Pharmacia & Upjohn

Switches In-Process Storage Trays To Reduce Costs And Maintain Product Quality

The MFG trays used by Pharmacia & Upjohn need to integrate with six different tray loading machines and four different unloading systems. Removing the gate opens the fourth side of the tray, allowing for automated tray loaders to move vials into the tray and enabling manual tray loaders and unloaders to simply slide the vials into the tray without lifting.

Pharmacia & Upjohn, one of the world's leading pharmaceutical companies, is under constant pressure to reduce costs while maximizing product quality. While Pharmacia & Upjohn traditionally used only stainless steel or Teflon-coated aluminum trays for the in-process storage of parenteral products, the company recently became interested in the advantages they could achieve by switching to plastic trays. They turned to Molded Fiber Glass Tray Company (MFG) and began using reinforced thermoset composite trays for several different applications in the parenteral drug production and packaging area of the Kalamazoo, Michigan facility.

"I am always on the lookout for ways to use our dollars more effectively. When I found that the cost of a plastic tray is only one fifth the cost of a coated aluminum tray, I had to take a closer look," noted Paul Gold, Production Engineer at Pharmacia & Upjohn. "While cost is always an element in every decision, I was searching for a tray that would meet all our needs. I sat down with MFG and gave them our wish list."

Pharmacia & Upjohn wanted an inexpensive tray that could be safely disposed of should contamination occur. They needed the tray to be dimensionally consistent so it could integrate seamlessly with the equipment in use on the existing production lines. The tray design had to be easy for operators to grip and lift, secure to stack, leakproof, and the tray material had to have a slippery surface so vials could easily slide on and off the tray. Lastly, Pharmacia & Upjohn needed the trays quickly and required responsive service from MFG.

"Our first project with MFG involved trays to handle a new oncolytic drug that had some unique characteristics," Gold said. "The drug is exceptionally difficult to clean if it gets away from us and we needed a better means to contain these types of products. Part of any good containment system includes a plan for failure."

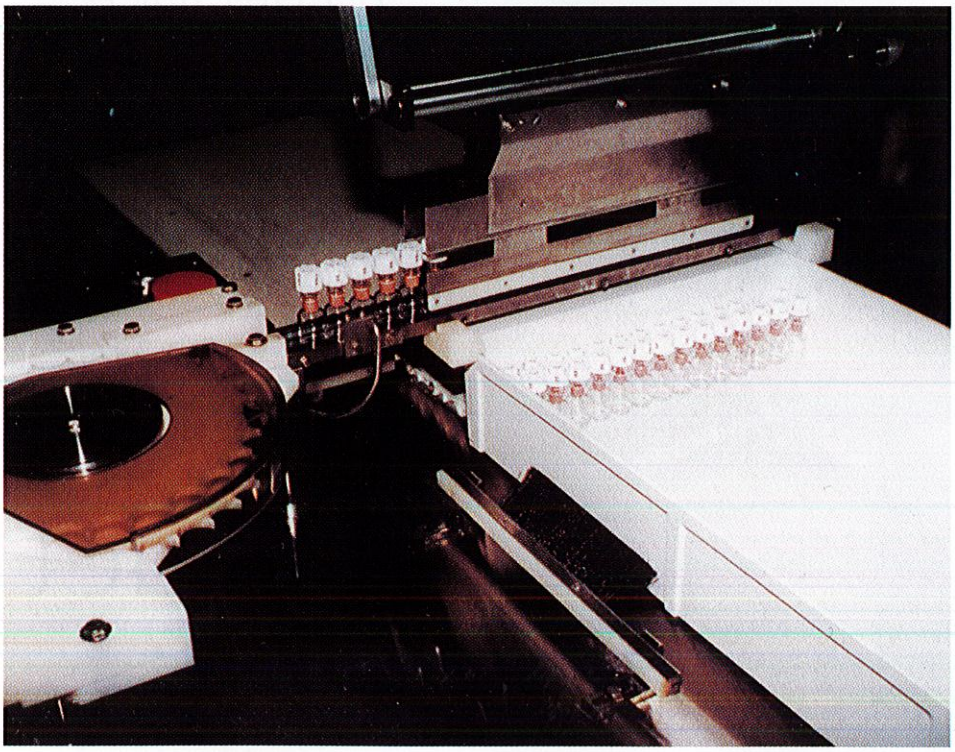
Traditionally, if a metal tray becomes contaminated by a drug that cannot be deactivated, the company would face a difficult and labor intensive task to assure complete removal of the drug, and then need to deal with disposing of the washwater. "The traditional approach to containment is the most common answer in the industry, but it's not necessarily a good answer," Gold commented. "Since the MFG trays can be easily incinerated, we now have a containment method that allows us a safe and effective way to dispose of trays which might become contaminated."

Pharmacia & Upjohn needed only a few hundred trays to contain their new oncolytic drug and searched for a standard, off-the-shelf tray that would minimize costs and delivery time. With over 250 standard trays to choose from, MFG helped Pharmacia & Upjohn select the one best suited for their application. "MFG was exceptionally responsive, even with this small order. We shared our ideas back-and-forth and, in a couple of weeks, we received a supply of trays that do the job well."

With the success of this first MFG project, Pharmacia & Upjohn began looking for other appropriate applications of reinforced thermoset composite trays. "For years, I have had the idea in the back of my mind that we could switch from metal to plastic trays as part of a sterile plant-wide application used for all products," Gold said. "I knew we would achieve significant cost savings if we switched to plastic trays and I suspected we could benefit in other ways too."

Like many other pharmaceutical manufacturers, Pharmacia & Upjohn is organized by dosage forms, with portions of the plant dedicated to parenteral drug production and packaging. These drugs typically come from the filling line and are accumulated into trays to await subsequent processing and testing. Once inspected, the trays of vials are transported to final packaging where the product is fed into the line that typically includes a labeler and cartoner. A 3-sided stacking tray with a gate, made of Teflon-coated aluminum has traditionally been used by Pharmacia & Upjohn to accumulate these products.

"We operate with a large quantity of trays in the sterile plant. These trays accu-



While Pharmacia & Upjohn traditionally used only stainless steel or Teflon-coated aluminum trays for the in-process storage of parenteral products, the company recently became interested in the advantages they could achieve by switching to reinforced thermoset composite trays from MFG. The cost of the trays from MFG are one fifth the cost of the coated aluminum trays that Pharmacia & Upjohn historically purchased.

mulate our work-in-process and can be used to hold batches of product for some non-production applications," Gold explained. Each tray holds from 66 to 777 vials, depending on the vial size. "Every few years, we need to buy additional trays to support our steadily expanding business and to replace damaged trays. Every few years, we paid someone to custom build metal trays by hand, at exorbitant prices."

When Pharmacia & Upjohn started looking at 3-sided stacking trays with removable gates made of reinforced thermoset composite for this application, the main driver was cost. "The cost of trays from MFG was one fifth the cost of the metal trays that we have traditionally purchased," Gold stated. "For the money allocated to buy 1000 aluminum trays, we bought 5000 trays from MFG. That additional inventory dramatically eased the capacity crunch in our plant."

The trays used by Pharmacia & Upjohn need to integrate with six different tray loading machines and four different unloading systems. Although these technologies are supplied by a number of different vendors, they all accept an identical tray because Pharmacia & Upjohn had the equipment customized to integrate with their existing metal trays.

The MFG trays include a captive gate on the open end of the tray. Compared to the gate system on Pharmacia & Upjohn's metal trays, the MFG gates drop smoothly into place and don't pop out. The robust gate on the MFG trays minimize product loss from inadvertent spills.

"The new trays had to fit into our processing equipment which all have exacting tolerances," Gold said. "Although MFG offers a wide assortment of standard trays, our requirements were so precise, we needed a custom tray. MFG was willing to custom build a mold for us at a reasonable cost."

At first, the nature of the molded material led to some changes in design compared to the standard metal trays. Then, the production personnel at Pharmacia & Upjohn and the MFG engineering team got involved and began making some significant improvements to the tray design, beyond what was needed to accommodate the new material. The result is a tray that offers a more robust gate that minimizes product loss from inadvertent spills, and a finger grip that makes the job of lifting the trays more ergonomically correct. The new tray also offers improved stackability that improves load stability during warehousing and in-plant transportation.

"The design of the trays is not trivial by a long shot. There are a dozen engineering details that could have caused the project to fail," Gold stated. "The success of this project is the result of MFG's creativity and cooperation, getting the right people involved at Pharmacia & Upjohn, and the partnership that developed between the two companies. These trays have been in use here for a year without any significant problems."

The MFG trays designed for Pharmacia & Upjohn include a captive gate on the open end of the tray. "The gate is the magic part of the tray; it's what makes the tray work," Gold noted. Removing the gate opens the fourth side of the tray, allowing the automated tray loaders to move vials into the tray. The open gate, along with a tapered front bottom lip, enables manual tray loaders to simply slide vials into the tray without lifting. The open tray also eases unloading since operators can slide vials into the infeed of the packaging line in just a few seconds. The smooth, slippery surface of the trays also facilitates the easy loading and unloading of containers, since the vials slide easily on the trays.

"The gate system on our metal trays can occasionally fail, resulting in spilled

Pharmacia & Upjohn turned to MFG for inexpensive trays that could be safely disposed of should contamination occur. The trays are dimensionally consistent and integrate seamlessly with the equipment on the production lines. The tray design is easy for operators to lift and offers secure stackability. The tray material offers a slippery surface so vials can easily slide on and off the trays.

product, and that's a direct loss to our bottom line," Gold said. "With the MFG trays, the gate drops smoothly into place and doesn't pop out. Getting the gate to stay within the perimeter of the tray was a major coup of the new tray design. It's an exceptional detail."

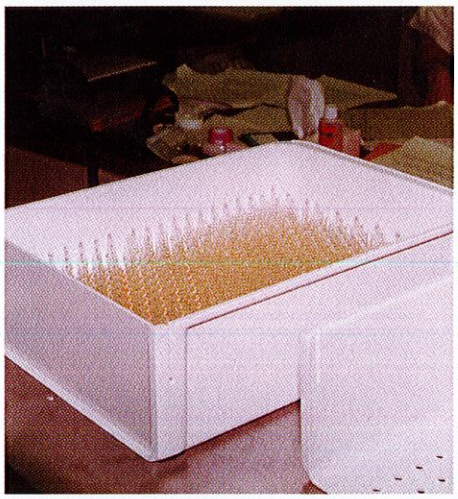
Another improvement with the new MFG tray is a finger lift and smooth edges that allow operators to easily grip and securely hold the tray. The traditional metal tray offers only a 1/8 inch lip to grip and hold, and the edge of that lip can be a bit sharp, making the lifting of trays a challenge. "The MFG tray gives us a more secure grip for lifting. This offers a dramatic ergonomic improvement to our operators and results in fewer dropped trays and less product loss," Gold explained. The reinforced thermoset composite trays from MFG also offer excellent dimensional stability and big load carrying capacity without creep or distortion. Pharmacia & Upjohn loads the trays well below their capacity.

Pharmacia & Upjohn recognizes that it's important to securely grip and lift the trays of product to move them between the packaging line and the pallet, and it's critical to securely stack the trays as well. "The MFG trays nest more reliably than the metal trays do, and that gives us better stacking strength and load stability," Gold said. "We move loaded pallets of trays through the plant on a forklift and the stackability of the MFG trays helps minimize load shifting."

The MFG trays move through the same process at Pharmacia & Upjohn as the metal trays. The reinforced thermoset composite trays withstand temperatures ranging from -60°F to +250°F and can handle even +300°F intermittently.

The cleaning regimen that Pharmacia & Upjohn uses is identical whether they are handling metal trays or MFG trays. "The MFG trays are compatible with our tray washer, which subjects the trays to very hot wash water," Gold said. "Before we had much experience with the new trays, we were concerned about the tendency of the polymer to contain static and attract dust, but this hasn't been an issue."

MFG can mold trays with different characteristics, able to withstand irradiation and autoclaving, as well as other processes. The material can also be molded in several pastel colors for product identification or other operational advantages. Pharmacia & Upjohn selected a light-colored tray that makes product spills easier to see. They chose a contrasting color for the gate, since the dark gate against the light tray helps operators quickly orient the tray correctly to the machinery.



The MFG trays designed for Pharmacia & Upjohn include a finger grip that makes the job of lifting the trays more ergonomically correct. "The MFG trays nest more reliably than the metal trays do, and that give use better stacking strength and load stability," noted Paul Gold

"In the past, all trays have had to be custom made to integrate with existing machinery. Then, when new machinery was designed, the infeed or discharge had to be customized to accommodate the existing tray in use at the company," Gold explained. "No two firms use identical traying equipment. The reason is that there has never been a commercially available tray that meets the generic industry needs for container handling... until today. For sterile injectable vials, there is no reason that I know of why we could not all use the same MFG tray. That might allow the equipment manufacturers to standardize their equipment. The cost savings across the industry could be very large."

Pharmacia & Upjohn began using MFG trays for parenteral products plant-wide in November 1997. "We did a follow-up after six months of use," Gold said. "Everybody who was using the new MFG trays gave the trays very good reviews. The reinforced thermoset composite holds up well. The wear-studies have proven out, the surface is resistant to damage and the sliding of vials on the surface of the tray is not a problem."

With two successful uses of MFG trays at Pharmacia & Upjohn, the company uncovered a third, custom application. Four-sided metal trays with a perforated bottom had been used to dye test filled ampules. Tray loading and unloading was a slow and cumbersome task because each ampule had to be lifted over the tray side.

"The rigidity and dimensional stability of the MFG trays got us thinking about this perforated application," Gold noted. "With the reinforced thermoset composite, we were able to eliminate that fourth side and replace it with a removable gate, without functionally weakening the tray." Pharmacia & Upjohn looked for a standard MFG tray in their extensive catalog and found a tray with suitable dimensions. MFG then customized that standard tray by replacing the fourth side with a gate, and punching holes in the bottom to accommodate the process.

"MFG took a low-cost tray off the shelf, modified it, and gave us what we needed very quickly and at a very good cost," Gold said. "MFG is a very forward-looking company with a can-do attitude."

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