

Demanding stamping

Stamping class-A automotive outer-body panels presents unique challenges

By [Russ Olexa](#)

Stamped components can end up at a customer's facility with slight imperfections on surfaces, which is often acceptable. However, for automotive class-A outer-body panels, this is not tolerable. These stampings are some of the most demanding, and most stampers avoid them like the plague because of the numerous manufacturing problems they present.

However, at Ogihara America Corp., this type of stamping is the company's main business in the United States. Although Ogihara finds it a challenge, it has ways to do it. The secret is using the latest equipment technologies, lean manufacturing and a successful personnel mix.

Automotive class-A outer-body panels are some of the toughest stampings to produce for metal formers because surfaces have to be flawless. Surface imperfections are what the consumer sees and what paint can easily exaggerate. So there can be a high scrap rate and exorbitant costs if the stamping process gets out of control. Therefore, a stamper like Ogihara must precisely control every step of the process to make sure scrap, if any, is within limits.

Ogihara America Corp., a subsidiary of the Ogihara Group in Japan, began stamping and sub-assembly of body panels in the United States in 1987. Ogihara Group is a tool and die company that has been producing tooling for the automotive industry since 1951. Today, Ogihara America is a Tier One supplier respected for its product quality of class-A and related body panels. Ogihara Group has fourteen plants, including one in Alabama, and offices around the world.

To build its products, the company uses clay feasibility product design, surface analysis, feasibility of structure, CAE, form analysis draw simulation and prototype tool design while developing the entire manufacturing process. Since class-A body panels can be tough to ship, because any type of surface damage will scrap them, Ogihara will even design and produce shipping racks.

Class-A parts challenge

Mike Zimmerman, Ogihara manufacturing director says, "One of the challenges of making class-A parts is getting the panel to stretch properly. You need a lot of stretch in it to avoid dings and dents. Cleanliness is also critical. You have to keep the panel dirt free.

"Another challenge is working very closely up front with the customer at the design stage, when they're developing the design and clay modeling to make sure the part doesn't have a lot of inherent defects that would cause a poor-quality panel surface," he says. "These defects can come from where the metal overlaps, where it folds for seams and at different radii in the part. So it's very important to work closely with these issues to make sure they are incorporated into the die and product design."

To get the die design and stamping process right, Ogihara uses stamping simulations along with information from detailed simulations done by its customers. But on top of stamping a class-A panel surface, Ogihara is oftentimes doing deep draws on these parts. On some non-class-A parts like door inner panels, the company does draws reaching anywhere from 6 in. to 8 in.

For these deep draws, Troy Burley, executive manager of manufacturing, remarks, "We do have special material for these types of deep draws. We use the deep-draw-quality or interstitial-free material to run them. The 8-in. draw inner panel is actually one of the only panels that we have that the blank is specified for the tolerance of the mechanical-property range to be able to produce it."

Ogihara uses both coated and uncoated materials for the exterior blanks. Coated materials can cause problems because the coating will pull off during the draw. Then it will build up on the tooling eventually causing problems. "That's when we have to clean the tools on a regular basis to keep the coating off the panel surface to make sure it's clean," says Burley.

Lubricating the blank is another important step in stamping class-A parts. Ogihara uses a water-soluble blank wash solution called chempet. Blanks are also washed before they go into the die. But if they need any type of lubrication for drawing, it is sprayed on as part of the stamping cycle. Staying with only one blank wash or lubrication product is critical notes Zimmerman, because any changes can affect downstream operations, such as painting, at the customer's plant.

Dies used for internal programs are almost all produced by Ogihara's Japanese parent company in Ota City, Japan. However, often the company will work with the automotive OEMs to either help produce stampings for a hot model when the OEM needs extra capacity or when they have emergency situations such as a press failure. These dies are often made by the OEM or another vendor and usually take longer for a die change than the 10 min. to 20 min. that Ogihara usually does it in. Burley says that they always help out their customers, but this type of stamping can play havoc with the company's lean manufacturing initiatives that rely on precise part scheduling.

He adds, "Our strength is that we've inherited the die working skills from our parent company. We take a lot of off loads from the OEMs at times, or we have to bring in their dies and prove out their product here. Often we work on their dies and then send them back to the OEMs with improvements."

Making it lean

Ogihara believes in lean manufacturing initiatives, especially since it averages up to 600 die changes per month. To do this, the company uses rolling bolsters, automated hydraulic clamping systems and adjustable die heights. Dies are also pre-staged on only one side of the press for quick movement, and the die setup team is extensively trained.

To do stampings in Michigan, Ogihara has three tandem press lines with a maximum tonnage of 1,600, 2,300, and 2,300 and maximum bolster sizes of 157.5 in. by 90.6 in., 180 in. by 100 in. and 180 in. by 100 in. respectively. It also has two transfer press lines with a maximum tonnage of 2,700 and 1,500.

With the amount of production they do, Ogihara has 1,100 in-house die sets always ready to go. In fact, once a die set is taken out of the press, it's checked over for any damage, cleaned, stored and tracked for the next job.

Zimmerman adds, "Another one of the things that we really focus on as a lean initiative is the plant layout. We really put a lot of stress on material movement, or any type of wasted movement. Also, scrap is important to us--how we're handling it, recovering it or not creating it. For instance, in assembly we ultrasonically test parts instead of doing destructive testing. So we don't have to scrap the part. We do a lot of initiatives with lean TPM activities and also Kaizan events, depending on what's needed for production. We'll go after our top five problem areas by doing Kaizan events on them."

Material challenges

Customer-driven high-strength steels and tailor-welded blanks are another challenge for Ogihara. Burley remarks, "We've had our issues with springback, splits and formability. But new software technology by Autoform Incremental allows us to do drawing simulations before we build the dies. It's helped out tremendously on getting the tooling production ready."

He adds, "High-strength steel gives the auto OEMs lower weight for the same psi. It's also geared toward less processing. The OEM can now make one part out of high-strength steel instead of sandwiching two parts together as done previously. An A-pillar is a good example of that. Instead of two or three parts sandwiched together for the same structural rigidity, they can make one part now. So not only does it save weight, it saves money in the overall processing cost. They de-content some of the car, which makes it less expensive of course."

To build dies for this high-strength steel, Burley says the company designs the dies to the product's specification and what's agreed upon with the OEM. "Then we do simulations, and with what we've learned with the high-strength material and the database we have now, manufacturing goes pretty smoothly," he says. "We take all the lessons learned in producing the new product, feed it back into our database, make

the ad-justments, and then every time we do a new product, we keep learning from it. We do lessons learned on most of the activities we do."

Servicing clients

Another way Ogihara has serviced its clients and expanded is by manufacturing final stamped part assemblies and fabrications. Over the past years though, Zimmerman says that the OEMs want the company to make the initial investment in equipment such as robots, welding systems and specialty machines to make assemblies rather than the OEMs buying it. If the parts run over the length of time stated in a contract, they can amortize their investment in the equipment. But with models changing more frequently and downturns in the automotive sector, often the equipment won't pay for itself because the part volume isn't there. So assembly work using specialized high-volume equipment can be risky.

Zimmerman remarks, "What happens is we have to assume much more of the risk for new OEM programs. We see more vehicles go down in volume production and an increase in the amount of vehicles that are out there because everyone wants a different vehicle. So instead of one run of 500,000, it's ten runs of 50,000, ten different vehicles. So they're spreading the risk out with that."

Given this scenario, tooling has to be more flexible for these variations. The industry has moved toward flexible manufacturing assembly cells. Zimmerman notes, "The new cells are built on bases so the entire operation can be picked up and moved to another area of the facility. It can be quite easily reconfigured by just changing the tooling plate, robot or specialty-machine programmed to do multiple parts. So you could re-use that piece of equipment, or most of the equipment for other part assemblies."

Once parts and assemblies are made, movement is extremely important to avoid any surface damage to the class-A exterior parts. Burley says the company has custom-made dunnage and racks for in-process part movement to avoid any damage.

"We help our customers with the rack design and any dunnage," he says. "Either they'll dictate the design, or we can do the design for them as a service. So we are very involved in making sure the shipping dunnage prevents any type of damage. In fact, we, along with a lot of our customers, are looking at more automated robotics and vision systems for rack loading and unloading."

Burley adds that this isn't driven by humans damaging a part but more from the part cycle time, keeping up with the overall demand/pull production Takt time.

"It's less expensive over a period of time with the robotic application than it is with labor, because of all the components that go into labor such as medical and other benefits," he says. "So it goes into the cost model. Whatever is the best cost model for that volume or projected volume of production we use."

Quality is another extremely important function at Ogihara. Along with standard coordinate measuring machines, the company uses a white-lighter Optigo optic system that can check thousands of points of a part within seconds using a point cloud and comparing it to a CAD file.

Zimmerman says, "Eventually we'd like to check our die work, the die simulation and all the die cavities using this system, feed that information back to our parent company and then make improvements based on the information. We'd also like to incorporate this system as an automatic part check on the line as we make it, at the stage just before it's auto-racked."

"One of the issues with auto-racking that all suppliers face, along with the OEMs, is how are you verifying the quality of that part before it goes into a rack? Most of that is done with the human element to verify the part quality. That's critical for us. We want our employees to spend as much time as they can verifying part quality, not just producing the part." **FFJ**