

## **SPECIAL INJECTION MOLDED RETURNABLE DUNNAGE TRAYS FOR V-8 2-VALVE AND 3-VALVE ENGINE CYLINDER HEADS FEATURE HIGH LOAD CARRYING CAPABILITY**

*Injection molded polypropylene plastic trays for machined cylinder heads that are extremely durable, dimensionally accurate and stable are helping one OEM automaker successfully meet the high quality and production requirements for engine assembly.*

Improvements in manufacturing processing are critical to improving quality and increasing productivity in automotive engine assembly. However, many times, what seems like a simple process improvement change, one that ultimately affects the dimensional configuration of a component, can have a major impact on the way that component must be handled and transported throughout the process.

Molded Materials Inc., a leading designer and manufacturer of injection molded dunnage and trays, frequently encounters this type of

situation. For example, one OEM automotive manufacturer changed the processing of their V-8 engine cylinder heads so all the manifold studs were assembled in place, prior to shipping to final assembly. This process improvement greatly reduced the chance of improper stud assembly later on in the process. However, the manifold studs protrude out approximately 1-1/2 inches from the manifold face, creating the

need for transportation dunnage trays with a design that maximizes interior space, very accurately locates the individual cylinder heads,

while protecting the critical sealing surfaces on the bottom and sides of the parts. The dunnage is a split tray design that has the versatility to handle V-8 designs with load carrying capability to provide stacking of four layers of parts, with four heads per tray, two trays per layer and eight cylinder heads per layer. The total weight of a stack of trays is 1620 or 1940 lbs., depending upon head type.

Mark Marra, Molded Materials' application engineer for the tray, says, "This tray concept is a lot more complicated than it looks. We first color-coded the dunnage to distinguish right and left hand cylinder heads. Blue is left hand and black is right hand. Each tray is 56.5-inches long, 23.75-inches wide



Fig. 1 Molded Materials solution to a complex issue with a need for maximum interior space and the versatility to handle different size components.

and 12.625 inches high. Both types of trays fit on a modified 5 x 48 x 57-inch pallet equipped with Data Logic R/F tags. Four seat belts are used to hold the lids in place. Total stack height with lid is 49-inches.”

Marra explains, “ The trays are injection molded polypropylene and designed to have the heads rest on a series of TPU (thermoplastic urethane) rest pads that are exchangeable for 2-valve or 3-valve designs. TPU materials meet the necessary protection and wear characteristics for parts with sharp edges. Features for the tray pack include pockets molded into the trays for part identification cards.”

Marra finally notes, “The critical position tolerances for this tray design require that the heads in the top or fourth layer must be within .190-inches from target. As a result, the injection mold design used to produce the trays must provide maximum part density, the necessary material thickness to meet the load carrying requirements as well as accurate part positioning and part security. This tray design provides all those requirements, and the proof is that more than 10,000 of them today are helping in the assembly of over a million engines a year.”

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