of polymerization equipment is therefore defined by the desired mix of diameters and heights of the various models. To adapt the contrasting tools to the different heights and to manipulate properly the different diameters of boilers one can choose among different solutions. Cannon have them all, industrially proven, tested and available. Look at the pictures in this page, and figure out if one of these solutions could be suitable for your own range of hot water boilers.

Then call the nearest Cannon office and see what’s the latest available version or the most appropriate for your needs. It’s so simple…
Coming soon: PU tires?

A new, innovative process will soon allow a Chinese company to re-tread large tires for earth movers avoiding the use of natural rubber. A two-component Polyurethane elastomer will be injected in a mold containing the used tire, and a new tread will be cast over the existing sides and substrate. The whole process has been set up by the US-based Amerityre, who is licensing the Qidong-based Qidong Qizhou Rubber Product Co Ltd. to use its innovative technology. The Cannon Group has been selected to supply the Polyurethane metering and mixing equipment for this large project in China. The large, dedicated machine required to cast the two-component Polyurethane formulation is manufactured by CTM, the UK-based equipment specialist distributing Cannon machines for the British market. The supply of the casting equipment, start-up, after-sales technical service and the supply of spare parts is jointly provided by a number of companies of the Cannon Group, which is directly present in all the countries where this project has been developed and will be executed. This article presents the basic concepts of this Polyurethane-based tire, the testing results of the first industrial applications, a description of the process and necessary equipment, and a marketing vision concerning the potential applications of this new technology. New tires – and not only for heavy duty vehicles – could be made out of PU very soon now!

AMERITYRE - Tire Technology for the 21st Century

Amerityre was founded in 1995: initially the company developed “closed cell” Polyurethane foam used for low duty cycle applications. These include bikes, wheelbarrows, law & garden, and various other applications. In early 2001 Amerityre Corporation began the idea of making a Polyurethane car tire, something that others thought and determined to be impossible. Amerityre has formulated a proprietary Polyurethane compound.

The next step forward in the revolution is to invent the technology for mass production. The manufacturing process developed by Amerityre is not like traditional rubber tire manufacturing in that high external heat is not required: the exothermic reaction that results in the crosslinking of the chemicals generates the high internal cure temperature to manufacture the desired Polyurethane compound. Because of the simplicity of a liquid phase technology, production of Polyurethane car tires is far less manufacturing equipment than is used in producing a conventional rubber tire. The Polyurethane tire factory of the future will have none of the straight-line, no-extruder or vulcanization presses. Amerityre’s equipment package is 1/10 of traditional rubber equipment with the same output.

The Chemistry

Amerityre has formulated a proprietary Polyurethane elastomer material that has the physical properties necessary to be used as a superior car tire material. Two chemicals - Methylene Diphenyl DiIsocyanate (MDI) and Toluene Diisocyanate (TDI) - are used worldwide to produce Polyurethanes. Through years of experimentation and testing, Amerityre has formulated a MDI-based Polyurethane elastomer that can withstand the heat generated from higher speeds and loads, and compete very favorably with a processed rubber compound on a cost basis and is environmentally safe.

The molding process occurs when the liquid Polyurethane formula (made up of isocyanate and Polyol) is combined with a catalyst. This combination causes a chemical reaction that results in the cross linking of the chemicals, which thereafter becomes solid. When the spinning stops, the mold is opened, the tire is removed and the process is repeated. The Polyurethane compound use in the Arcus car tire is more environmentally friendly than rubber. It is chemically inert and safe for humans, and will be 100% recyclable.

The Polyurethane industry has devised several technologies for recovering and recycling Polyurethane waste materials.

High heat is also the primary mode of failure for tires designed to run flat. Lower operating temperatures will translate into better run-flat characteristics of the Arcus car tire design, the data in Table 2 shows comparative temperature data derived by Amerityre in testing the Arcus tire design against a rubber extended mobility tire. The Arcus and rubber extended mobility tires were mounted to the front of a Corvette and driven at 55 mph for 2 hours. The data shows the Arcus tire ran, without air, cooler than the extended mobility tire.

The Revolution

The data shoes the Arcus car tire ran, without air, cooler than the extended mobility tire.

The Process

Amerityre manufactured the prototype Polyurethane elastomer car tires utilizing a molding machine that centrifugally casts the tire by pouring a predetermined amount of Polyurethane into a spinning mold. The liquid Polyurethane then spreads out in the mold through centrifugal force. Prior to pouring the Polyurethane elastomer material into the tire mold, the reinforcement materials (i.e. plies, beads, and belts) necessary for tire construction are suspended within the mold cavity and locked into place. Therefore with every tire the plies, beads, and belts will be spaced perfectly...every time.

The Molding Equipment

Amerityre manufactured the prototype Polyurethane elastomer car tires utilizing a centrifugal molding machine.
The First Major Project, in China

1. This project includes:

   a. The 'closed loop' metering machine of Qingdao Qizhou Rubber Product Co. Ltd. Company.
   b. The mixing section of the plant destined to the Qingdao-based company. The availability of the proper technology was the key to success.
   c. Expert PU technicians speaking the local language and used offices in Beijing, Shanghai and Guangzhou, all featuring a manufacturing center in Southern China and three service factory that must guarantee a continuous production.
   d. Cannon USA, based near Pittsburgh, Pennsylvania. The American operations of Cannon – a fundamental link for the contacts with Amerityre - are responsibility of the company.

The equipment had to go beyond the availability of a properly working machine.

A two-component formulation based on chemicals developed by Amerityre, characterized by a gel time from 1.5 to 3.5 minutes, depending upon the chemistry used and the temperature.

Due to the very large shots requested by the largest feasible working machine.

For a project that includes the re-treading of off-the-road and commercial tires.

The performances required to the metering machine for this process are peculiar, and very demanding.

The performances required to the metering machine for this process are peculiar, and very demanding.

The Future: PU Tires Under Our Cars?

This new process enables a tire to be made that has no entrapped air bubbles. Now and only now can a "perfect" tire be manufactured again and again. This new process utilizes a very limited manufacturing surface, and requires almost no warehouse space, if the production schedule is well planned. It takes approximately 30 minutes to manufacture a rubber tire…..while only minutes with Amerityre's process. The chemical reaction is exothermic and no external heat is required in the molding operation.

1. Two large carbon steel tanks for the chemical components, insulated externally and built with a preconditioning jacket, where hot water can keep the chemicals at a temperature of up to 95°C. Their working capacity allows for several hours of uninterrupted molding operations. The tanks are vacuumed after the end of each production cycle to avoid entrainment of air in the formulation and guarantee an airbubble-free tire as a result. Small air bubbles are detrimental for the life of the tire, since they tend to heat up the tread when rolling. Slow speed blade agitators provide thorough temperature conditioning throughout the tank.

2. Two temperature-conditioning units (48 KW for Polyol and 24 KW for Isocyanate) enable heating of a full tank of material from 50°C to process operating temperature of 60°C in approx 10-15 minutes. In addition to supplying water directly to the mixing head; the heat also supply water to a manifold system for pipe heating.

3. Interconnecting rigid, water-jacketed piping with insulation and flexible joints to and from the metering group.

4. A single 27Kw package chilling unit provides cold water to the heating units of both the Polyol and Isocyanate tank conditioning units so as to aid temperature stability control.

5. A generous pumping system to feed the mixing head; based on large, water jacketed gear-type pumps, it allows for maximum output 1,250 l/min of Polyol and 600 l/min of Isocyanate. These components are handled, at the operating temperatures, to a maximum viscosity of 1,500 cps, and can be fed at a maximum working pressure of 30 bar. Proper sets of digital gauges are installed on the line to ensure that maximum feed pressure to pump is maintained and maximum system pressure of 30 bar is not exceeded.

6. A special mixing head is needed to handle this massive output rate: this model is of a well-proven design and offers greater output versatility when processing at high outputs and or with higher viscosity systems. Feed pressures are maintained via manually adjustable flow restrictors; this facility is particularly useful when processing materials of very low viscosity.

Manual calibration is possible directly at the mixing head via a calibration plate that mounts directly onto the face of the mixing head for 'weft' weight calibration checking. An inverter rated 2 pol. 2800-rpm motor directly drives the mixing head, so as to be able to not only vary mixer speed, but also run the cleaning and flush cycle at a different speed for maximum cleaning efficiency. The mixer barrel is fitted with a water-cooling jacket to avoid excessive heat build-up during the mixing phase. The two mixing head component pistons are mechanically linked so as to avoid opening and closing timing issues.

Hot water from the component Polyol component tank is fed to the mixing head to keep it always at the right temperature and ensure immediate operation when required.
Encapsulation & Insulation processes for electrical components

New Cannon low-pressure dosing unit for cast resins mixing and pouring

The electrical, automotive, appliance, filter and packaging industries are some of the most important users of cast foaming processes where micro-shots with very low outputs are required. They must respond to ever-growing market demands of high quality products and services, which means that they need to update production capability by adding new and technologically advanced equipment and to increase volumes by keeping low costs. Cannon have designed a new generation of metering machine dedicated to the encapsulation, and insulation of electric and electronic components. A remarkable advantage of this machine is its flexibility of use: in addition to the common Polyurethane formulations, it can also process epoxy resins.

Thanks to their intrinsic chemical and physical characteristics, these materials are the most suitable for insulating applications where chemical resistance, overheat dissipation, adhesive, flame retardant and electrical properties are strongly required, granting better vibration dampening. This insulating process, commonly called "Potting", ensures a full protection of the electrical and electronic devices from the environment thus preventing dust, water, moisture and chemical agents penetration.

The Cannon "Potting" technology is used with success for the production of a wide range of items such as printed circuits, locks, electric components, electronic components, condensers, magnetic valves, micro-switches, plugs, sensors, relays, transformers, resistances. Aiming at achieving an extremely compact structure, rational, easily maintained and positioned, all the main dosing unit groups (chemical storage, dosing system, mixing head and control panel) are fixed on a single aluminium frame equipped with wheels. Furthermore, the open structure allows excellent accessibility to all the parts for easy maintenance and cleaning operations.

The dedicated Potting metering unit is ideal for very small, frequent shots made at very low output. The mixing head is driven by a remote motor and it is extremely light and ergonomic for easy handling. It is usually supplied with a plastic static mixer that can be replaced at the end of each production cycle by a new one. In case of applications where less reactive formulations are required, a dynamic mixer is also available. Excellent mixing and very good quality of the poured resin is achieved by either mixer. The raw materials are stored in 40 l jacketed tanks, pressurized up to 4 bar, and provided with visual levels. On request, it is possible to equip the dosing unit with an automatic filling system allowing the quantity of material to be kept constant inside the tanks, and with a dedicated one-zone thermo regulator providing an accurate control of the component temperature during the whole working cycle.

The new Cannon "Potting" unit is able to process formulations with a wide range of working ratios (up to 10:1), high viscosity components and very small outputs (up to a maximum of 0.20 g/s). The pouring pressure is manually adjustable by means of conical injectors. The pouring precision, the steadiness and process repeatability are main factors when operating at low pressures. For these reasons the machine is equipped with high precision dosing gear pumps operated by DC motors and controlled by "closed loop" thus ensuring the preset parameters to be kept constant and the good quality of the end product.

The machine functions are monitored and controlled in real time by a PLC, which is interfaced with a dedicated control panel, based on "Touch Screen" technology. The system is able to memorize up to 19 pouring programs, allows the operator to manage and modify the process parameters: pouring time, Pol/Iso ratio and total output, according to production needs.

Cannon philosophy has always been to supply customers with dedicated flexible and highly integrated solutions: dosing machines, systems for mixing head movement and loading/unloading equipment for manufactured product handling. Even in the case of "Potting" technology, Cannon offers complete "turn-key" plants designed to specific customer applications/production requests.

Forty years of experience in dosing and mixing of chemical components and resins, more than 12,000 machines installed all over the world, an intense and constant activity in research and development, contribute to the continuous technological improvement, quality and high safety of the whole production range.
A well-established manufacturer of injection molded plastic parts, Plasticform opens to a different technology and invests in a fully automated equipment for gasketing. The move allows them to supply a ready-to-use complex components for the automotive, the householdings, the furniture and the electronic businesses. Cannon Afros equipment – and ingenious internal resources – have accomplished the ambitious task.

Based in Melfi, Potenza – home of one of the largest FIAT plants in Italy – Plasticform is a supplier of quality plastic parts, mostly destined to the automotive and transportation industry. Their manufacturing capacity covers a quite broad range of part’s weigh, owning a series of modern injection molding machines from 60 to 1,000 tons of clamping force. Technical and aesthetic components for car interiors and exteriors, components for the “white goods” – all the householdings used for kitchen and washing purposes – accessories for a local, well-developed furniture industry, for electronics and electromechanical assemblies. Plasticform concentrated on “difficult” molded plastic parts, those with less competition and more added value.

Plasticform’s Needs
Linked to a group of industries based in the northern Italy that also supplies the very same range of components, Vincenzo Di Miscio, Plasticform’s Managing Director, tried last year to expand the range of products made by his Company. His ambitious project included the investment in a new plant able to apply a continuous gasket over their injection molded parts. Water and air proofing are the main reasons for applying a gasket to a plastic part, and this possibility would have allowed them to approach a broader range of applications and users, supplying a “ready-to-use” component with greater added value.

Rather than simply imitating his partners – which already owned some gasketing plants of a different origin – Di Miscio ran a thorough survey of the potential suppliers of this FIPS (Foamed In Place Systems) and approached Cannon Afros, a closer and equally qualified partner for his venture.

The Cannon Solution
Cannon proposed a very compact solution, whose rational layout immediately pleased him, and the deal was cut: a completely automated foaming plant was promptly supplied and put in place: first job would have been the application of a continuous gasket over a large plastic cover protecting the gearbox of the Grande Punto, one of the best selling FIAT models made a few hundreds meters from his factory, in Melfi.

The dosing machine supplied is a RS8, a low-output, low-pressure model, capable of dispensing two components and open to future expansion for more streams of different formulations. The mixing head already accepts four different streams, so this future option is already achievable without major investments or re-design of this production cell. The robotized operation allows for a wide range of products to be poured in sequence: standard pallets – travelling on an automated conveyor - are fed with a number of plastic injection parts and presented to the pouring station. The pre-programmed path is executed at the desired output, and the mixing head can be cleaned once every twenty pallets of produced parts, to limit consumption of chemicals and of cleaning solvent. “Well – to say it all – at the beginning it wasn’t a walk in the park...” says Pierpaolo Fuschetto, the production specialist in charge of this equipment “Starting a new process which involves reactive polymers with a staff very qualified in injection molding only is not the easiest task. One must realize that he’s dealing with “chemistry in mold” and that the processing variables are more complex and less predictable than those typical of injection molding”.

Put Fantasy in the Process!
Productivity, in the very first phase, was lower than expected, he reminds. A number of factors was slowing down the cadence, but the staff proved to adapt very quickly to the new process, put creativity in it and things slowly got better. “People in this region of Italy are well known for their impresive capacity to adapt to difficulties and react with creativity; a number of simple, ingenious solutions were put in place – conceived and made by our technician running the plant – to integrate the purchased equipment with those ancillaries needed to interface the foaming process with other handling and preparation chores.” continues Di Miscio. “We could avoid more expensive tools and processes suggested by external suppliers, and these clever solutions allowed us to reach the targeted level of 400 parts per hour! Thanks to our ideas – let me say thanks to our fantasy! – we also reduced the consumption of some chemicals, shortened the curing time of the gasket and streamlined the flow of parts throughout the plant. We are now very pleased of what we’ve got!”

Confident that more ambitious targets can be reached now, he’s looking ahead to extend their working cycle to a second shift, and looks for new series of products for the construction industry: their engineering capacity covers the whole cycle of production, from prototyping to pre-series to mass production, including the design of the molds and their construction.

For more info on Plasticform see their website: www.plasticform.it

www.plasticform.it
Refrigerated trucks: XL is better!

Large insulated panels are increasingly needed for manufacturing huge insulated trucks. A variety of insulating media can be used for this demanding application, and Polyurethanes provide the most flexible solution. Cannon have matured significant experiences in the past ten years in the challenging task of automating the production of these large elements. One of the latest achievements is a complete plant for the production of extra long (XL size) panels, installed this year in Germany for a leader of this field, who will be able to produce two complete trucks per hour.

The Market

The transportation of goods is increasingly done “on rubber wheels”, i.e. by truck but... gone are the times when a truck was either “a bus” or “a tanker”. A major truck manufacturer offers today at least thirty different versions of commercial vehicles, each of them covering a specialized mode of transportation to ensure the highest logistic's efficiency.

Refrigerated transportation constitutes a major field of activity in this domain, providing the key ring in the “cold chain” that today at least thirty different versions of commercial vehicles, each of them covering a specialized mode of transportation to ensure the highest logistic's efficiency.

Rigid walls provide a safer solution than canvas-covered boxes, both in terms of anti-theft and anti-fall aspects. A rigid wall, made with a metal or GRP sandwich filled with a few centimeters of Polyurethane, constitutes a much tougher obstacle for the occasional burglar, improving security and lowering insurance costs.

Unstable loads or sharp objects often hit, on sharp bends or sudden breaks, the interior walls of a truck, and many times they break the canvas or plastic covers that hide them in the boxes. A rigid wall absorbs most of the hit, providing safety and avoiding permanent damage to the sides.

The Client

Metal Service Brüggen Ltd. was founded in 1990 by Bernard Brüggen who, very soon, found an interesting cooperation with the Wertle-based trailer manufacturer Krone. When Krone downsized internal production of some of their components, these were outsourced: the complete manufacturing of Swap-Bodies (closed boxes) and flat bed construction was outsourced to Metal Service Brüggen, which soon also took over the manufacturing of spare parts for Krone vehicles.

Their production range is today quite sizeable, and includes the line of Swap-Bodies for trucks and rail. In synergy with Krone, Brüggen developed the refrigerated line of trucks called Fresh Liner, made of sandwich panels with a PUR-hard foam core and a shock-resistant metal top coating.

The solution was demand the suppliers to be selected accordingly. Several qualified plant suppliers in the field were investigated, and Cannon was among them.

The Needs

The success of the Fresh Liner series and Krone’s stubbornly-pursued target of becoming the World’s number one supplier of Swap-Bodies, convinced Bernard Brüggen to further expand their fast-growing company, deciding in the year 2005 the construction of a new factory in Lübtheen, between Hambrurg and Berlin.

Foreseen for the production of refrigerated and insulated trucks, this modern production unit has a very ambitious target: to roll out one complete Swap-Body every thirty minutes! In strict synergy with Krone, Brüggen developed the refrigerated line of trucks called Fresh Liner, made of sandwich panels with a PUR-hard foam core and a shock-resistant metal top coating.

The chassis of the Fresh Liner has all the qualities of the Krone program: durability, low maintenance costs and long-term rust protection due to powder-coated E-coating.

The Solution

Cannon was ready to face the challenge, thanks to a long-standing tradition of large plants for all the applications of thermal insulation components: refrigerators, cold rooms, walk-in coolers, freezers containers.

To make a long story short, an innovative solution was designed and submitted to Brüggen. It included covering almost the entire of the system (chemical bulk storage, foaming machines, polymerization presses) plus the design of a complete layout for the new factory – a very challenging task covering almost 20,000 sqm – and the specifications for other fundamental components of the assembly line: the metal forming plant.

A substantial contribution to the product engineering was also offered, in order to optimize the manufacturing process. All the alternatives were evaluated, the usual battle was fought between the buyer and the potential sellers, and Cannon won the 10 million Euro order. The Client understands why, since the quoted price was not the major deciding factor: let us have a look at the proposed solution first.

The Supply

A refrigerated Swap-Body is made assembles individually insulated panels of different thickness and composition. What is generally fixed for this project is the dimension of the box: 13.6 m length by 2.5 m width by 2.7 m height.

Thickens of the panels vary, according to the models, from 3 to 8 cm for the side panels, 8-10 cm for the roof and about 15-20 cm for the floor. Facings are constituted by pre-painted flat steel sheets in most of the cases, but may include aluminum sheets and gel-coated GRP foils.

One press was required for each side panel, one for the roof, one for the floor and one for the squared front and the large rear doors.

The supplied Cannon solution includes components made by three different Units of the Group, which were coordinated by a Project Manager of one of the Cannon companies.

Chemicals Storage

Bono Sistemi supplied the chemical’s bulk storage: four 30 m³ tanks for two different Polyllys, three 30 m³ tanks for the Isocyanate, one 45 m³ underground tank for the blowing agent. From here the two Polyols are transferred on demand to the premixing station where, using two Bena EasyFroth 40 units, they are precisely blended with the required percentage of blowing agent (a Pentane grade) and sent to the two 2,000 liters day tanks backing the PUR dosing machines, located on a mezzanine in the production hall. A preblending unit for the addition of one catalyst is also installed in this formulation’s room, to allow for fine tuning of the foam’s reaction profile in case of special needs.

Metering and Mixing

Cannon Aflos provided the metering and mixing equipment. High-output, high-pressure machines were constructed, to allow for the delivery of large doses in a reduced time. Special execution was demanded by the potentially explosive blowing agent used in these formulations. Two large A-System 350 Penta Twin machines were supplied for sidewalls and roof panels, while two A-System 200 Penta Twin were destined to the floor and the front ends plus doors.
Foaming needs are different, according to the type of panels: side walls and roofs demand for an open pouring technique, while front and rear panels must be injected in closed mold. The floor – due to different design alternatives – might need either open mold pouring or closed mold injection. In both cases, the chemistry of this system requires a very high instant output and extremely efficient mixing heads, able to pour the liquid blend without major splashing at the high output required. Considering an average panel-size of 13.6 m x 2.7 m x 0.1 m and an expected foam density of 30 kg/m³, the resulting shot size is in the order of 180-200 kg of liquid – to be dispersed and properly mixed in less than 20-30 seconds. Quite a job...

The choice went for eight mixing heads of the largest available size of the well-known LiSphen Cannon mixed, the FPL32, for the open mold operation. Two of these large heads are firmly inserted at the opposing ends of a large plastic pipe, hollow in its lower side. When the lower plates - containing the bottom facing of a panel – is sliding into the polymerization press at the speed of 1 meter per second, the foam injection starts from both heads, fed by the two dosing units which operate simultaneously, controlled by the central PLC.

The hollow plastic pipe is quickly filled with liquid, which exits the holes drilled in its bottom and is uniformly distributed across the width of the panel. Since the foaming operation is precisely synchronized with the entry of the lower plates in the press and stops as soon as this has finished its run, the liquid is also laid down precisely and evenly on the whole length of the panel. This guarantees a homogeneous spread and distribution of the foam across the whole surface and avoids the need for the foam to “run” to fill the corners. This implies a possible saving in raw material, due to the lack of foam’s overpainting.

The hollow pipe is automatically released at the end of the pouring operation, and drops in the panel or in a waste container positioned underneath. The self-cleaning mixing heads do not require further maintenance operations till the next shot. Another plastic pipe is manually positioned on the pipe-holder fixed as a bridge in front of the press short side, and the machine is ready for the next foaming cycle.

Four FPL 24 heads were chosen for the robotic injections to be performed in closed cavity, in the two presses where the floor panels and the front ends plus doors of the box are produced. Characterized by a compact size and with a reduced nozzle’s diameter they can be inserted in the side of the thinnest panels without geometry problems.

Here a pipe-holding system – for a plastic pipe of much smaller diameter – is mounted in parallel to the main one. In case of need it will be used to pre-laydown a small quantity of this adhesion-promoting formulation just before the laydown of the insulation foam.

The System 350 Penta Twin dosing machines feature four 107 cm³//rev Renothor pumps, to guarantee maximum precision and constancy of flow for the rather long injections, which are performed at very high output. The very same brand of pumps – of smaller models, though – equips the other dosing units.

All process parameters – component temperatures, pressure, output and ratio - are monitored with high accuracy sensors on the high pressure line, and recorded with a Cannon OVs electronic control.

A Siemens S7 PLC takes care of the whole operating sequence and relevant safeties on each machine. This high level of specifications in terms of mechanical and electronic components is designed to ensure long-lasting equipment in a completely automated process. Cheaper solutions would have been more interesting money-wise but would have not been recommendable on the long run.

Polyurethane Foaming Technology

The technology of PUR foam injection is of fundamental importance. A correct formulation of the liquid mixtures is necessary to achieve the best foaming rate with the right expansion, to obtain the correct density and to ensure the best mechanical properties of the foam.

The foaming factory has been designed around the production process, to maximize the rational flow of components and finished parts. The presses hold the panels for a curing time which can vary from 20 and 60 minutes, according to the thickness of the foamed part, and unload them on the same side from which the relevant lower plates had been previously loaded.

A series of large semi-automated handling systems are designed to carry out the complete foaming cycle within the panel: only the face of the rail with its holes is visible. This solution creates some problems to the assembly phase of the panels: all these robust metal bars must be fixed into the interior face of the panel, by carving first the proper holes in the metal facings in the lower trays – is carried out automatically by pneumatic aerial manipulators. While two trays are mounted on a mezzanine above the polymerization presses.

Four large high pressure machines are used to meter the PUR formulation: they are mounted on a mezzanine above the polymerization presses. The presses hold the panels for a curing time which can vary from 20 and 60 minutes, according to the thickness of the foamed part, and unload them on the same side from which the relevant lower plates had been previously loaded.

A series of large semi-automated handling systems are designed to carry out the complete foaming cycle within the panel: only the face of the rail with its holes is visible. This solution creates some problems to the assembly phase of the panels: all these robust metal bars must be fixed into the interior face of the panel, by carving first the proper holes in the metal facings in the lower trays – is carried out automatically by pneumatic aerial manipulators. While two trays are mounted on a mezzanine above the polymerization presses.

A series of large semi-automated handling systems are designed to carry out the complete foaming cycle within the panel: only the face of the rail with its holes is visible. This solution creates some problems to the assembly phase of the panels: all these robust metal bars must be fixed into the interior face of the panel, by carving first the proper holes in the metal facings in the lower trays – is carried out automatically by pneumatic aerial manipulators. While two trays are mounted on a mezzanine above the polymerization presses.

This solution creates some problems to the assembly phase of the panels: all these robust metal bars must be fixed into the interior face of the panel, by carving first the proper holes in the metal facings in the lower trays – is carried out automatically by pneumatic aerial manipulators. While two trays are mounted on a mezzanine above the polymerization presses.

This solution creates some problems to the assembly phase of the panels: all these robust metal bars must be fixed into the interior face of the panel, by carving first the proper holes in the metal facings in the lower trays – is carried out automatically by pneumatic aerial manipulators. While two trays are mounted on a mezzanine above the polymerization presses.

This solution creates some problems to the assembly phase of the panels: all these robust metal bars must be fixed into the interior face of the panel, by carving first the proper holes in the metal facings in the lower trays – is carried out automatically by pneumatic aerial manipulators. While two trays are mounted on a mezzanine above the polymerization presses.
Curved insulated roofing panels are increasingly requested by the building market in various lengths and in versions insulated with Polyurethane foam, mineral wool or expanded Polystyrene. Their overall dimensions require an impressive storage space and their high value represents a significant share, given the geometry of the finished products, if they are laid in a yard waiting for a customer. These are two good reasons for justifying the technology investments that enable to deliver a production mix that is highly flexible in terms of both dimensions and its materials used for cladding and insulation itself.

Cannon have developed different manufacturing solutions based either on rotating carriers - able to hold multiple molds and served by carts travelling on rails - or on AGV (Automated Guided Vehicles) systems allowing for a very high degree of flexibility in panel’s radius, thickness and type of foams, with output as high as 800-900,000 m² per year.

The Market
Curved insulated panels for industrial and recreational buildings have recently gained a significant share of the roofing market - in Italy and other European countries - for a number of reasons linked with the high degree of flexibility in panel thickness, radii and type of foam, with output as high as 800-900,000 m² per year.

The Products
These curved panels, available with a wide range of profiles, come in large formats that have been standardized by the Cannon engineering specialists and a highly automated solution has been envisaged. Using proprietary concepts derived from other space-taking solutions, such as large sandwich panels (or domestic refrigerators and freezers) Cannon have designed and built a number of dedicated foaming plants of compact layout, high degree of automation, flexibility in producible models, and quality insulation solutions due to optimisation of diffusion. The four-position rotary Drum handles the polymerization phase after the foaming takes place, as performed in the upmannon process.

The Supply

Two operators execute one preparation task, and one forklift operator supplies pulleys of panels. The production sequence words as follows:

- Stacks of 800-100 curved, grooved, 3 mm thick fibrous-concrete plate are transported by forklifts onto an unloading/cutting bay mounted on a rotating platform with two side-by-side docks. Leaving the stack on the unloading station, all the sheets are pre-heated and automatically centred when the unloading is completed. When the stack is ready, the robotic arm takes the curved facing, rotates and wipes the full dock is positioned near the pre-heating station. When required, a roto-masked 3-axes robot with vacuum suckers picks-up one curved element and moves it laterally over the pre-heating station. Here a series of low-inertia, high- efficiency NV's KB elements (Cannon design) heat the fibrous-concrete sheet to remove all humidity and ensure that - when foamed a few minutes later - its surface temperature will be of 40°C. To achieve this result the temperature of the sheet must reach 80°C at the end of the heating phase. When the panel has reached this pre-set temperature the MVR heater automatically stop. In the meantime in the contiguous assembly station one empty mold half has been transported and fitted with the lower facing of the sandwich, that can be either fibrous-concrete or pre- painted steel. These facings - that come from an unloading/cutting bay and are laterally deposited above the curved facing - are automatically deposited on the bottom of the mold. The operation applies a strip of thin Polyester foam onto the perimeter of the panel, to prevent the contact between rigid foam and the mould inner sides. When the lower facing and the sides are ready, one lateral curved element is transferred from the pre-heating station – using the robot described above – and deposited over the lower mould half. When required, this package is transferred with a wheeled system on the loading/unloading cart that services the foaming jig. To save time and energy this cart has been designed with two places - one is used to return an empty mold half to the assembly station, the other to bring a ready mould half to the foaming jig. The core of the plant is constituted by the special foaming jig, designed to hold four large moulds, mounted on the four sides of a square-sectioned steel frame rotating around an axial-line axis. This design derives from the Cannons patented Drum unit, introduced in the early ’80s to produce two or four different models of domestic refrigerators with a zero-time mould-change system. For this larger production a bigger version has been designed, with four mould carriers. When one finished panel is produced, the operation is performed on the lower of the four moulds. This is opened with a parallel movement of the lower plates, which goes over an unloading table with a sliding mechanism. While the mould carrier opens, the lower mould half remains on the wheels of the unloading table and during this sliding movement, social with the jig. It is deposited on the empyreme of the opening/unloading cart, that makes one side step at the end of this operation, to present the lower half containing the sandwich ready to be injected with foam in front of the jig. The same unloading table with cylindrical rollers and wheels lifts the package and moves it into a head that closes the upwad parallel movement and locks it in position. The Drum unit with four mould carriers rotates clockwise by 180°, so that the newly-introduced sandwich is brought to the uppermost position and now presented with its concave side upwards. A Cannon LN mining head, mounted on a pivoting head carrier, is introduced in the injection hole, positioned midway on the side of the mould. This is the ideal foaming position, because the liquid Polyurethane is injected in the mechanically most critical part of the curved panel, where we do not want to have air traps and junction lines of mixing foams. The reacting liquid wets the surface in a very homogeneous way, then the foam starts rising and distributes sideways, pushing all elements of the mould half containing the sandwich ready to be injected with foam in front of the jig. The same unloading table with cylindrical rollers and wheels lifts the package and moves it into a head that closes the upward parallel movement and locks it in position. The double-place unloading cart that received the finished panel still presents the centric position once more, to allow for the automatic pick-up of the part with another dedicated 3 axes suspended robot this stacks the panel on a special pallet, and when this is full the product is removed by the forklift and sent to the warehouse.

The System
The system produces twenty panels per hour with three people on 275 m² of factory floor. Three combinations of upper and lower facings (fibrous-concrete/fibrous-concrete, fibrous-concrete/painted steel/painted steel/ painted steel) can be used with this plant, designed to handle various types of panels.

Future extensions of the system are foreseeable in the open of the project the inclusion of another unit or even a separate dosing unit (only some rigid piping and another mining head would be required), and the same unloading/unloading cart. Doubling the capacity is avoided therefore due to the high space requirements of the new plant. The main advantage of this solution is that it economizes, flexibility and quality, deriving from:

- Limited floor occupation, due to the compact layout of the Drum unit foaming jig and to the rational use of robots and loading systems. Similar systems based on conventional rows of fixed presses occupy more than double of space.
- Low cost of labour, thanks to its high degree of automation and to the reduced maintenance to be carried out on a single rotating mould carrier instead of multiple conventional ones.
- High manufacturing flexibility, thanks to its ability to produce different models.
- High quality of the finished products, due to optimum mixing and distribution of foams.

One of these plants has been installed early this year in Italy at the plant of a leading supplier of insulated panels who integrated his line of conventional, flat panels for roofs and walls.

The AGV Solution
The AGV concept of Automated Guided Vehicles (AGVs) allows for a very high degree of flexibility (in panel’s radius, thickness and type of foam) and provides an output as high as 800-900,000 square meters per year for this range of AGVs’ manufacturing development. The reason for this is the use of a highly innovative solution for moving the large panels central for this foaming process.

A fleet of Automatically Guided Vehicles (AGVs), working completely autonomously, transports a combination of different moulds from one station where foam is injected, to another where...
The AGV-based foaming solution features outstanding flexibility in the use of the wire-guided vehicles that carry around the molds.

The AGVs are designed to handle all the types of rigid facings: metal sheets—either steel or aluminum—fiber-reinforced concrete and glass-reinforced resin. They can move in eight directions plus the complete rotation, providing high performances both in terms of speed and precision.

The AGVs have been built by a major manufacturer of these vehicles and incorporate the following specifications issued by Cannon Tecnos engineering office.

- The inner metal liners: all the types of rigid and flat lower liners are loaded on the molds. The manipulators are designed to load any type of rigid facings metal sheets—either steel or aluminum—fiber-reinforced concrete and glass-reinforced resin. Should thin aluminum foils or Polyethylene film be used, they will be unloaded from their position nearby and cut to measure before their deposition on the mold.
- The outer metal lines loading station: corrugated steel sheets are calculated with a dedicated machine in a nearby hall, and transported here stacked on pallets. Here the sheets are picked up with pneumatic hands and loaded on the molds. Near this station the only manual operation of the whole manufacturing process is performed: the application of pieces of sponge on the borders of the panels. By using a sponge in order to lift the foam stay in the panel while the air is evacuated, avoiding air traps in the foam.
- The station where the molds are cooled: the molds are cooled using the stored upper mold. Molds that were left here at the moment of demolding after the polymerization.
- The AGV station: this massive station a 180° rotation of the mold occurs prior to the injection of foam. This is made in the central point of each panel, with the concave face looking down.
- The AGV-based foaming solution features outstanding flexibility in the use of the wire-guided vehicles that carry around the molds.

The Advantages

- High productivity: with a fleet of four AGVs the plant—working 24/7 years per year on a 3-shifts basis—can produce 950,000 m³ of panels per year.
- The manufacturing process is very regular and flexible, due to the very specialized task performed by each station. Since every operation is performed in a dedicated island the whole process can be sped up without suffering from the longer cycle of some of the operations.
- One of the most appreciated advantages of this concept is the possibility of introducing small special orders “on the fly” fitting them into pre-scheduled production programs. An unexpected mold can be quietly prepared off-line, without disturbing the preset sequence of operations simply because such a rigid schedule does not exist! Each station performs what is demanded by the mold that is arriving next, which is clearly identified by the computed sequence of operations.
- High flexibility of production, expandability and modularity.
- Panels of different thicknesses with different curing time—can easily be mixed in the production schedule without forgoing the plant to adapt the cycle time to the longest one.
- Very few operators are required for this high-productivity unit: one supervisor, one flexible operator feeding the corrugated upper sheets from the nearby calculating line and removing the studios of finished panels, two operators positioning the sponges in the molds, two operators for the preparation of molds (only when necessary) and one for helping during the initial debugging phase of a new model.
- Ergonomic to operate and user-friendly to be programmed and controlled.

A plant with this sort of capacity and flexibility obviously requires a certain amount of space if it is going to cooperate with the necessary efficiency, as well as to facilitate any possible future expansions.

The level of investment is—for the MUV solutions—higher than that demanded for the fixed process or with rotary Domes.

The stationary equipment includes the automatic profiling and cutting line for the injection holes and suckers for holding the facings in the mold, the inner metal liners, using special needle-fitted hands that pick up the contents of the mold, and the outer metal lines loading station.

The filling and cutting line: it is used for the preparation of the inner metal liners.

The advising stations: for the outer inner metal lines here a bank of Cannons made MVI Lamps bright the temperature of the inner metal lines up to 450°C.

The inner metal liners loading station: here all the types of rigid and flat lower liners are loaded on the molds. The manipulators are designed to load any type of rigid facings metal sheets—either steel or aluminum—fiber-reinforced concrete and glass-reinforced resin. Should thin aluminum foils or Polyethylene film be used, they will be unloaded from their position nearby and cut to measure before their deposition on the mold.

The AGV station: this massive station a 180° rotation of the mold occurs prior to the injection of foam. This is made in the central point of each panel, with the concave face looking down.

When this option occurs the injection points are positioned laterally, and the injection cycle ends in sequence. After a given time—when the foam has filled the cavity and there is no more risk of air components—the mold is again rotated by 180°, bringing it back to its original position with the concave face looking down.

The cutting time starts here. At this point the process the metal sheets have a temperature of around 40–60°C, to provide the best conditions for proper adhesion and flowability of the foam.

The robotic arm is designed to transport the complete rotation, providing high performances both in terms of speed and precision.

The AGVs are designed to hold a load of 5 tons, they can move in eight directions plus the complete rotation, providing high performances both in terms of speed and precision.
Crios going full steam on Insulation & Refrigerators

Good news from Cannon Crios, the Group’s Division specializing in plants for refrigerators and thermal insulation: new and consolidated projects keep them pretty busy! Continuous foaming laminators for insulation panels and new solutions for specialized panels are highly demanded at the moment; same situation for their dedicated solutions for non-domestic refrigerators.

The demand for continuous foaming panel plants is rising in several countries, and the activity is quite frantic at Cannon Crios to keep pace with the requests! The Insulation Division of the Group – in charge of this segment of market – tries to stay out from the frenzy of basic applications and to specialize in the most peculiar ones: fancy an example? Continuous foaming plants for roof panels imitating the traditional, curved clay tiles, typical of Mediterranean countries.

A Dedicated Line for Clay Tiles

These roofing elements are commercialized as composite panels, comprising two metal plate coverings connected by a layer of Polyurethane insulating material. They are self-supporting, monolithic, insulated, resistant and light. Their geometric configuration follows the shape of a classic floor tile, giving the panel a pleasant, elegant appearance. They can be of geometric configuration follows the shape of a classic floor tile, or of natural copper. The inner side of the panel is usually of pre-painted zinc coated steel.

Cannon has developed this year another complete line to an Italian leading manufacturer of these specialized roofs, consolidating its significant know-how in the handling of these non-standard, irregularly-shaped metal facings.

Combined Insulating Media

The request for plants to make panels filled with various type of insulating media is getting common, these days panel makers would like to have the flexibility of using standard PUR (Polyurethane), fire resistant PIR (Polyisocyanurate), Phenolic foam, mineral wool, sometimes EPS (Expanded Polystyrene). Things get a little more complex, engineering-wise, when these combinations of very different products are to be handled and fit in the metal sandwich that constitutes a roof or wall panel.

But there are obviously ways around it, and Cannon knows and has successfully dealt with them in the past few years. More than ten different technical solutions have been commissioned around the world by Cannon, in developed and developing countries, in their first years of activity in this continuous panel business.

The latest significant orders – gone to Russia, Ukraine, Saudi Arabia, China, Spain, Italy and Austria – confirmed the market’s confidence in Cannon Crios as edible supplier of non-standard solutions. If it’s difficult, they get more fun in solving it.

Special Commercial Refrigerators

Vertical and horizontal refrigerators and freezers, bottle coolers, ice-cream freezers or displays, vending machines for cold drinks are a preferred pick, for Cannon Crios. Their manufacturing series and construction characteristics are particularly suitable for the classic foaming solutions that Cannon have developed more than twenty years ago: RotoPlug systems – for the zero-time change of models – have been applied with success to these very large, quite deep, complex cabinets.

Complete plants – with a degree of automation depending on the requested production capacity – have been recently supplied in Mexico, Turkey and Ukraine. Horizontal refrigerated counters and displays, combined displays with “vertical plus horizontal” design, freezers for ice-cream shops, or special models for medical laboratories may require more dedicated tool’s design and construction: the majority of the requests are for single fixtures, which are always very special ones, all different from each other. They must always be adjustable in all possible directions for different family range product, and each also requires one adjustable inner plug.

These projects have a length of 1 up to 4 m, are often demanded with separate small corner parts for joining their different elements - depending on the design of the shop where they will operate - and all of them must be foamed on the same single fixture. These special projects have often been executed by Cannon, and the commercial network of the Group welcomes inquires to evaluate their technical feasibility and suggest the optimum solution.

Insulated Garage Doors

Home owners around the world are more and more appealed by the modern elegance of brightly-coloured, highly-insulating doors for their garages. In line with a more energy-conscious mentality which is demanding better insulated walls and roofs almost everywhere, also these large surfaces are now expected to keep the bad weather out and thus expensive heat – or the cold, in summer – inside the house! Doors can be rolling upwards or folding sidewise, and are usually made with insulated panels of limited height, in the lengths required by the size of the garage. Customers can choose between several basic models that can be personalized as regards dimensions, type of panels, colour, size, configuration, and the type of operation: manual or motorized, equipped with the most advanced technical features, such as radio control and sensor monitoring.

Insulated panels and special seals protect against temperature variations and bad weather. The most efficient insulation is achieved through a thick layer of Polyurethane foam applied between the two external facings. Special Cannon plants have been designed for these applications, which include presses for discontinuous method of production, where panels are injected individually with the desired quantity of foam, or for continuous foaming. In this case a narrow panel is produced, that is later cut to size and finished on the short sides. Special limited in production’s flexibility, these lines are characterized by extremely high yield and constancy of foam’s quality. For a very varied product mix – featuring different models, dimensions, finishing materials and colors – the preferred method is discontinuous foaming: a very productive solution – based on the longest-ever produced Drum unit – has recently been delivered to a major US producer. Equipped with a full set of automated devices for panel handling and pre-heating, this dedicated discontinuous-foaming machine reaches an annual output which is comparable to that of a continuous foaming solution, with much lesser occupation of space and lower investment.
DOMESTIC REFRIGERATORS AND FREEZERS.

<table>
<thead>
<tr>
<th>POS.</th>
<th>PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Free standing or built-in refrigerators</td>
</tr>
<tr>
<td>B</td>
<td>Vertical freezers</td>
</tr>
<tr>
<td>C</td>
<td>Chest freezers (Horizontal freezers)</td>
</tr>
</tbody>
</table>

COMMERCIAL REFRIGERATORS AND FREEZERS

<table>
<thead>
<tr>
<th>POS.</th>
<th>PRODUCTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Vertical bottle coolers/displays very often with advertising</td>
</tr>
<tr>
<td>B</td>
<td>Horizontal bottle coolers (with advertising as above)</td>
</tr>
<tr>
<td>C</td>
<td>Vending machines for cold drinks (with advertising)</td>
</tr>
<tr>
<td>D</td>
<td>Vertical freezers/displays for ice cream (with advertising)</td>
</tr>
<tr>
<td>E</td>
<td>Horizontal freezers for ice-cream (with advertising)</td>
</tr>
<tr>
<td>F</td>
<td>Vertical refrigerators/freezers for shops and supermarkets</td>
</tr>
<tr>
<td></td>
<td>Horizontal refrigerator/counter/displays for shops and supermarkets</td>
</tr>
<tr>
<td>G</td>
<td>Special refrigerators/freezers for medical laboratories</td>
</tr>
<tr>
<td>H</td>
<td>Special refrigerators like absorption type for caravans or places where there is no electricity</td>
</tr>
<tr>
<td></td>
<td>Special vertical/commercial refrigerators fitted with personalized equipment/technology</td>
</tr>
</tbody>
</table>

Cannon is currently engaged in the commissioning of two large foaming plants; one for the production of refrigerator cabinets and doors, and one for the production of foamed panels. In both cases the Cannon Group is leveraging its know-how and production capabilities in both Italy and USA.

The Cannon Crios Division is the leader in automated cabinet and panel foaming plants. With over forty years experience and thousands of operational systems throughout the world, Cannon is capable of engineering and delivering highly sophisticated systems that meet demanding customer requirements for manufacturing flexibility and production worthiness.

The systems pictured below can handle cabinets up to 48 inches wide and panels ranging in length and thickness up to 20 feet and 3 inches respectively. Sophisticated control systems provide for automated parts handling and tooling changes.

Cannon delivers large turnkey foaming plants to North America

The Cannon USA division has delivered more than fifty metering systems for the safe deployment of Cyclopentane blown foams. Cannon expertise and leadership in the area of Cyclopentane foaming systems is key to on-time and compliant system commissioning.

For more information please contact: Cannon USA, Inc., Cranberry, PA, phone +1-724-772-5600, e-mail cannon@cannonusa.com www.cannonusa.com

Dedicated metering units - with all the relevant ancillary equipment, piping and plant controls - are manufactured, installed and serviced by Cannon USA in Cranberry, Pa, for the whole North American area.
Adelante, MexiCannon!

After an initial period of set up and organization of its structure, MexiCannon takes off with vigour their job of representing and servicing the Cannon Group’s technologies in the largest country of Central America - and beyond!

Present in Mexico for many years through an Agency, Cannon have set up a few years ago a direct Location based in Tlalnepantla, near México City. This confirms the substantial interest of Cannon for this great country: many machines and complete plants are working since many years in the largest Central American nation – and the Group's commitment is also there, and growing. Lead by Carlos Aguilar, a young manager with a brilliant technical and marketing background in plastics processing equipment, MexiCannon have an agile structure of seven persons providing commercial advice, technical service and spare parts to customers located in Mexico and surrounding countries.

México benefits since a few years of increasing growth in their industrial activity, thanks to both internal development and transplants from their northern neighbours: several US-based companies have moved their plants across the Rio Grande border, attracted by economic labour and Government’s grants. Customers have seen them as prompt local service, speaking their language. In particular the domestic refrigerator manufacturers produce today a large part of their fridges here, and most of them are made with Cannon foaming equipment. Significant projects for the “cold chain” have been recently realised in northern México, including one of the Group's largest foaming plants for domestic refrigerators, complete plants for large commercial models, cold stores and refrigerated trucks.

Cannon is also well represented in the automotive industry with plants for Tier One suppliers manufacturing foam seats and other PUR parts for car interiors. When required, MexiCannon have deployed one of their specialists for one full year at the customer’s plant to assist and train local manpower for a new important project. Strict cooperation with local suppliers of chemicals have also brought significant commercial results, and added value to their customers who have seen a significant human and financial resources from this tight link.

The furniture industry saw in Central America a significant growth in PUR consumption, due to an expanding activity in slabstock foams, mainly for mattresses. MexiCannon provides service to a number of Cannon Viking slabstock and single block plants located in México and in the neighbouring republics.

In the field of single dosing units and mixing heads, an important “plus” provided by the local Cannon office in a form of complete service – including rental, fast exchange, simple repairing or complete overhauling of heads – is not locally available from competitors and suppliers of cheap clones of Cannon’s well-known models.

“[The business cannot be played by the discounted price only] when the customer picks a producer at random, he has lost by far more than the difference in price he might have gained when he bought it from a dealer, who is not organised to assist him technically afterwards.” confirms Carlos Aguilar.

And this concentrates in a sentence the basic concepts who have put Cannon in the forefront of this technology more than twenty years ago: do it well and keep it working with a local presence, Adelante, MexiCannon!

Cannon have recently supplied to Whirlpool México - for their new plant located in Saltillo - a modern foaming line. The foaming process for these single- and dual-door models is handled by one of the largest insulation plants ever built by the Cannon Group in its 40+ years of activity.

Whirlpool Corporation (www.whirlpool.com) is a global manufacturer and marketer of home appliances, recipient of annual sales of more than $18 billion, 73,000 employees and nearly 73 manufacturing and technology centers around the globe. The company markets Whirlpool, Maytag, KitchenAid, Amana, Brastemp, Brandtke, Consul and other major brand names to consumers in more than 170 countries.

---

SoliSpray update

Cannon have recently developed a new way to spray Polyurethane formulations loaded with high-density fillers used to produce “heavy layers” -foamed products used in the auto industry to provide sound insulation in the passenger compartment and to absorb vibrations coming from the engine and the transmission.

SoliSpray provides a practical alternative to the conventional way of making heavy layers, which involves thermoforming of filled thermoplastic sheets, BRIM, used to make foams loaded with Barium Sulphate, Calcium Carbonate and other mineral fillers. The advantage that comes from being able to make these components without having to use costly presses and molds, depositing just the right amount of material over the tool. The produced elements absorb vibrations and sound waves coming from the engine, from the wheels, from the gear box and from various external sources, providing improved comfort. Semi-rigid MHD-based Polyurethane foams with an open-cell structure are the preferred choice. Generally, various combinations of low cost, heavy powders are dispersed in a polymer matrix that can thus reflect sound waves in the frequency range between subsonic and audible. Cannon’s principal objective in developing SoliSpray was to optimize investment costs. The innovation lies in its ability to produce insulating parts by spraying a pre-filled Polyurethane formulation, and using a single mold half, and in some cases without the need even for a production head. A mixing head capable of working with filled materials was a must. An EPI 10 head was chosen, modified with an appropriate spray nozzle, designed to apply regular lines of homogeneous reactive mix with precision and an extremely low amount of overaping between two consecutive lines of foam. A six-axis anthropomorphic robot was chosen, capable of reaching all points of the part to be foamed, and of orienting its wrist to reach any vertical walls of the support. The dosing machine had to be able of working with a highly viscous Polyol loaded with abrasive mineral fillers. An HE-Systen Twin, a piston-pump unit, was selected for the task. As far as production plant is concerned, Cannon has developed a complete series of solutions, each one optimized for a different level of production. In addition, Cannon have developed a second technology that perfectly complements SoliSpray, called Foam&Film. This enables thin thermafoam films to be thermoformed directly on the surface of the mold. This process has already been successfully used in the auto industry as a means of totally eliminating the need for release agents. The combination of Foam&Film with SoliSpray eliminates not only release agents, but also the cleaning of the mold altogether.

Interesting applications are being developed at Cannon’s Research & Development laboratories: producers interested in carrying out practical experience in this direction are welcome for a constructive talk!
Cannon Eurasia News

Important milestone have been achieved in the last years in Russia and CSI countries by Cannon Eurasia.

Russia and CSI countries are developing and growing very rapidly and the demand of high-quality machinery and services is increasing day by day. For these reasons Cannon have invested a lot in the last years in Cannon Eurasia, in order to be ready to grant to the customers not only the best possible equipment, but also a prompt and qualify pre- and after sales service from Moscow.

Service
The Service Department has been improved a lot since during 2005: our Russian Service Team is now very qualified and grants an high level of technical assistance in all territory of CSI for following services:
- Technical and technological consulting, thanks to the important experiences in these markets and deep knowledge of international and local chemicals
- Certification of machinery according to Russian standards
- Start up of machinery
- Training of customer technicians
- Check and control of machinery
- Maintenance of machinery
- Modifications and upgrading
- On-site assistance
- Phone assistance and consulting
- Fast intervention in all territory of CSI: we get at the customer's site within 24-48 hours from the call, keeping in mind that the CSI covers 10 time zones and that it takes 12 hours to fly from Moscow to Vladivostok!

Spare Parts Stock
An important stock of spare parts is maintained in Moscow, already cleared from customs formalities and ready to be supplied to the customers - in local currency - in all the territory in a very, very short time.

"We are very satisfied of these important results and we can proudly say that during the last two years all installation of Afros machines have been done by Cannon Eurasia service team!" says Andrea Castellan, General Manager of Cannon Eurasia.

Sales of Machinery in Roubles
Cannon Eurasia now sells machinery in Roubles DDP, so customers have not to worry for all import formalities (and problems) because Cannon Eurasia takes care of:
- Foreign currency procedures
- Transport to Moscow
- Custom clearance
- Import taxes and duties
- Shipment to final destination
- and the customer receives the machinery at his final destination without any other engagement.
"The customers are appreciating more and more the quality of Cannon equipment and services, and they really feel that Cannon is now very close to them, taking care of their production problems and results," continues Andrea.

International Team at Work
Due to the globalization many foreign companies - especially in automotive and domestic refrigerators - are planning or realizing investment in Russia for local production. Cannon Eurasia is working on these projects in team with various locations – such as Cannon Deutschland, Cannon USA and Cannon Var East – and

Marco Vulpato (left), Managing Director of Cannon and Andrea M. Sonno, President of Lissant, sign the contract for the supply of the second continuous foaming line for sandwich panels.

Cannon: double-2 in the Russian market of sandwich panel producers

Another important step has been made by the Cannon Group in capturing the Russian market of sandwich panels. In the aftermath of a tough competition extended over nine months (a time span in which the CSI covers 10 time zones and that it takes 12 hours to fly from Moscow to Vladivostok!), securing Lissant total leadership both in quality and production volumes in the post-Soviet space by striking the 80% share of the overall rigid PU foam! And in Italy – only in one nation as Italy – a country with a Mediterranean climate, where everything which could or should be built was built several decades (or centuries) ago, this indicator is threefold!

All the more so, as the latter does not hide its ambitions and is developing new large-scale plants to conquer the Russian "virgin lands". What other definition could we give to the boundless Russian market with its rapidly growing building volumes, where, at the most, only 10 to 12 million square meters of thermoinsulating panels are produced, of which from 2 to 2.5 million square meters are made with rigid PU foam! And in Italy – only in one nation as Italy – a

"We can say that in CSI practically all producers of domestic refrigerators preferred Cannon machinery!" concludes Castellan.

Domestic Refrigerators
Another important milestone is the continuous appreciation that the domestic refrigerator's manufacturers show for Cannon's machinery. During 2007 the Group has successfully supplied or commissioned numerous plants in this important sector of the "white goods" industry:
- Pwiz – their second line for cabinets foaming
- Vestel – a door foaming line
- Oskar Meloni Progetti – lines for cabinets and doors
- Sepo – their second cabinet and doors foaming lines

"We are aware that in this market practically all producers of domestic refrigerators preferred Cannon machinery!" concludes Castellan.

Banktabs
New applications are now hot for Cannon Eurasia: they have recently commissioned a complete equipment for bath tabs for Omera, near Moscow, one of the most important producers of bath tabs in Russia.

The Cannon production facilities include:
- A large CannonForma thermoforming unit
- Afros/Sirek backfoaming system
- Bedotti CNC trimming system

Well done, Cannon Eurasia Team!
**C-Max Multi-Process Foam Plant**

Cannon Viking will shortly deliver the latest C-Max Multi-Process, high pressure foam block plant to a new client who is a rapidly expanding foam block producer in Eastern Europe.

This latest state of the art C-Max machine is being supplied with seventeen individual metering streams, each operating at high pressure, linked to a high pressure mixing head to enable the production of very high quality, fine celled polyether foams for use in furniture, automotive and laminations applications.

The C-Max machine is based upon Cannon Viking’s vast experience in Maxfoam trough foam production and liquid laydown (conventional) foaming with the combination on this machine of trough and liquid laydown foam technology on the one foaming machine. With the addition of high pressure metering and high pressure mixing this machine gives the capability of maximum production flexibility and the highest quality of foams - all on one machine. Low and high density foams can be produced with ease with either trough - used normally for furniture grade foams - and liquid laydown, for foams used in quality applications.

This machine has also been custom designed to enable further expansion to produce high quality Polyester foam blocks at a later date as the customer requires.

Another key feature on this plant, as specified by this customer, is a flat top system where by a top paper/film is applied to the top of the foam block just after foam laydown and then counterbalanced top ski units flatten the foam block during expansion and cutting on the plant to enable the formation of flat topped foam blocks of perfect rectangular shape for maximum conversion economy.

Similar C-Max plants have already been supplied to customers throughout the world capable of Polyether, Polyester and other specialty foams like Viscoelastics to clients within Europe, the United States of America and The Far East.

**Laboratory Foaming Plant**

During the last two months Cannon Viking have supplied a turn key installation to a major Polyol and TDI chemical raw material manufacturer located in Shanghai, China. The machinery was specified to allow the testing and development of new raw materials, as well as enable customer demonstrations and trials – all in the new purpose built and designed laboratory.

The equipment supplied by Cannon Viking consists of a high pressure C-Max laboratory continuous foam block production plant and a Blockmatic single block machine. The C-Max continuous plant enables both Maxfoam trough and liquid laydown (conventional) foam production techniques, and the Blockmatic will enable rectangular foam blocks of varied sizes: the raw material supplier will be able to duplicate raw material trials on similar machinery to that operated by their end clients located throughout Asia/Pacific. Both machines are supplied with multiple metering streams to permit the use of a wide range of Polyols, Isocyanates and Additives.

Cannon Viking is the world’s leading supplier of laboratory foam block production equipment having supplied more than 30 individual installations with raw material producers located in their facilities throughout the world. With this kind of project Cannon Viking has a highly experienced and dedicated team of specialists to offer a tailor made machinery package combining the latest in electronic controls, chemical metering and mixing with either single block production or continuous block production to meet the specific requirements of the raw material producer.

Talk to us for more detail - we have a great deal to offer!

**Maxfoam Technology: The Latest Developments**

We are pleased to introduce a new Maxfoam machine within our continuous foam plant range, called the Maxfoam ‘Elite’.

With the growing global demand for more varied types and higher quality foams we find that many customers now require a foam block production plant capable of simple further expansion and upgrading.

In the initial phase the Maxfoam Elite is supplied as a standard Maxfoam plant - normally with high pressure metering units and mixing head to produce frictioned foams; in addition the Elite machine also includes a special fallplate and mixing head arrangement to ease simple later upgrading to the machine, to enable liquid laydown (conventional) foam operation for optimum quality foams.

When the machine is installed we plan with the customer to allow sufficient space around the mixing head section of the plant and operation platform to easily adapt the machine later with the minimum of inconvenience and machine shut down.

**ViscoElastic Foams “The Affordable Way”**

With the large growth in Visco Elastic Foam – also known as Memory Foam, being used more extensively in mattresses and pillows – Cannon Viking has developed a custom made Blockmatic Single Block Machine package.

The equipment is based upon Cannon Viking’s highly successful Blockmatic 150 kilo shot machine but with multiple separate metering lines and tank storage for the special Polyols and additives used to produce visco foams. The mixing capacity of the machine is also increased to enable the formation of large foam block of maximum economy: machines have already been supplied within the Europe, Middle East, Asia Pacific and most recently Eastern Europe for production of this highly profitable foam.

Please contact Cannon Viking – through your nearest Cannon Office or directly – for more information!
Alongside the well-proven InterWet technology and OuterWet technologies – intended for the application of one or numerous layers of glass-reinforced material over diverse areas of a mold, to obtain a piece in composite material with excellent mechanical properties and aesthetics – Cannon offers today a further processing option for spray foams. Non-reinforced rigid foam can be applied over thermoformed substrates, in subsequent passes, to reinforce them and provide thermal insulation. The moderate investment required and the high production flexibility are opening up interesting application areas, such as bath tubs, shower trays, parts for caravans, campers, ambulances and other special vehicles, micro-cars and boats.

The number of options available for co-injecting glass fibers or insert fillers with Polyurethane foam is on the rise. Cannon technologies cover the whole range of needs concerning the quantity and type of glass reinforcement desired in a PUR composite part. The table shows them in summary:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Glass % Content</th>
<th>Glass Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>OuterWet</td>
<td>&lt;20</td>
<td>1/2 Roving</td>
</tr>
<tr>
<td>InterWet</td>
<td>=40</td>
<td>1 Roving</td>
</tr>
<tr>
<td>Direct Preform</td>
<td>=55</td>
<td>1/2 - 2 Roving</td>
</tr>
<tr>
<td>Tissues</td>
<td>&gt;55</td>
<td>Mat</td>
</tr>
</tbody>
</table>

The recent introduction on to the market of new Polyurethane formulations, intended for spray application and capable of being laid down in multiple layers without creating aesthetic problems on the surface of the part, has prompted Cannon to develop a technology that meets their industrial application needs.

Glass-reinforced Spray Foams
This solution allows for the production of large parts with a multilayer sandwich structure, made up of various combinations of solid PU, solid and cellular PU, solid and cellular Polyurethane and short glass fibers, in order to meet diverse functional and aesthetic requirements for diverse product areas. The target market for this technology is one that currently uses GFRP (Glass Fibre Reinforced Polymer) to improve the robustness of large parts that are either stamped or thermoformed from sheets of ABS and Acrylic (PMMA). The chance of eliminating Styrene monomer and other similar solvents in a high-series production process today constitutes not only an economic advantage, but also represents an important need in terms of respect for operatives and environment.

This method provides the maximum production flexibility: with the use of suitable dosing equipment, the formulation can, depending on requirements, incorporate blowing agents, to obtain one or more layers of expanded material, or it can be used pure, to get one or more compact layers. The system can be used to spray onto the thin walls of an object that needs reinforcing, or to spray into a mold in order to make an all-Polyurethane part. In both cases, only a single mold half is needed, given that the expansion of the foam does not need to be controlled or confined: the Polyurethane layers, whether solid or expanded, polymerise at ambient temperature in the open mold. Thanks to the compact size of the mixing head, it is possible to combine it, in a single workstation and using the same robot, with a spray gun for painting directly in the mold, or for applying another type of coating at a higher thickness.

Technological Advantages
In summary, the advantages of this production process are:
• elimination of Styrene monomer and of manual application of glass fibers from the spraying process;
• reduced labour costs, thanks to the high level of automation;
• significant reduction in equipment costs – in particular for molds, and for the workplace as a whole;
• elimination of mold carriers;
• shorter cycles, higher productivity per shift;
• raw material cost savings, thanks to optimised material usage;
• ability to produce large parts, with dimensions limited only by the reach of the robot.

Production Advantages
As far as the finished product is concerned, the principal advantage can be summarised thus:
• parts are lighter and more rigid;
• parts have improved impact resistance;
• increased opportunities for thermal and acoustic insulation;
• improved surface quality, with consequent advantages in terms both of aesthetics and functionality (for handling)

Applications
Industrial applications that have so far achieved positive results with the technology include sheets of ABS and PMMA back-foamed for bathtubs, shower trays and sinks. Other applications that can be realised today are large body parts for agricultural equipment, for earth-moving machines and for transporting materials. In general, the sectors best favoured are those that require parts to be produced with the use of suitable dosing equipment, for earth-moving machines and for transporting materials.

Non-reinforced Spray Foams
Cannon now also produces a machine able to spray a high-density Polyurethane resin that, thanks to its mechanical resistance characteristics, is ideal as reinforcement for any thermoformed product, such as bath tubs, shower trays, parts for caravans, campers, micro-cars and boats. The formulation does not contain any additive that could emit toxic substances during processing or when using the product in which it is applied, and respects the norms on emissions. Furthermore it allows for a flexible type of manufacturing: manual, semi- or fully automatic process can be achieved with a clean product characterized by higher-than-average thermal and acoustic insulation, optimum resistance and elasticity, is not classified as a special waste material and can be recycled and reused as a secondary raw material.

Sprayfoams gain new applications
The New AG6 Metering Unit
The spraying process is carried out with the Cannon AG6 high-pressure dosing unit. The dosing unit is part of a complete package plant, which usually is composed of:
• dosing unit
• pre-heating oven
• box for temperature and humidity control
• turning table or rotating system
• spray robot

The AG6 high-pressure dosing unit is based on the Cannon “AP” unit’s concept, features a 6 cm³/rev fixed output pumps with variable-speed gearbox and the OVS for monitoring output and ratio of components.

A full set of heated hoses and a thermostat that control the temperature of the metering station, ensures the correct output flowrate and thus the viscosity of the products, ensuring the correct metering head, that is provided with a proven air drilling system.

One high pressure filter on the lso side removes any possible small crystal from the raw material, for consistent quality of the spray cone. Pneumatic pumps mounted near the component tanks avoid the operator the chore of refilling them periodically from their storage drums.

The Cannon network is actively promoting this machine and the related equipment for the above mentioned applications: more than ten machines were sold during this year, and several other orders are close to a definition.

Innovation
Interesting experiences have been made in conjunction with four European suppliers of formulated coatings, to spray a Polyurea-based gel coat directly on a mold half, backcoating it after a few seconds with PUR formulations containing variable amounts of short glass. Interesting results have been obtained with the various types of Cannon equipment for these spray applications, and the first orders are being executed in these weeks.

The system seems to be appealing for the manufacturers of automotive interior parts: the possibility to apply a spray foam over a mold half rather than injecting it in a full mold attracts more than one producer already!
Shinnon, Cannon’s first Chinese manufacturing centre — created two years ago to assemble Polyurethane dosing units for the domestic market — delivered this year their first complete molding plant for the world’s leading producer of cars.

Managed by expert Chinese specialists from the Group’s Singaporean branch office, Shinnon benefits from the continuous technological support of Cannon Afros, the world leaders in Polyurethane technologies.

“If I am exciting experience” states Pietro Migliorini, the Cannon Afros manufacturing specialist holding a degree in mechanical engineering from Milan’s Politecnico University, who is devoting his time to the training of local technical staff at Shinnon, near Guangzhou, in the southern China’s Guangdong province. Pietro in the past two years of his life has been constantly transferring his manufacturing skills to the young, motivated team of Chinese technicians that work for Shinnon.

“While we were transferring from our Italian and European manufacturing facilities to one of the world’s most modern Chinese approach whatever western methodology Afros is transferring to them”, says Ching Kwock Leong, the Technical Director, a Singaporean of Cantonese origin.

Shinnon is now very busy in executing important projects for major players of the automotive industry, who have much appreciated the local availability of high quality Polyurethane technologies at a manufacturing cost affordable by their local production Units, which must follow the same basic economic rules to stay competitive in this very aggressive market.

In Shinnon going to cannibalize the Group’s manufacturing strategy, shipping more economic equipment to the European or the American markets?

“It’s an exciting experience” says Marco De’ Guidi, the Group’s Corporate Marketing Director overlooking the whole project.

“There is space for both old and new sources of complex plants, within the Group. Distances, mentality, outsourcing options still make a lot of difference. Our manufacturing strategy is spread over Europe, USA, Japan and now China. Till it makes sense, it stays like this!”

 manager of Cannon Far East in charge of the general management of this corporate project. “The difficult part is not in making them, but in making them with a profit! And this — in a country where the concepts of profit and margins are still a subject to be clearly explained to an accountant — sometimes to be introduced to elder people still influenced by the Marxism’s dogmas — is not the easiest of the tasks”, continues Lee Meng. “What we want to achieve, in this starting phase, is the overproduction of a modern Cannon manufacturing unit in China, thinking globally and acting locally, as it is now common to say for companies working locally for a multinational Group!”

Continues Kwock Leong: “Our young people here at Shinnon — we are more than 45, now, and growing — love to be the Chinese arm of an internationally appreciated Group. They are proud of what they do, and they put their maximum effort in applying with a modern Chinese approach whatever western methodology Afros is transferring to them”.

And by “modern Chinese approach” he means fast learning, hard-working and optimizing costs, exploiting the booming supply of qualified work available in the Pearl River Delta area. Gone are the times of cheap copying and poorly fitted sweatshops: in this area modern mechanical shops provide now state-of-art machining services, an ideal support for a company executing orders on design, strictly of non standard execution.

Shinnon delivers now — to the leading automotive producers of Far East Asia and China — Polyurethane molding plants built in accordance with the latest Cannon standards of quality and safety.
More than 45 persons work today at Shinnon, in the Pearl River Delta area, in Southern China.

Quality Shinnon low-pressure dosing machines produced for the domestic market.

Cannon on Internet: Networked Dedication

Cannon always devoted much attention to their presence on Internet, opening dedicated specialist sites for their Divisions, Locations and Technologies.

Herebelow a useful list of the Group’s sites:

The Divisions
- Cannon Afros, Dosing Units & Heads for PUR: www.afros.it
- Cannon Crios, Refrigerator Dosing Plants: www.crios.com
- Cannon Tecnos, Automotive Appl. Plants: www.cannontecnos.com
- Cannon Viking, Slabstock Plants: www.cannonviking.com
- CannonForma, Industrial Thermoformers: www.cannonforma.com
- Cannon T.C.S., Die-Casting Plants: www.cannontcs.com
- Cannon BONO, Energy & Ecology Solutions: www.bono.it
- Automata, Industrial Electronic Controls: www.automatav.com

The Locations & Agents
- Cannon Deutschland: www.cannon-deutschland.de
- Cannon Eurasia - Russia: www.cannon.ru
- Cannon Far East: www.cannonfareast.com
- Cannon in India: www.cannon-india.com
- Cannon Istanbul - Turkey: www.cannon.com.tr
- Cannon Nippon - Japan: www.nipponcannon.com
- Cannon Solutions - UK: www.cannonsolutionsuk.com
- MexiCannon - Mexico: www.mexicannon.com
- MECE - Spain: www.mecedes.es
- Nortec-Cannon - Denmark: www.nortec-cannon.dk
Let's play the game!

The international network of Cannon Locations and Agents meets on a regular basis to update the product’s list, verify the marketing strategies and welcome the newcomers.

The latest meetings – held near Milan and Manchester – have gathered Cannon people from China to South Africa, from Brazil to Scandinavia. A new breed of local Agents reinforces the international presence of the Group.

The international presence has always been a strategic plus for the Cannon Group, that provides – through a network of Locations and Agents – very close technical and commercial support to their customers in more than forty countries.

Regularly held in the proximity of the main Manufacturing Centers, the Cannon Group’s Sales & Marketing Meetings provide unique opportunities to their participants to reinforce personal relationships, refine marketing strategies, learn from their most successful colleagues.

Held near Milano, Italy and near Manchester, UK the two specialized 2007 meetings have gathered Cannon people from as far as South Africa and Nigeria, China and Japan, Brazil and Argentina, Pakistan and India. A significant number of new Agents joined the Group in the past few years: these two meetings gave them - for their first time - the opportunity to meet colleagues from other countries and to develop with them possible cooperation for multinational projects.

To relieve the long hours of meetings and interactive discussions, an interesting golf lesson has given the participants the thrill of a well-driven shot (Golf Club Le Robinie, near Milan, Italy)

And the Golf Contest winners are… (left to right) Shane Wootton of CTM UK (the 3rd best), John Davies of Cannon Solutions UK (The Winner), Maurizio Motton of Tecnos Italy (the 2nd best …but he’s a Pro!)

The vicinity to the main factories allows for in-depth analysis of the latest technical solutions and of some significant plants in their final stage of construction.

The latest innovations are illustrated by the specialists who have developed them, and guests from major chemical firms are often invited to share their vision of the various markets, and strengthen local links with the Cannon network.

Held in the historic working cotton mill of Quarry Bank, the UK Sales meeting has given the opportunity for a tasty guided tour of the well-preserved industrial site where in 1784 an important textile activity started.

A real lesson of mechanical, automation and energy-related matters, to the sales people of a leading Group dealing with mechanics and industrial energy production! (Quarry Bank Mill, Styal Estate, near Manchester).