Stainless Steel Propeller Production

When it comes to propeller performance and selection, no one comes close to Mercury Propellers.
That's because for over 60 years, we've been conceiving, designing and creating technology solely for the water. It's how we've developed more industry-leading innovations and why we offer the widest selection of High-Quality Aluminium and stainless steel propellers than any other manufacturer. Infact, our dedication and commitment to be the best is unparalleled in the industry and that is why our propellers not only fit Mercury engines they can fit most other manufacturer engines as well.
In determining boat performance, propellers are second in importance only to the power available from the engine itself. Without the propeller's thrust, nothing happens. Your boat's propeller affects every phase of performance, handling, riding, comfort, speed, acceleration, engine life, fuel economy and safety.
Your propeller is the primary connection between your engine and the water and selecting the correct propeller to make that connection is critical to achieving optimum boat performance.

Manufacturing Mercury Stainless Steel Propellers starts with a 5,000 year old process – investment casting – which requires specially engineered wax to create a prop mold. The wax is warmed up to 180 degrees and poured into a "wax press" where a machine operator creates a pattern in the shape of the propeller.

Wax Press Operator Bob Nolan creates a wax pattern

Wax patterns are dipped in ceramic 5 times to make a strong, thick shell

Next, the pattern is dipped into two ceramic finishes. It's initially dipped in a primary coating and left to air dry for two hours. Then it's dipped four more times in a secondary finish that improves thickness and strength. In between each dipping there is another five hour drying period. After all five coatings are applied, the pattern is left to dry under high-powered fans for 24 hours.
The entire dipping process takes more than two days.

Once there's a strong, thick ceramic shell, the wax pattern can be removed. Each piece is placed in an autoclave where the molds are steam heated for 18 minutes at 325 degrees Fahrenheit at 100 PSI of pressure. During the cycle, the wax melts and separates from the shell and is collected for future patterns.

Next, the empty cavity, now free of most wax, is placed in a burnout furnace. Inside, the furnace reaches more than 2000 degrees Fahrenheit. It's so warm employees wear aluminized clothing to deflect the heat.
The burnout furnace burns off any residual wax and strengthens the shell. It also prevents shock when melted metal is poured into the cavity in the coming minutes. While the molds are in the burnout furnace, an hour long process, 500 pounds of stainless steel is melted at 3000 degrees Fahrenheit.

Wax is melted off by 180-degree steam in autoclave

Furnace Operator Jerred Nelson pours melted stainless steel into shells

After the shells are removed from the furnace, the liquid metal is poured inside the cavities from a ladle 50 pounds at a time. The process continues until all 500 pounds of melted metal are poured.

Shells are then cooled on carts for about an hour then transferred to the cleaning cell, where residual ceramic is removed using three types of equipment, a knockout machine (resembling a jackhammer), an abrasive saw and a sand blaster. By the completion of this process, the prop is free and clear of residual ceramic or oxidation. It is the last step of the casting process.

Cleaning cell operator Phil Gabatholer removes ceramic residue with a sandblaster

Machinist Earl Freund works on a propeller hub so it can be affixed to the shaft

Now the prop has been cast, machinists take over. Mercury's standard Delrin sleeved props require minimal machining on the outside diameter of the hub. There is more extensive machining involved on props that counter rotate, like the Bravo 3. Machinists have to work with the hub of the propeller and splines so the prop can affix to the prop shaft for these types of propellers.

Grinder LeRoy Ruedinger thins the leading edge of a propeller

Next, the propeller is transferred to the grinding dept where grinders thin the leading edge of the blade and other areas of the prop that require sanding.

In the surface refinement area the props are placed in a drag finish machine for 2 hours to have their peaks and valleys sanded out. The process creates a matte finish like Bravo 3 or pod drive props have. All other propellers go through a second refinement stage – burnishing – which creates a high lustre finish.

After the prop goes through surface refinery, Sam Thuerwachter boxes up a finished Enertia propeller

Finally, the prop is fitted with Performance Vent System plugs, which can be customized to deliver a better hole shot, and then transferred to the boxing area to be boxed and delivered.