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WHITEPAPER

Converting from Sheet Molding Compound to Thermoplastics

Manufacturing the SMC Sheet

Sheet molding compounds (SMC) are fiber-reinforced thermosetting sheets. They are similar in structure to semi-cured fiberglass mats. To manufacture the SMC sheet, one layer of resin paste is applied to a conveyor. There, fibers are introduced onto the paste layer in a random orientation to cover the resin to the required density and uniformity, and another resin layer is applied over the fibers. The layered sheet is then compressed to impregnate the fibers with the resin.

After the sheet is compressed, it is typically wound onto a roll and set to cure for several hours to several days. The resulting sheet is easily handled and malleable, which allows it to be formed during the compression molding process.

Compression Molding

To form the part from the SMC using the compression molding process, sheets of SMC are inserted into a heated press. The sheet is typically smaller than the finished part, as the compression molding process is both a pressing and forming operation. During molding, the SMC flows into the mold cavity under pressure. The hot mold activates the thermosetting resin, curing the part in the mold. Flashing resulting from the molding process is easily trimmed after the part has cooled.

This process can be used to form details such as ribs and bosses since the resin/fiber matrix flows due to the mold pressure and reduced viscosity of the resin when heated. However, care must be taken when designing the mold to ensure fibers do not separate from the resin when forming these details. The formed part has a good surface finish and can be coloured or primed for painting during the molding process by adding a pigment paste to the thermosetting resin.

Thermoplastics—A Proven Alternative to SMC

Thermoplastics offer manufacturers an alternative to compression molded SMC parts due to their range of mechanical properties and excellent wear resistance. Thermoplastic materials will not fray, dent or ding, and retain the base materials' properties and durability, which can decrease replacement and out-of-service costs. They are also chemical and stain resistant and hold up to the harshest disinfectants and chemical reagents without discoloration or cracking.

The Rigors of a Medical Facility

Medical device and equipment manufacturers require materials that can withstand the daily demands of a hospital or medical facility. Equipment must be able to withstand impact with walls, carts, beds or other equipment without chipping, cracking or fraying. In these environments, materials must hold up to frequent cleaning and wash downs with harsh disinfectants and chemical reagents.

Materials must balance performance requirements with providing designers with the ability to furnish a warm and welcoming environment for patients to reduce patient fear and anxiety. Long-term care and assisted living facilities prefer products that are evocative of a more traditional home and blend in with the overall aesthetics of the facility.

Advanced Capabilities from Thermoplastics

Thermoplastics solve for these issues because they are able to stand up to harsh cleaners and chemicals used to manage infectious diseases, while offering aesthetically pleasing options, including custom colour matching, wood grains, and surface finish effects. Increased regulatory requirements have led to the development of thermoplastic materials that meet smoke, fire, and toxicity regulations, making them ideal for diagnostic imaging machines, patient monitoring devices, furniture, beds, and other products.

To produce a finished part, thermoplastics are pressure or vacuum formed over a mold. This process allows the formed part to be produced with complex geometries, undercuts, and different surface finishes. Fasteners and hardware can be integrated into the part during forming. These factors result in reduced manufacturing, finishing, and overall assembly time.

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Most thermoformed parts are made on a single tool, providing high-quality parts with tight tolerances. This tolerance control leads to an enhanced fit and finish of the final part or assembly, including snap-fit capabilities.

Thermoplastics offer increased design freedom through:

- Superior design aesthetics
- Choice of colours, textures, and finishes
- Ability to form complex geometries
- Integration of functions into one part
- No finishing or painting

Thermoplastics are recyclable and contain no VOCs, making them an environmentally sound solution that supports end-of-life recyclability and life-cycle design. The thermoforming manufacturing processes do not outgas VOCs or create any hazardous waste requiring disposal.

Available in a wide range of standard colours and finishes, thermoplastics can be custom matched to nearly any colour. Since the colour of the material is consistent throughout its thickness, scratches and marks are virtually unnoticeable.

Consider thermoplastics for:

- Production runs ranging from 10 to 1,500 units
- Short component part lead time
- Larger parts that would otherwise require assembly
- Improved durability requirements

SEKISUI SPI

SEKISUI SPI offers a range of thermoplastic materials manufactured in nearly any colour to match your design and application. Our designLab® and FSTLab™ are available to help you enhance your designs, ensuring they meet regulatory compliance and safety standards.

For more information on how to convert your design to thermoplastics using our appLab™, or to learn more about SEKISUI SPI and our line of KYDEX® and ALLEN® Thermoplastics, contact your local representative or visit us at **www.sekisui-spi.com**.

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