CUSTOM INJECTION MOLDED SHIPPING TRAY FOR ENGINE SPROCKET ASSEMBLIES MAXIMIZES PART FRIENDLINESS

Trays that are injection molded from thermoplastic polypropylene have functional features that are not possible with vacuum-formed or structural foam designs.

Component shipping trays continue to be a very important element in the manufacturing process for automotive and light truck manufacturers. Just-in-time inventory strategy, combined with a supplier base that is more global, brings into the process additional transportation factors that ultimately could become quality issues. Such things as secure part containment, part protection from damage and contamination, and the durability of the trays or dunnage are factors that have to be considered. Some of the leading Tier I and Tier II suppliers are now using dunnage or trays that are thermoplastic injection molded, where the ability to design specific functionality and flexibility into the material handling device is adding value.

Molded Materials Inc. is one material handling designer and manufacturer that is providing injection molded dunnage and tray solutions for shipping, processing and assembly operations. Recently, they worked closely with INA Corporation at their facility in Fort Mills, South Carolina to design and develop a series of special trays for shipping engine components to an OEM assembly plant in Canada.

Greg Lee, logistics manager for the Fort Mills facility, says, “The requirements for effectively shipping parts or assemblies to customers are as varied as the part configurations themselves. One of our interesting new tray designs is one for sprocket assemblies. For this tray, our major concern was potential part contamination from the tray material. For that reason alone, structural foam designs were eliminated. In addition, our desire was to have trays with maximum part density, which ultimately eliminated vacuum-formed designs because of inherent process limitations. The solution was to develop a cost-effective injection molded thermoplastic polypropylene tray design that was contamination free, provided excellent durability and dimensionally stability and had good nesting properties.”

Lee adds, “Typically trays that nest gears or sprockets are molded or formed with urethane inserts that actually secure the parts. These inserts are hard and provide damage protection for the part as well as prevent possible contamination from the teeth digging into a softer type of tray material. Understandably, trays with urethane inserts are costlier. For our application Molded Materials was able to design an injection-molded tray that is 100% polypropylene, passed all the required shake tests, and without the need for urethane inserts, reduced the potential tray cost by one half. (see Fig. 1) In addition, Molded Materials designed the injection molds with interchangeable mold inserts that allow trays with different

internal dimensions to be molded with the same basic mold, greatly reducing future tooling costs for different part sizes."

Mark Marra, Molded Materials' application engineer for the sprocket tray, says, "When we're able to work with the customer right from the beginning of a component program, as we did with INA, we are able to add more value in terms of design, materials and reduced tooling costs. Inherent in the injection molding process is the ability to design accurate detail into the mold that provides exactly the kind of part positioning, security and density required. Special pockets, cut-outs, ridges, tabs, and rails can be produced with material thickness and rigidity not possible with vacuum-formed or structural foam designs. In addition, injection molded trays can typically be designed to hold up to 30% more components in a tray than a vacuum-formed or structural foam design."

Figure 1

Mara explains, "The sprocket assembly trays are designed to be manually handled (see Fig. 1). They are 36-inches long and 15-inches wide with built-in handles. Tray height is 2.57-inches with raised interlocking tabs on each corner and recesses on the underside to interlock with trays top and bottom. Wall thickness of the polypropylene is .156-inches. Seventeen assemblies can be loaded in each tray. The five equally spaced protruding screws on one side of the sprocket assembly fit into molded pockets in the tray to position the part. Hexagonal-shaped 1.2-inch high rails separate the parts from touching each other. The tops of

Figure 2: Light truck engine sprocket assemblies are safely transported from INA to the OEM customer in injection molded trays that are designed and manufactured by Molded Materials Inc.

the trays are designed with a series of holes and slots that accept matching male components molded into the bottom of the tray that secure the trays tightly together sealing them from outside contamination and effectively holding the components in place."

Marra adds, "Each of the trays holds 17 parts, and there are fourteen layers of trays that can be stacked on a standard 32 x 38-inch pallet, for a total of 476 parts. (see Fig. 2) With this tray design concept, an empty tray is used on the top of the stack to seal the top layer. This eliminates the need for any protective VCI paper that is typically used in an effort to inhibit rust."

Lee concludes, "We have found that the best and most cost-effective tray designs are realized when they are engineered right from the beginning of a program. That's when we can build in all the necessary functionality and durability, provide for continuous improvement, and keep the cost within targeted budget guidelines."