



InterWet Technology

Co-Injection of Filled
& Reinforced Polyurethanes

Automotive

Appliance

Insulated Panels

Furniture

Structural Applications

cannon

POLYURETHANE TECHNOLOGIES

The Technology

Filler Co-Injection: "The Cannon Way"

Cannon has developed and manufactured an innovative system for the internal co-injection of Polyurethane formulations with a large variety of fillers.

The innovative aspect of this new technology lies in the excellent wetting of the fillers, which are metered and mixed with polyurethanes directly within the mixing head chamber, using a special co-injection concept (patent pending).

This ensures a thorough wetting of the solid component and a homogeneous dispersion in the mixture, hence its name: InterWet (Internal Wetting).

This process is characterised by high mixing efficiency and foaming performances, blend homogeneity and a significant production cost saving.

Thin-walled moulded parts reinforced with non-reactive fibres, or filled with low cost additives, can be produced with excellent chemical, physical and mechanical properties and characteristics.

The InterWet technology was originally designed for the production of structural parts reinforced with glass fibres (roving based) and especially for automotive industry applications, as an alternative solution to the traditional production processes based on glass mat or cut glass fibre pre-blended with polyol.

More recently, thanks to the great success of this technology in the

market and following extensive development work, its use it has been profitably extended to very different industrial applications, combining the flexibility of the foaming process with the advantages of using a wide range of fillers.

Innovative Concept

The mixing technology is based on the renowned Cannon FPL high pressure mixing head, specially modified. This specific head is well known and recognized in the market for its proven efficiency, compact design and L-shaped geometry.

It is equipped with an appropriate feeder mounted on the upper section, which allows the use of a wide range of solid fillers: glass fibres, iron powder, mineral fillers (expanded calcium carbonate, marble granulate, barite, graphite, sand), etc..

In a controlled processing sequence the chemical components (Polyol and Isocyanate) are injected at high pressure into the mixing chamber.

Glass fibre co-injected with PU, foamed and moulded

Cannon InterWet high pressure mixing head.



3D lay-out of a standard glass fibre chopper hydraulically driven and equipped with a quick blade changeover.



At the same time in a typical foaming cycle, the solid component is metered and fed by the upper section of the head through a specially designed chopper hydraulically controlled and assisted by pressurised air. The process is completely automated and each single step is monitored by a sophisticated control system to ensure constant process repeatability and component ratios.

The innovative concept introduced by the Cannon InterWet technology is to meter and mix the filler directly through the head: the solid component meets the liquid formulation just in front of the mixing chamber in order to facilitate a synchronised and instantaneous internal mixing of both, followed by injection of the final blend into the mould.

This means that the kinetic energy generated from the turbulence of pressurised liquids is used to wet the solid component thoroughly, guaranteeing a homogeneous mix and efficient filler dispersion.

By means of a specially developed pneumatic deflector-device, mounted at the outlet of the mixing head, a superior quality and optimum blend lay down has been achieved, ensuring an excellent distribution of the mixture especially when dealing with extremely complex mould geometries.

When the pouring phase is ended an air flush cleans out any residual PU from inside the filler-feeding duct, avoiding clogging problems during the successive shots.

Technological Advantages

The Cannon InterWet technology offers significant technological advantages and it is recognized worldwide as a successful, proven alternative production system, which is:

- not only limited to long fibre injection but also designed to ensure a flexible use of more than



Sophisticated InterWet multihead system for the production of glass fibres PU reinforced automotive exterior body parts.

one type of additional solid fillers. Depending on specific customer's requirements, the mixing head can be either equipped with a glass-fibre chopper unit or easily converted to process a large range of bulky, irregularly sized fillers by mounting a special dosing unit developed by Cannon. A dedicated and automatic system allows changes to be made to both output and fibre-length independently, shot by shot, during the pouring process.

- able to manage and monitor with a dedicated closed-loop control the total component output and keep it constant.
- characterised by high reliability and repeatability of the foaming process, as a result of the innovative co-injection concept introduced and patented by Cannon, and quality of head parts

Furniture application: table bar foamed with a mixture of marble sand and polyurethanes.



and relevant finishing treatments which allow the use of abrasive fillers without affecting the life of the mixing head.

- fully automated and controlled by special safety devices for monitoring every single production step (filler feeding, fibre glass cutting, co-injection and mixing phases), to maintain optimum foam homogeneity and quality.
- equipped with a Cannon FPL high pressure mixing head characterised by a compact design with reduced size and weight, thus it does not require heavy-duty pouring robots for handling and for the quick lay down of fast-reacting blends on wide, open moulds.

Furthermore, Cannon has recently developed innovative equipment to meter and mix a three-component slurry. High-solid-content slurry, obtained by blending powdered ultrafine solid fillers in non-catalysed Polyol as the carrier, is fed as a third stream at low-medium pressure to the mixing head via the axial port of the mixing chamber originally used for metering colour paste.

Process Advantages

In contrast with other technologies available on the market, the Cannon InterWet co-injection of Polyurethane and fillers, presents several advantages during the foaming process, such as:

- increasing the productivity, eliminating most of the traditional problems related to the expensive dispersion of filler into the raw material (i.e. possible absorption of additives into the filler, abrasion, clogging of lines and tanks, fluctuating percentages of filler in the liquid, etc.).
- reduction of management and logistical costs. This "lightweight installation" does not require additional

equipment such as premix, cylinder machines, pre-formed part storage areas, handling, etc..

- significant cost savings in terms of reduced manpower, reduction of raw material costs by utilising low cost additives and fillers. Compared with glass mat and pre-cut glass fibre, glass fibre roving is less expensive.
- reduction of scraps due to a fully automated foaming process. Furthermore, the mixing system is based on just a few standard parts, which are cheaper than specially developed ones and are easily maintained.
- significant improvement of the product's physical, mechanical and qualitative characteristics, thanks to a homogeneous and random long glass fibre dispersion in the PU foam.
- improved working conditions and quality of the life within the production plants, with a profitable and sustainable technology based on a solvent free process that respects the health of the workforce and, more generally, the environment.

Side part of a complete earthmover's bonnet realized with Cannon InterWet and FFT - Foiled Fiber PU Technology developed by GMP Italia SpA (Italy).



InterWet plant dedicated for the production of sandwich insulated panels.



Applications

Cannon InterWet is a flexible and proven technology, extremely suitable for use in a wide range of industrial applications. It was originally designed for the production of reinforced structural parts for the automotive market, heavy trucks and earthmovers (i.e. door panels, parcel shelves, tractor hoods, fenders, internal and external body parts, etc.),

External body part of a Caterpillar's earthmover, courtesy of Thompson Plastics Ltd (UK). A PMMA thermoformed sheet back-foamed with a GF reinforced PU.



which represent typical examples of industrial products where the mechanical resistance and a very lightweight product are mandatory and unavoidable characteristics.

Nowadays, the success achieved with InterWet in those sectors has enthusiastically engaged Cannon in another challenge: to industrialise new applications for other sectors. In the light of the experience gained from investing in continuous R&D activities, dealing with special tailor-made projects and putting into production many real applications worldwide (for

instance insulated sandwich panels for air conditioning plants, furniture parts, bar tables etc.), Cannon InterWet could almost certainly be profitably extended and applied to the production of:

- energy absorbing panels.
- structural parts for appliance, furniture and cold chain industry.
- decorative parts.
- agricultural containers.
- insulating parts for building (blocks, bricks, structure etc.).

If you have an application in mind, do not hesitate to contact us because together with the support of Cannon's R&D specialists, it may be possible to evaluate the development and the industrial feasibility of a new product. Just an idea to open "new production possibilities", realising a profitable and dedicated solution! With the innovative Cannon InterWet technology a simple inspiration can become reality!

Standard layout of a typical Cannon InterWet foaming line



Sandwich insulated panel based on an external structural layer foamed with glass fibre reinforced PU.

Cannon

POLYURETHANE TECHNOLOGIES

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