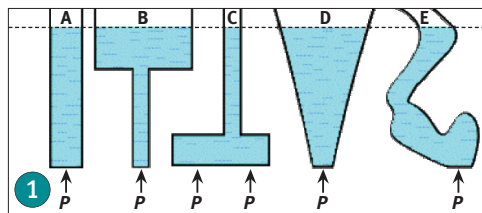


Buttons Are for Wimps *Debunking a Casting Superstition*

BY J. TYLER TEAGUE

Casting has always been a mix of art and science. Occasionally, though, casters allow the art to overshadow the science, creating traditions borne of misguided beliefs. J. Tyler Teague takes great pleasure in debunking these beliefs. The owner of JETT Research (jettresearch.com) in Johnson City, Tennessee, Teague has developed a reputation as an expert caster with a scientist's mind and a rebel's heart, who isn't afraid to stand up to the industry's superstitions. In this Tech Sheet, he takes on the belief that a large base ("button") for a casting tree leads to improved fill.

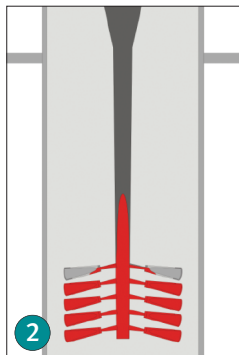
It doesn't matter whether you are casting large production trees or small ones, using vacuum-assist or simply gravity casting: The use of large buttons is a waste of money. It's pure superstition that a large button exerts enough pressure on a casting to improve fill. Fact is, the pressure in the flask is relative to depth and not to volume, and only the metal that is directly over the main sprue exerts any pressure at all. Some French guy named Blaise Pascal in the 1600s and a Swiss guy from the 1700s named Daniel Bernoulli described these laws of liquid pressure way back. Read



up on it.

Basically, depth rules. In Figure 1, the pressure at all points marked "P" are the same regardless of

the shape or size of the container. This means that all that the metal you throw into the button makes you feel secure but serves as little more than a heat source and money drain. If you really want a good fill, use a tall main sprue with a funnel-shaped pour basin, as shown in Figure 2; the drop of the metal from the crucible to the bottom of the flask takes advantage of both the kinetic energy gained during the pour and the inertia of the molten mass, leading to a better fill. I prefer to use full-size sprues and flasks when doing this technique to ensure I get those added advantages. The couple of dollars for the extra investment is cheap compared to the cost of the metal for a button or a non-fill casting.



Remember, you want to cast only as much metal as you really need. To help you figure that out, here are my step-by-step instructions for the fearless casting of a buttonless tree, free of superstition:

1. Weigh your base and your main sprue with no waxes. Record the weight and label it W1. When you finish putting the parts on your tree, weigh the tree and record that weight as W2. $W2 - W1 = \text{wax part weight (PW)}$.

2. Measure the diameter of your main sprue in two places: at the top (D1mm) and 10 mm below the last part on the tree (D2mm). Add those numbers together and divide by 4. This will give you the average radius.

3. Take the average radius and square it (i.e., multiply it by itself). This will give you the average cross sectional area.

4. Measure the length of the tree from its top to that point 10 mm below the last part, and label it L. Multiply the cross sectional area by that length.

5. Multiply *that* product by 3.14 (Pi). You now have the volume in mm^3 of the main sprue (V_{mm^3}) that you want to cast: $((D1+D2)/4)^2 \times L \times 3.14 = V_{\text{mm}^3}$.

6. Divide the specific density of the metal you are casting by 1,000 (i.e., move the decimal over 3 places to the left) and multiply that by the V_{mm^3} . (See Figure 3.) This gives you the weight needed to cast the main sprue (SW).

7. Multiply the PW by the same specific density, then add that to the weight needed to cast the main sprue (SW). You now have the metal weight you will need to cast buttonless.

8. Continue with fearless casting!

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SPECIFIC DENSITIES

Injection Wax	0.95
Carving Wax	0.92
RP Resin	1.10
Sterling	10.36
9kt Yellow	11.24
10kt Yellow	11.47
14kt Yellow	13.07
18kt Yellow	14.86
22kt Yellow	18.00
24kt Yellow	19.32
9kt Ni White	10.75
10kt Ni White	11.05
14kt Ni White	12.56
18kt Ni White	14.42
9kt Pd White	10.75
10kt Pd White	12.47
14kt Pd White	14.25
18kt Pd White	16.61
900 Platinum	21.54
950 Platinum	21.50
950 Palladium	12.11

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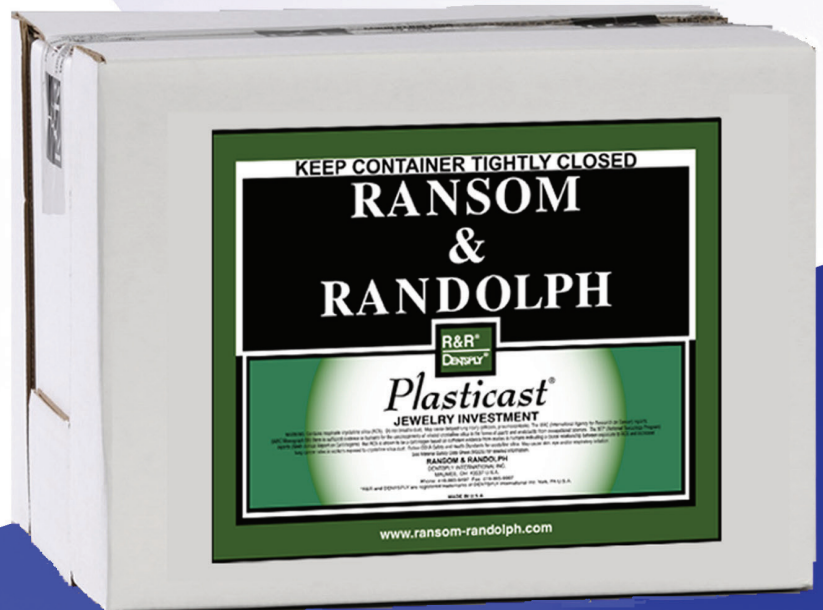
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