CONTINUOUS PRODUCTION LINES FOR SANDWICH PANELS

FOAMING & INSULATION TECHNOLOGY

- Continuous Lines for Large Productions
- Tailor-made Design & Configurations
- Rigid & Flexible Facing
Rigid polyurethane foam with its ideal strength to weight ratio, thermal and acoustic insulation properties, durability, and unmatched versatility, ensures high performance and exceptional energy efficiency in a wide range of applications: building, warehouses, prefabricated structures, roofs and walls, sectional doors, ducts and air conditioning systems, soundproofing cabins, cold stores, walk-in-coolers, pipes network for water/oil/heating distribution.

ISC srl supply the building and construction industry with a wide range of proven, reliable, economically and technologically advanced solutions based on discontinuous and continuous methods for the production of insulated boards, sandwich panels and insulated parts. The decision to choose one technology over another is mainly due to the production volume required, to the part complexity and to the level of investment.

ISC srl design and offer a worldwide basis, anything from single stand-alone units up to complex and fully in-house manufactured plants with high degree of integration, technological synergies and automation (automatic loading system for raw materials, handling systems and packaging equipment for finished products, turntables and carousels, premixing units, chemical storage). When manufacturing complex "turn-key" foaming systems ISC srl adopt modular development criteria to offer unbeatable flexibility during configuration. This choice also means that the actual line can be expanded at a later stage with the addition of extra modules.

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The ever-growing demand for insulated panels in building applications is driven by the new energy-saving regulations imposing significant reductions on power consumption, that can be achieved by the thermal insulating properties of the materials used.

Sandwich insulated panels can be produced with a maximum thickness of 250 mm and either flexible (paper, cardboard and felt, centesimal aluminium sheet, etc.) or rigid facing (metal sheet, GRP, etc.) and using different types of insulating materials: polyurethanes, PIR, phenolic resins, mineral wools.

Panels with rigid or flexible facing can be part of the building structure and in many cases substitute traditional constructive materials offering better thermal and acoustic insulation properties.

These panels improve the look and utility of the building as well as its speeding-up construction and reducing the amount of expensive wood necessary for structural frames, saving time and energy and protecting natural resources as well.

Dedicated presses and foaming plants for the manufacture of curved panels are also available. Typically a sandwich curved metal panel insulated with polyurethane and internal microribbed liner is used either as new roofing elements or for the replacement of fibre-cement slabs.

The continuous thickness of the polyurethane insulating material provided an excellent barrier against the dispersion of heat in winter and the entry of the sun's rays in summer, giving the panel a pleasant, elegant appearance.
In addition, it is important to point out that foamed-in-place insulation delivers the highest energy efficiency and creates a strong, well-insulated monolithic panel. On request, ISC srl can also provide complete solutions for the production of insulated panels with an external curved, grooved facing from cement fibres. The internal flat facing can also be made with either cement fibres or painted steel with a polyurethane core, with the possibility to produce models of different size and shape.

Sectional doors and garage doors are another interesting application niche where sandwich insulated panels are successfully applied. The sectional door comes from a simple and effective concept that consists of dividing the door into panels to be lifted and lowered vertically or moved horizontally, making it modern-looking (attractive doors with various styles, shapes, profiles, finishing and colour options), extremely practical with the great advantage of a reduced space required for the opening/closing phases. Commercial sectional door and residential garage door panels can be shaped with an attractive stucco embossed painted profile, natural look wood grain style, embossed surfaces, with shadow lines for added strength. The panels are produced in both continuous and discontinuous processes: the result is a solid and aesthetically pleasing sandwich strong enough to bear commercial abuses. Foamed-in-place PU insulation is highly efficient giving these panels twice as much energy efficiency as polystyrene.
Air Conditioning & Ventilation Ducts

Typically, conditioning systems are made of simple trimmed metal sheet panels, presenting some negative aspects: the lifespan of the parts is compromised by the formation of rust, acoustic and thermal insulation is very poor, furthermore, on forced air distribution systems, a quarter of the energy used for conditioning is wasted through intrinsic system losses close to ducts and junctions.

As an alternative to the standard machinery for insulated sandwich panels with metal facing, ISC srl has developed a new production process for metal-free panels. Instead of using metal sheet, the structural external layer is made of formed composite sheets or glass-fibre-reinforced PU, resulting in a whole plastic panel characterized by its lightweight and excellent structural properties and unbeatable energy efficiency. Polyurethane foam is a proven insulating material recognized for its reliability, durability and efficiency. Its outstanding insulation properties prevent heat loss, or alternatively maintain temperatures, over an extremely wide range of conditions, from extreme cold environments to ones of intense heat, without freezing or cracking.
The increase in production volumes and the variety of possible applications demands a higher production capacity. For these reasons continuous laminators are the best – and sometimes the only - possible alternative solution for large-scale production. Roof and wall panels are made mainly of a metal section support and a polyurethane insulating mass, which assure a double barrier, one against corrosion and the other against thermal dispersion. Therefore elective components, like zinc or paint coated sheets, are chosen to offer an effective barrier against atmospheric agents; the same for polyurethane or polyisocyanurate foams, the most efficient thermal insulators against heat transmission. ISC srl supports the customer with dedicated and tailor-made, on-the-job training courses. On request, training sessions can be organized at a production plant where on a daily basis the customer's operating staff will work in close contact with our specialist in order to achieve a correct and optimal know-how transfer.
Unwinding group is usually composed of four decoilers, two for the upper profile feeding and two for the lower one, which are equipped with an automatic loading and positioning system of the coil on the relevant mandrel (two is the minimum possible configuration).

The coilers are usually arranged in pairs in order to achieve fast production changes. When one coil is working the second one can be set for the new production.

Rock wool panels are specially designed and require to meet "fire safety" requirements both for the construction of new buildings and the renovation of existing premises. When the insulation material is not self-adhesive, i.e. mineral wool, the equipment for sheet forming and panel cutting will not change, while in parallel to the metal profiling group, dedicated devices are integrated for mineral wool mattress loading, cutting (either in-line or off-line), handling and gluing.
Roll Forming Machine

Profiling line for wall panels complete with micro ribbing device to shape the rigid facing and form the junctions. Roof panels require deeper ribs and a dedicated set of forming rolls for the external sheet layer.

The main feature of the roll forming equipment is the number of roller holder shafts, which is related to the profile to be obtained. The system is designed for fast replacement of the forming rolls (cassette system). Typically the group is based on a two-levels configuration to separately profile the lower and upper layers.

Pre-Heating Tunnel

This keeps the formed sheets at a desired temperature in order to achieve good foam adhesion and the final quality of the sandwich panels.
Dosing, Mixing & Foaming

A high-pressure multi-component dosing unit (number of components according to chemical formulation) equipped with mass flow transducers and double diaphragm pumps. When hydrocarbon-based blowing agents (i.e. Pentanes) are used, the whole foaming equipment is specially configured with dedicated raw material storage, premixing unit, explosion-proof devices and active ventilation system to ensure the maximum safety.

The foamed insulating material, polyurethane, PIR or phenolic resins, is poured by means of a dedicated mixing head assembled and driven by a bar that slides transversally over the panel, giving optimal foam distribution.

For Phenolic Resins

When using phenolic resins, the dosing unit, storage for chemicals, mixing head and all the parts in contact with them have to be specially designed to handle corrosive and high viscosity liquids. The resin component could also contain up to 50% in weight of solid fillers to improve the already excellent resistance to fire of these foams: but the operating viscosity of the component is expected to be around 50,000 cps!

Pre-Heating Tunnel

Regularly-cut strips of mineral wool are fed between the two metal formed sheets, immediately following a station where a two component PUR adhesive has just been applied by spraying the inner metal surfaces using a double dispensing machine and two transverse mixing guns.
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Double Belt Conveyor

The double belt conveyor represents the most important part of the line. It consists of two conveyor belts aligned one above the other and capable of contrasting the pressure generated by the foam reaction and ensuring a perfect flatness.

The gap between the two belts is adjustable, allowing the processing of panels with different thicknesses. In order to obtain an optimum PU polymerization, the upper and lower sections are independently heated.

A ISC srl fully designed, innovative drive fitted to the conveyor: two independent electric motors operate two endless screws mounted above and below the two belts. This solution provides higher efficiency and more linear speed avoiding the “polygon effect” and is characterised by lower maintenance and reduced wearing of moving parts.
Cutting Equipment

Leaving the double belt conveyor, the sandwich panel enters a sound-deadened cabin where the cutting machine sawns the finished panels to the desired length. The cutting group (available with single or double configuration) can be supplied with disk or band saw.

Handling Systems

To avoid heat accumulation, thus preventing wavy surfaces, bulges, foam tears and scorching; the high thickness panels need to be properly cooled before stacking. To save space, ISC srl suggests dedicated cooling rack devices that use air as coolant.
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Tank Farm

Being a solution provider as well as a worldwide supplier of complete plants, ISC srl is also able to offer a full package that includes chemicals and hydrocarbon blowing agent storage equipment. ISC srl satisfy a wide range of customer's requirements: from simple chemical bulk storage, up to polyol/Cyclopentane blend storage, small bulk storage for hydrocarbons, complete pentane storage systems. In particular, concerning the storage of hydrocarbon blowing agents, in the case of pilot plants or small production lines, storage containers can be installed immediately outside the production building in a naturally ventilated area protected against the sunlight by a cabinet. This open-air system is easy to inspect and maintain.

Reaction to Fire
Reaction to fire is the degree in which a material resists combustion. With regard to this, materials are assigned a class (0 through 5): the higher the class, the higher the degree of combustion.

Resistance to Fire
Resistance to fire is the ability of the building element to limit the spread of flame, and retain the integrity of the thermal insulation for a period of time. The performance of panel systems when tested is expressed in minutes from ignition to the conclusion of the test, which is determined as the failure point at which the panel ceases to comply with the requirements of the specific test.