PISTONS WITH DELICATE RING ASSEMBLIES USE SPECIALLY-DESIGNED INJECTION MOLDED SHIPPING TRAYS

Automotive manufacturers and suppliers are finding that specially designed thermoplastic injection molded dunnage and shipping trays can provide unique value-added benefits that are not possible with vacuum-formed designs.

When just-in-time inventory became a significant production strategy for automotive and truck manufacturers, the value placed on dunnage and shipping trays changed. Finished parts and assemblies are always on the move and need to be protected from damage and contamination. Equally important, the dunnage and/or tray is typically "returnable" and has to be durable and dimensionally stable, and in some instances must have the ability to be accurately positioned or located for use with automated loading and unloading systems. Each application is both part and functionally specific. The ultimate success will be determined by an engineered design that meets the required criteria, at a reasonable cost.

Molded Materials Inc. is a designer and manufacturer of engineered material handling solutions for shipping, processing and assembly operations. They work closely with both the automotive manufacturer and the component supplier to solve problems related to shipping parts in dunnage or trays.

Mark Marra, application engineer for Molded Materials, points out, "We are being asked, more frequently, to assist suppliers in engineering solutions for shipping unique part assemblies. Assemblies that, for one reason or another, have never been shipped as an assembly before. A recent example is a Molded Materials polypropylene shipping tray for aluminum diesel engine pistons with the rings assembled to them. Piston rings are a precision ground component that cannot properly function if they are nicked or scratched. Having the ability to ship pistons with the assembled rings, properly protected from damage, provide a tremendous savings to the engine manufacturer by eliminating the ring assembly operation at the engine assembly plant. Molded Materials designed and engineered a unique solution." (see Fig. 1)

Jim Lamb, Molded Materials' manager of engineering says, "When we were asked by the piston supplier to provide a solution, we found that the customer was only familiar with vacuum-formed types of dunnage and trays. This is not uncommon today, because injection molded designs tend to be more costly, and suppliers typically look to the lowest cost method, and that is usually a vacuum-formed design. However, vacuum-formed designs usually have dimensional stability and durability limitations. This was not an option in this application."

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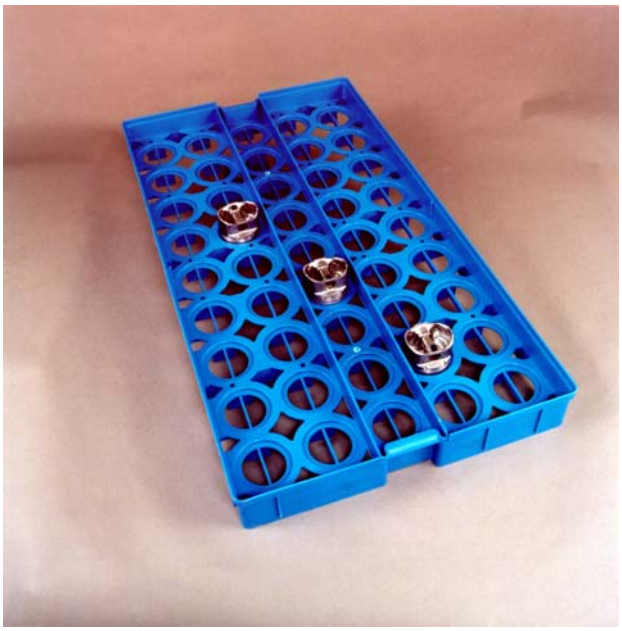

Figure 1: Pistons with assembled rings are shown with the returnable injection molded trays that were designed by Molded Materials Inc.

Lamb adds, " The injection molded shipping tray design that Molded Materials ultimately produced is durable, easy-to-handle and quite unique. The piston assemblies are currently loaded and unloaded manually, so built-in handles are designed into the tray. Location and alignment bosses and tabs have been designed into the underside of the tray to allow for future use of automated/robot loading and unloading. In addition, the bottom shape of the tray has been designed to have locating positions that are identical to those on the top. Molded tabs from the top tray fit around the pistons to securely hold them in place when the trays are stacked.

The tray is molded from a thermoplastic polypropylene. It measures a little over 24-inches wide by 45-inches long and 4-inches high. When stacked, the trays provide little or no open areas for possible contamination as well as an ample surface area for identification tags. The tray weighs 11.1-lbs empty and 65.1-lbs when fully loaded with pistons. It has a material thickness of 5/32-inch.

Lamb continues, "The tray holds 45 pistons and is designed to stack nine trays high with a protective lid for the top tray. A total of 450 piston/ring assemblies are held in each pallet with a total pallet height of 34.121-inches. Each tray features finely detailed shallow nesting pockets, positioned in the middle of the tray height. The pockets trap the top end of the pistons, not touching the rings, but securely holding the assembly in place. Because the pistons are located midway in the tray height, the weight of the pistons is suspended, so the weight of the pistons are never resting on themselves. "

Tom Elkington, vice president of operations, Molded Materials, Inc. points out, "Today, automotive component suppliers are being required to supply the returnable trays and dunnage for their products. The costs for these material handling devices have to be included as part of the total product cost for the supplier. In most cases, these trays or dunnage are specially designed for each individual type of component. The term 'generic' does not apply here. As a result, some component suppliers have a tendency to be very conservative with the costs associated with these types of material handling devices and don't perform all the due diligence required to anticipate some types of problems. 'Target Pricing'

strategy has become the driving force for suppliers to the U.S. automotive industry. However, suppliers that do recognize the potential material handling problems, find the payoff in trouble-free shipping and consistent part quality pays for any margin erosion from added tray or dunnage costs. In most cases, the best material handling solution is engineered, and that usually means the application of some kind of injection molded thermoplastic design."