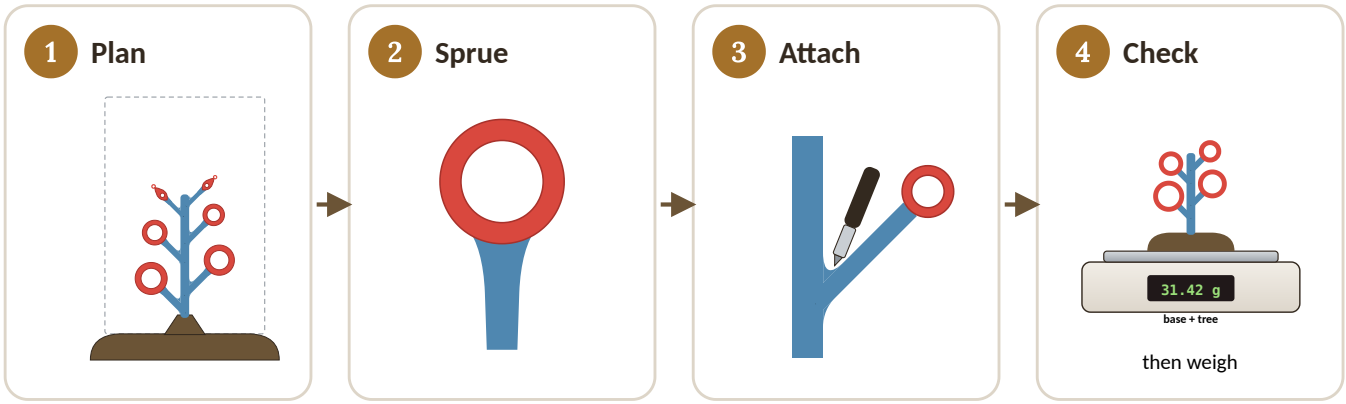
CASTING TREE GUIDE

From clean patterns to a casting tree.

Your patterns are clean and dry. Next they go onto a wax tree, ready for investing. A good tree feeds metal into every pattern and lets each one solidify in the right order. Poor spruing is the leading cause of shrinkage porosity, so take your time with this step.



THE NUMBERS AT A GLANCE

About 45°
the usual starting angle between sprue and trunk

3 to 5 mm
between patterns, never under 2 mm

6 mm min
from any pattern to the flask wall, 10 mm is safer

13 mm min
of investment above the highest pattern, up to 25 mm on large flasks

Thicker
every sprue a little thicker than the part it feeds

WHAT YOU NEED

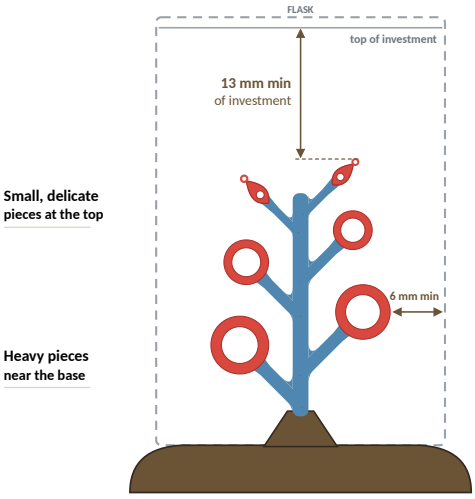
- **Rubber sprue base** — sized to your flask
- **Casting flask** — to check the fit as you build
- **Round wax sprue wire** — in a few thicknesses
- **Wax pen** — fine tip, adjustable heat
- **Sticky wax** — for tacking parts in place
- **Digital scale** — reading to 0.01 g
- **Soft-tipped tweezers** — for handling patterns
- **Nitrile gloves** — no skin oils on the wax
- **Debubblizer** — surface tension reducer

Before you start

- **Fully dry patterns.** All IPA must have evaporated. Its vapour is flammable, so keep it away from a hot wax pen.
- **Inspect under magnification.** Only use clean, undamaged patterns. A flaw in the wax becomes a flaw in the metal.
- **Gloves on, cool room.** Skin oils spoil the investment surface, and heat from sun or heaters can distort fine wax.

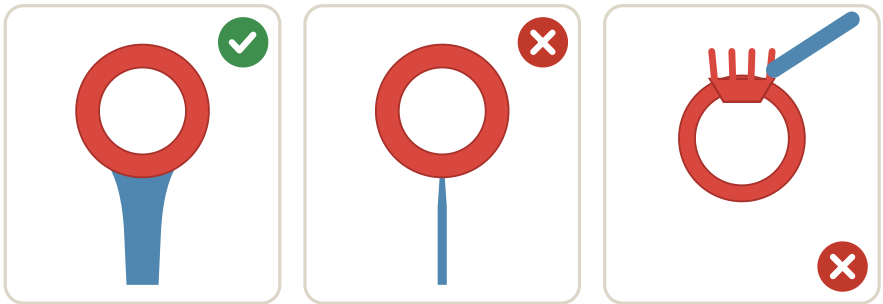
1 Plan the tree

- **Pick the flask first** and check the tree against it as you build. Keep every pattern at least 6 mm from the wall (10 mm is safer). Leave at least 13 mm of investment above the highest pattern on a small flask, and up to 25 mm on a larger one.
- **Heavy pieces low, delicate pieces high.** The top of the tree ends up at the far end of the flask, where metal pressure is highest. That helps fill fine detail.
- **Similar pieces together.** Very thick and very thin pieces need different flask temperatures, so put them on separate trees.
- **Balance the tree.** Spiral the patterns evenly around the trunk, and keep them clear of the trunk as well as each other.
- **Trunk thicker than any sprue.** It feeds all of them.



2 Sprue each pattern

- **Attach at the thickest part.** On a plain band that is usually the base of the shank. On a ring with a heavy top, attach at the side of the head or inside the ring, or use two sprues. If a sprue point was printed in, use it.
- **A little thicker than that part.** A thin sprue freezes first and leaves shrinkage porosity. Two thin sprues are no substitute for one of the right size.
- **Short and round.** About 19 mm at most. If it has to be longer, make it thicker.
- **Flared into the piece,** not narrowed where it joins. A narrow neck starves the piece of metal.
- **Away from detail.** Never on stone seats, prongs, engraving or texture, so clean-up does not damage them.
- **Add sprues where needed:** one for each heavy area that is cut off by a thin section, and consider an extra one for 18ct gold and above.



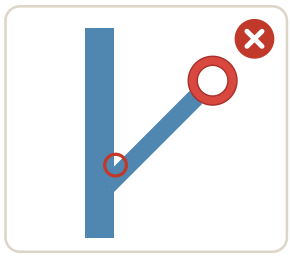
Thick, short, flared
at the thickest point

Too thin, or choked
where it meets the ring

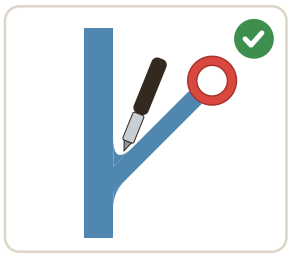
Onto prongs
or other fine detail

3 Attach the patterns to the trunk

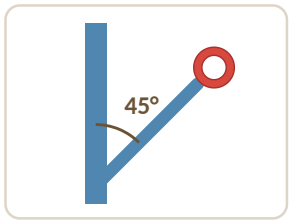
- **Start at the top of the trunk and work down,** so drips cannot land on finished patterns.
- **About 45° to the trunk,** pointing up and away from the base. If your caster specifies an angle, use theirs.
- **Wax pen on low heat.** Melt the sprue wax only. Never touch the pattern with the hot tip.
- **Smooth fillet at every join.** No gaps, pinholes or sharp corners. A sharp corner of investment can break off and end up in the casting.
- **3 to 5 mm between patterns,** never under 2 mm, and nothing touching.
- **Check every join.** Tap the base gently and reweld anything that moves.



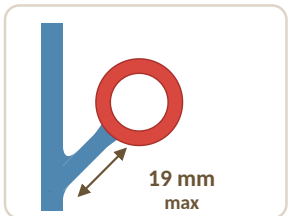
Sharp corner or gap



Smooth fillet, no gaps



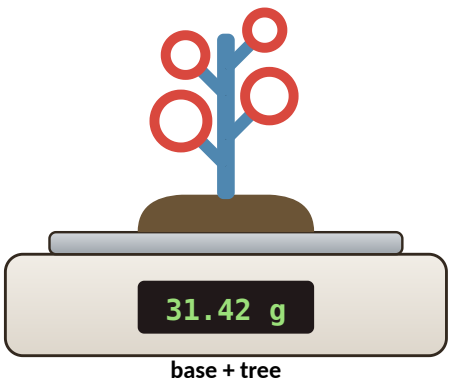
About 45° to the trunk



Short feed sprues

4 Final check and weigh

- **Look over the whole tree.** No drips on patterns, no wax bridges between them, every join smooth.
- **Weigh.** Weigh the printed patterns before spruing. Weigh the empty rubber base, then the finished tree. The difference, minus the patterns, is your sprue wax.
- **Work out the metal** with the formula below, then add about 15 g for the button, or about 10% of the metal weight on larger trees.
- **Debubblizer.** It helps stop air bubbles clinging to the wax. Recommended with a bell jar setup, optional only if an investing machine mixes and pours under vacuum. Let it dry completely.
- **Keep the tree clean** until you invest: covered, cool and out of the sun.



base + tree

Metal needed

patterns × (metal density ÷ printed wax density) + sprue wax × (metal density ÷ sprue wax density) + button

Take the sprue wax density from its data sheet, and measure your printed wax once with a 20 mm test cube, as our metal weight calculator shows. Printed wax and sprue wax are not the same density, so one standard ratio for the whole tree will be off.

COMMON MISTAKES

MISTAKE	WHAT IT CAUSES	DO THIS INSTEAD
Sprue too thin, on a thin section, or two thin sprues instead of one proper one	Shrinkage porosity, incomplete fill	A sprue a little thicker than the thickest part, attached there. Extra sprues only where needed
Narrow neck where the sprue meets the piece	Feed metal cut off, porosity	Flare the sprue into the piece
Sharp corners or gaps at joins	Investment breaks off and ends up in the metal	Smooth fillet at every join
Patterns too close or touching	Thin investment between them breaks, leaving fins or joined castings	3 to 5 mm apart, never under 2 mm
Too close to the flask wall or top	Thin investment cracks or metal breaks through	At least 6 mm to the wall, 13 mm of investment above the highest pattern
Wax pen too hot	Melted or distorted detail	Low heat, touch the sprue wax only
Sprue on a setting or fine detail	Detail lost during clean-up	Sprue where clean-up is easy
Thick and thin pieces on one tree	Thin pieces fail to fill, or thick ones shrink	Similar pieces on the same tree
Guessing the metal	Short pour, or wasted metal	Weigh and calculate every tree

BEFORE IT GOES INTO THE FLASK: CHECKLIST

- [ ] Every pattern clean, dry and inspected
- [ ] Every sprue flared, every join filleted
- [ ] No drips or bridges, every join checked
- [ ] Heavy pieces low, delicate pieces high
- [ ] 3 to 5 mm between patterns, clear of the trunk
- [ ] Tree weighed, metal calculated
- [ ] Each sprue on the thickest part, and a little thicker
- [ ] 6 mm min to the wall, 13 mm min of investment above the highest pattern
- [ ] Debubblizer fully dry, if used

Make it easier in the design file

- **Add a sprue point to the model,** such as a small post at the thickest part. Attaching is quicker and the join stays off your detail.
- **Print similar pieces together,** so each print run makes one well matched tree. Our design for casting guide goes further, and the investing and burnout guide takes the finished tree into the flask.

3D WERK

Local Flashforge WaxJet support in Sydney

Questions about your wax patterns?

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