

Diversity in Part Production

Pacific Hydraulic Presses Help Hudson Tool and Die Produce Products That Keep Precise Time, Save Lives, and Bring Space Station Personnel Home



Hudson Tool and Die products are unique. These deep-drawn components go into everything from Cesium Atomic clocks to heart pace makers and even in coolant lines for NASA's space-station crew recovery vehicle. Without the flexibility and tonnage control capabilities of hydraulic presses, some of these products would be hard or even impossible to produce.

"Hudson Tool and Die (Ormond Beach, FL) was founded in 1940 by a Czech tool and die maker immigrant," said Vice President Peter DiLella. "He started working on tools and dies for deep drawing in Newark, NJ, which is Hudson County where our name came from. He grew the company, and in the early 1960's he bought 70 acres of land here in Ormond Beach, Florida. Years later he started building a warehouse and distribution facility. As the



business grew through the 1970s, several presses were brought here to manufacture products from New Jersey. In 1986 a holding company called JSJ Corp. (Grand Haven, MI) bought Hudson Tool & Die. Now JSJ Corporation, which is a holding company that owns nine manufacturing companies, owns us. In 1991 a decision was made to close the New Jersey facility and move everything to Florida."

DiLella said the company has four business units within the Hudson facility. "Our main focus is precision diaphragms that are very thin metal stampings made of exotic metals such as stainless steel and titanium. Our customers take these individual diaphragms and weld them on their IDs and ODs to make them into a bellows assembly, which are ultimately used mainly in the computer chip manufacturing industry. It's our biggest end-use customer. There are some other applications for these diaphragms such as cooling lines for NASA's space-station crew recovery vehicle, as well as for drug pumps. One of our customers uses these bellows inside a drug pump that pumps either insulin or pain medication," remarked DiLella. Hudson's second business unit is in automotive parts. They produce mostly stainless steel components for exhaust systems for several large Tier I auto parts manufacturers. For example, every Chrysler PT Cruiser has an exhaust component that came from Hudson Tool & Die. They also make thermostat housings, and air-bag sensor housings. Their third business unit produces implants for medical products, which are made from high grade titanium. These products include defibrillators, pacemakers, drug pumps, bone-growth stimulators, and battery cases that go



inside these other devices. Their fourth business unit, their largest, produces custom products. "Basically anything that doesn't fit into one of our other three business units gets clumped into custom products," said DiLella. "Custom products has about 900 customers a year with widely varied applications and markets. We go from very low-tech applications, such as aluminum candle molds for the candle industry, to a very high-tech product like the beam housing for Hewlett Packard's Cesium atomic clock. Joe Hynes, our product development manager, helped Hewlett Packard design this product. He took their welded tube design and made it into a deep-drawn tube," added DiLella. "We do have standard products offered in a catalogue we've been building since the early days of the company. Currently there are about 25,000 deep-drawn shapes in our catalogue that we are tooled for, and it's broken up into several different categories. We have rounds, squares, rectangles, specials, and some odd shapes and sizes along with mill spec cans," said DiLella. Hudson also takes these standard deep-drawn shapes and adds holes, flanges, or other pieces to them to produce a custom solution. DiLella said that deep drawing has always been a manufacturing niche for the company. "It was something that our founder saw a need for and built the company on that technology. Our name is kind of a misnomer. We're not a tool and die company, we're a deep-draw facility. We do have a large tool and die facility in-house with about 30 tool and die makers, but it's just to support our deep draw internal needs. Currently we have 212 people at this 110,000-sq. ft. facility. We run three shifts in our medical department, with the rest of the business lines having two shifts."

Mechanical vs. Hydraulic

To get the precision they need for many of their products, especially the stamped metal diaphragms used to make bellows, Hudson Tool and Die has been shifting away from mechanical presses to hydraulic ones. A recent purchase was a Pacific Press Technologies (Mt. Carmel, IL) 500-ton OBM-48-48, single-piston hydraulic press with a 24"-stroke 54"-open height,



which is used to make many of these diaphragms and large deep-drawn parts. Another of the company's four Pacific presses is a model PFII 200-ton gap-frame press. The other two Pacific presses are 150-ton PF II models. One of the jobs that Hudson produces in their 500-ton Pacific press is a stainless steel drawn blank that is 0.135" thick and roughly 25" in diameter. It ends up as a deep-drawn can that's roughly 12" in depth formed in two operations. President Farly Fitzpatrick said, "The reason we selected Pacific hydraulic presses over mechanical presses was mainly because the type of work we anticipated doing with it was quite large, relative to what we normally do in mechanical presses. We needed higher tonnage during much of the stroke, much more than what a mechanical press would yield. Normally at 1/4" off the bottom is where the rated tonnage is reached on a mechanical press. Hydraulic presses offer their tonnage at any portion of the stroke, which is what we needed. "Pacific presses historically had a good reputation with us, because we had other Pacific ones in the

shop before buying the 500-ton one. We looked at other manufacturers before buying, but they don't make anything close to what we were looking for," Fitzpatrick said. He added, "We liked the user-friendly touch-screen. That worked out well for us, because we could set up the job parameters, store them, call them up, make modifications to them if we wanted to, and lock out people from modifying the programs unwillingly or willingly. It had the features we needed." Pertaining to their heavier draw work,

Fitzpatrick adds, “We would have had to purchase a much larger mechanical press to get the amount of energy that a hydraulic delivers when drawing above the bottom of the stroke. Mechanical presses offer link driven systems now, and some have different eccentric drives that help generate tonnage higher in the stroke’s position. But we feel hydraulics offer us a better solution, because they have full tonnage throughout their entire stroke. And that versatility is the greatest thing about them.” Hydraulic presses also offer Hudson a smaller footprint. Fitzpatrick said this helps out tremendously. “Again, comparatively a mechanical press in the higher tonnage needed to do what we needed it to would have taken up a much larger footprint — much larger. The Pacific press has a relatively small, compact footprint and generates 500 tons. In the future, we’re going to be switching over to more hydraulic presses simply because of their versatility over mechanical presses. Our Pacific 500-ton press also solved a lot of issues with larger deep-drawn cans like press cycle control. We’re also seeing that hydraulic presses’ strokes per minute are starting to rival mechanical presses. They run fairly quick for what we need. I would recommend Pacific hydraulic presses to any company.”

One of their parts made in the 500-ton hydraulic press is an 18”-diameter diaphragm. Process Engineer Maura Ebert said one of their parts made in the 500-ton hydraulic press is an 18”-diameter diaphragm that looks much like a large washer. This is eventually welded together with others to make a bellows. “The diaphragm is stamped using a metal to urethane die process. We have a tool-steel upper die, and it’s pressing against a stainless steel sheet on top of a urethane bottom die that is contained in a round collar to hold the urethane’s round shape. The upper tool-steel die has the part form along with bridge gaps around the OD and ID. These bridge gaps are 1/8” triangular clearance areas that allow the urethane to expand into them under pressure. Given enough tonnage, the urethane will press up into the bridge gaps on the outside of the cutting surface and snap the stainless steel material. If you have very thick material, and you have a large diameter, it’s not going to snap unless you have a significant amount of tonnage, and this is best done with a hydraulic press, because you have more control over the cycle.” This type of die is less costly than a conventional male/female die set said Ebert. Joe Hynes also mentioned that hydraulic presses offer greater control of the press cycle that is so important for deep-drawn products. If a press cycle is too fast with tonnage only available at or near the bottom as with a mechanical press, it can severally damage the drawn part. Or the part might not be able to be produced at all. A hydraulic press can be programmed to run its cycle at any ram position within its stroke, and this can easily be accomplished using the press controller.



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