Defy Tradition

RW manufactures personalized jewelry using a modern approach

by Tina Wojtkielo Snyder

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Personalized jewelry with symbols, initials, and other meaningful images and text continues to be popular among consumers. But sometimes casting those intimate details in a piece of jewelry can pose challenges. Take, for example, this double-sided sterling silver pendant created by RW Manufacturing in East Rochester, New York.

A custom order for a mother of two, the pendant features one son's name and birth date on each side, along with an image of his footprint. It measures approximately 43 mm long by 26 mm wide by 3.25 mm thick (1.75 inches by 1 inch by 0.09 inch). Because the pendant is double-sided, it had to be cast on the thicker side of the range RW uses for such pieces—between 1.75 and 3.25 mm. "When you cast such a large, thick piece that has lettering, the investment tends to break as the molten metal rushes in and the lettering fills in," says Melissa Holthoff, who is in charge of CAD design and development for RW. "The thicker the piece, the more problems you have getting those details."

When the design for this pendant was created in Matrix, the CAD designer imported a scan of each child's inked footprint and built the file around the scan. For the lettering, RW's CAD designers used the Georgia font, which was requested by the client, and followed a simple rule to ensure the best casting results: Lettering in milled waxes and molds should be at least 0.5 mm deep and 1.75 mm tall, but the depth of the letters should be $^2/_3$ or less the thickness of the piece. In this example, the lettering for the 3.25-mm-thick pendant is approximately 0.75 mm deep on each side and 2.5 mm tall. Because this piece is double-sided, RW chose the 0.75 mm depth per side to leave a 1.75 mm thickness in between. "Ideally, you want a minimum of about 1 mm of metal between the two sides," says Holthoff. "We chose a maximum depth [for visual impact] that would allow us to finish the piece easily while being mindful of its structural integrity."

The footprint has layers of depth that range from 0.5 mm at the shallowest parts to 1 mm at the deepest parts. "Because the footprints scan in shades of black, gray, and white, you obtain different depths when milling for each shade," says Holthoff. "The black is the deepest, the gray is in the middle, and the white is the highest. If there is some investment breakage or part of the footprint fills in, you really can't tell because of these various levels of detail."

Whenever casting a design that features lettering, be sure to set yourself up for success in the CAD file by chamfering the bottoms of the letters. Most lettering programs feature crisp letters with sharp angles that look great on-screen but pose nightmares for the caster. By chamfering the bottoms, you smooth out the sharpness and enable the metal to flow more smoothly into the casting, preventing investment breakdown.

Not so with the names and birth dates. After milling the wax from the CAD file, RW's casting staff followed the procedures they generally use with such thick, heavy pieces to avoid no-fills. They sprued it from both sides of the base, using a larger 4 mm sprue that feeds into two 3 mm sprues, making the route of metal flow as direct as possible into the casting. They then invested the flask with Ransom and Randolph's Plasticast, burned it out, and proceeded to cast in sterling silver. As you can see in the photos (opposite page), their first attempt failed, a result RW attributes to the metal flowing into the casting much too rapidly.

"We milled another wax and changed the position of the sprues, placing them as far away from the lettering as possible," says Holthoff. "We also added an angle to the sprues, shaping them to go up around the piece and then into the lettering, giving the molten metal time to slow down before it meets the details."

This approach, which RW now uses when casting such a piece in any precious metal, left the lettering intact and resulted in a successful casting. "It may defy the logical approach to casting such a piece, but in this case directing the flow of metal [straight into] the base of the heavy piece resulted in too much turbulence and ultimately caused investment failure," adds John Keim, president of RW. "Sometimes you have to rethink the way you've been doing things—defy tradition—to arrive at the best results."

A custom order for a mother of two, the pendant features one son's name and birth date on each side, along with an image of his footprint. It measures approximately 43 mm long by 26 mm wide by 3.25 mm thick (1.75 inches by 1 inch by 0.09 inch).

The footprint has layers of depth that range from 0.5 mm at the shallowest parts to 1 mm at the deepest parts. Even if some investment breakdown occurs in the footprint area, it's not noticeable.

To ensure the best possible results when casting pieces with lettering, RW's CAD designers follow a simple rule: Lettering in milled waxes and molds should be at least 0.5 mm deep and 1.75 mm tall, but the depth of the letters should be $^{2}/_{3}$ or less the thickness of the piece. In this example, the lettering for the 3.25-mm-thick pendant is approximately 0.75 mm deep on each side and 2.5 mm tall.

The first attempt at casting, with 3 mm sprues placed at both sides of the pendant's base fed by a larger 4 mm sprue, failed.

After milling a second wax and changing the position of the sprues, RW's team succeeded in achieving the desired detail. "We placed the sprues as far away from the lettering as possible and angled them," says Melissa Holthoff. "They go up around the piece and then into the lettering, giving the molten metal time to slow down before it meets the details."