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By **Tim Heston**,  
Contributing Editor

**T**his summer, fire displaced several staff members at Qualtek Manufacturing, a Colorado Springs, Colo., stamper nestled safely in a valley east of the fire line. It didn't immediately threaten the building, but workers having lunch outside could see the smoke.

The wildfire was an apt metaphor for Qualtek's history. The company has reinvented itself over the years, innovating and staying safely ahead of this industry's "fire line"—that is, global competition. Like many shops, Qualtek participated in the electronics boom of the 1990s before all of that work went to Asia. The 60-employee company has since picked up work from the medical and aerospace sectors, as well as alternative-energy markets like wind and solar. Stainless steel grades such as 304 and 316 make up the lion's share of work in the pressroom.

A dozen years ago Qualtek came under new ownership, and since then the stamper has staked a clear business strategy: differentiate. The company serves a diverse customer base and isn't beholden to just a few giant customers or industry sectors—a hard lesson learned after significant amount of electronics chassis work went offshore.

The firm also has differentiated itself with its processing technologies. The stamper offers a mix of

technologies few competitors in the region offer: wire electrical discharge machining (EDM), full finishing services, heat treating, and, not least, some advanced stamping capabilities.

#### **TOOLING FOR SERVO**

When Qualtek purchased its 150-ton servomotor-driven mechanical presses from AIDA, one in 2009 and another in 2011, the technology wasn't brand-new, but it had yet to penetrate the stamping market on a broad scale (see **Figures 1** and **2**). This remains true today, according to the 2012 *Capital Spending Forecast* from the Fabricators & Manufactur-

ers Association. A statistical sample of U.S. stampers said they planned to spend a little more than \$8.3 million on servo presses. That's a small fraction of the spending planned for more traditional presses. The study's respondents said they planned to spend \$38.5 million on hydraulic and \$66 million on traditional mechanical presses.

As sources pointed out, the company has yet to find a tool and die shop with extensive servo press experience. "It's a challenge to find tooling shops that really know what a servo press can do," said Bruce Hupfer, Qualtek's director of technical sales.

#### **CONTROL OF LEAD-TIME**

Doctors work in bright environments, and a distracting glare can be more than just a minor annoyance. That's why doctors take notice when they see precision instruments that don't reflect a bright light right back in their eyes. Although they may not know it, they can thank Qualtek Manufacturing's low-gloss electropolish finishing process.

"It's important for the medical industry for instruments to have a clean surface, but it shouldn't be high-gloss," said Bruce Hupfer, director of technical sales at the Colorado Springs, Colo.-based stamper. "Low gloss means you don't get that glare that practitioners find distracting during examinations."

The low-glare finishing is one of several electropolishing, anodizing, passivation (which removes free iron from the surface of stainless steel), and other finishing processes the company offers, as well as gas and vacuum heat-treating.

"Some companies were sending products for stamping in Denver, and then sending them to Chicago or other places for finishing," Hupfer said. "Their lead-times were months. We can do it all in-house, and we can control the lead-time."



**Figure 1**

Mayra Renderos and Petra Nunes discuss the control parameters at one of two servo presses at Qualtek Manufacturing.

“Anything that runs in a mechanical press will definitely run in a servo press,” said Shrinivas Patil, product manager at Dayton, Ohio-based AIDA-America. “But the servo is a more sophisticated press.” The right tooling design, he said, can make a servo press even more productive.

And that, Hupfer said, is why the servo press’s tooling can be both challenging and beneficial. When tooling arrives for the servo press, Qualtek technicians modify its components slightly, so the tools take full advantage of the new technology. The shop can take on jobs with traditionally difficult, extremely precise part geometries, be it a drastic bend radii or precision holes or slots.

“For example, in one of our designs for an aerospace customer,

we can hit really tight tolerances with the current setup,” Hupfer said. “The positions of the bends and slots are just unbelievably critical.”

### **SERVO PRESS BASICS**

When developing the servo press, design engineers removed the main motor, flywheel, and clutch and replaced it all with a servomotor that focused energy only where needed and, in effect, made the ram a controllable axis. The slide velocity can be controlled throughout the cycle. This gives the tooling designer and press technician a host of new factors to consider.

Servo presses still cannot deliver full tonnage throughout the stroke, as hydraulic presses can. They have tonnage rating curves like their fly-

wheel clutch-driven counterparts. Maximum tonnage still occurs at a specified distance above bottom dead center (BDC), and the higher up the stroke the ram goes, the less tonnage is available. But unlike a standard mechanical press, the servo variety can stop nearly anywhere in the stroke, descend to BDC, and provide maximum energy. That’s because the servomotor, unlike a flywheel, can provide maximum energy even at 1 stroke per minute (SPM).

This has both productivity and precision-forming implications. A shorter, fully controllable stroke lets the press run at a higher SPM, yet still form the metal at a slower pace. The ram ascends to top dead center, descends, and then slows slightly



**Figure 2**

Qualtek bought two servo presses in recent years, one in 2009 and the other in 2011.

at just the right point to form the metal.

The ram can dwell at the bottom of the stroke as well as perform a kind of rocking, or “pendulum,” action that if necessary can be used to help metal settle in its new shape. Stroke control and dwell allow more to be accomplished in each station of a progressive die. What used to take, say, five drawing stations now may require only three. Multiple press hits, including restrikes, can be accomplished in one station. Lubrication requirements also may change depending not only on the part geometry and tooling, but also on the ram’s speed and position.

### **TWEAKING THE TOOLING**

“There are a lot of variables to adjust the stroke,” Hupfer said, “and learning how to maximize those variables has been the biggest challenge. There’s a lot of trial and error. What if we slow the ram down here? Or rock it here?”

The company does no in-die processing such as tapping, staking, or welding—tasks that become easier with precise control of ram move-

ment—but the servo presses have helped eliminate some secondary operations indirectly. He said that the servo presses tend to leave very clean cut edges, which have eliminated previously necessary deburring. He attributed this, again, to highly accurate, controllable ram movement.


The level of control has reduced setup time for repeat jobs. With the right tooling and program, operators can adjust stroke parameters to meet specific needs for a job—to account for, say, specific metal springing back a certain way. The technicians bring up the program that instructs the press what the cycle time is, when to slow down and speed up, where to rock and dwell at the bottom of the stroke, and other variables. “We can then tweak those variables based on what the part looks like when it comes out,” Hupfer said.

Those small modifications, be it for a certain bend radius or any other element, are then cataloged. For the past several years, the knowledge base has grown, and it has helped technicians determine the optimal recipes regarding stroke

characteristics as well as tooling. Hupfer said that the shop uses traditional tool and die rules of thumb as benchmarks, but then moves on from there to determine how to alter a die’s forming and cutting stations to take advantage of the press’s controllable ram.

The details behind all this have turned out to be valuable intellectual property. And according to Patil, Qualtek isn’t alone on this. Some tool and die considerations are somewhat straightforward. Consider the pilots needed to locate the strip and maintain constant strip progression. As Patil explained, the pilot lengths can be shorter, because the stopping time on a servo press is quick and the stroke can be short, rising only a few inches off the surface of the metal before descending again, looking a bit like a punch press in action.

But outside broad rules, some job-specific tooling knowledge is being kept close to the chest. “We’re not seeing dramatic changes in tooling,” Patil said. “It’s a tweak here and a tweak there. But many people with the knowledge want to keep it a secret.”

Does the shop alter specific forming stations? What tooling attributes work for specific parts, and how exactly do they differ from traditional tooling designs? When it comes to these details, Hupfer and his colleagues keep quiet. The knowledge won’t stay a secret forever, of course, especially as the servo press’s market presence grows. But until then, mum’s the word. 

*Contributing Editor Tim Heston can be reached at [timh@thefabricator.com](mailto:timh@thefabricator.com). Images courtesy of Qualtek Manufacturing, 4230 N. Nevada Ave., Colorado Springs, CO 80907, 719-598-3394, [www.qualtekmsfg.com](http://www.qualtekmsfg.com).*

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