

INVESTMENT CASTING: Pro Shop Boon?

Cast clubs offer the professional a whole new sales approach. While you are teaching your member how to swing, you can sell him clubs that will correct his mistakes during the learning process by PARKER SMITH

The club professional should be entering a new era of selling golf equipment. Technological advances made by the major (and a few minor) manufacturers have enabled the professional to buy and sell clubs that are beneficial to the average player, clubs that actually help him hit the ball farther and straighter.

In the past, different types of shaft designs and materials captured the advertising headlines. This year, however, the professional has a major story to tell his members about what has been done for them at the end of the club.

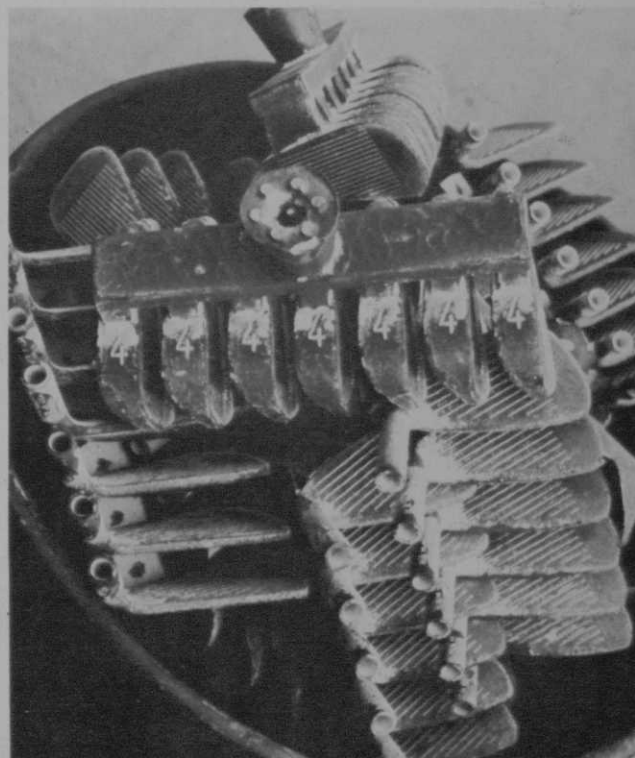
The process of investment casting, a concept borrowed from the aerospace industry, has opened a whole new dimension to the club manufacturers. Up until now, all irons were made by forging. Although forged clubs are by no means inferior, they are limited in their ability to distribute weight to specific areas of the clubhead. Forgings are made by drop-hammering red hot steel bar stock in a pair of hardened steel die. This means that the object to be

forged sits on a bottom die and another die is dropped down onto it. The shape of forged material is thus limited to that which can be withdrawn from the dies. The dies themselves are subject to wear from the pressure of the hot metal, and forgings can vary somewhat as the dies wear. The forged clubheads have to be ground and polished to uniform weights for a matched set of clubs. Of course this is done with extreme precision on all top quality forged heads. The economics of inexpensive sets, however, usually don't provide the money for completely precise polishing and grinding. This variation in forged head weights accounts in large measure for the variation in swing weights within a set of these clubs—a good point to remember when your member complains about a set of clubs that were forged. Don't be afraid, though, to buy forged sets of top lines. They will be every bit as good as the cast clubs, will have excellent workmanship and will help the golfer when he does hit the center of the blade.

When forging first became a sophisticated club-making process and the manufacturers knew they

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Two stages of the investment casting process—pouring the hot wax and the cast clubs as they come out of the mold. During the casting process, the molten wax is "lost" by melting and running out of the mold, leaving a cavity of the exact shape required.



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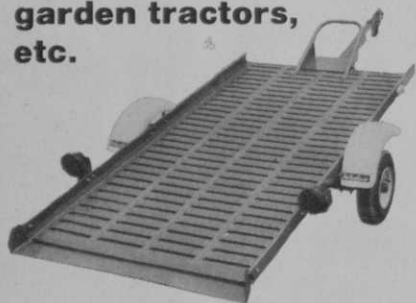
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needed a new wrinkle in design, they tried different shapes for the heads. With casting, they can try different weights. Casting allows heads to be weighted in new ways—sole, toe-heel, toe-sole-heel, total perimeter—and even makes possible new ways to weight the “sweet spot.” Each of these has a special value to a certain type of golfer and can be sold as such.

The short hosel took the non-productive weight out of the head and added it to the blade. The hollow-back took the weight from the “sweet spot,” where “the average player hits it once in 10 tries” anyway, and put it out on the corners—the part of the blade that usually hits the ball. By removing this weight from the center and adding it to the edges, the moment of inertia is increased. The benefits for the average golfer should become apparent immediately. A weighted sole lowers the center of gravity of the head, thus getting the ball in the air more easily. Got a few members who complain they hit line drives? Hand them a sole-weighted club, tell them what it's designed to do and watch their eyes light up.

Conversely, the player who skies the ball should try the old-fashioned blades with thick tops or the new perimeter-weighted clubs where the center of gravity is at a higher point, thus enhancing the player's ability to keep the ball “down.” A toe-weighted club is the perfect gift for the golfer who toes it, the heel-weighted for the man who tends to catch it in the “neck.”

In each case, the casting process gives the manufacturer virtually unlimited freedom and consistent accuracy in producing any desired shape of club. Briefly, the cast head starts with a pattern from which a two piece metal “master” mold is constructed. Molten wax is then injected into the mold and allowed to cool, producing an expendable wax clubhead. This is “invested” or dip-coated with several layers of a refractory slurry to form an expendable shell. Then the wax is melted out, the shell is cured in an oven (burning off any remaining wax) to leave a female cavity or mold of the exact shape desired. Finally, molten steel is poured into the expendable shell mold, producing the cast head. Note that the wax patterns are “lost” when they're melted out and that molten steel, being poured into the mold, does not contact the metal master wax mold. That's why the 100,000th or last “precision” cast head will be nearly exactly the same as the first.

When you're doing your buying, don't think that cast clubs will totally replace forgings, however, because many of your members will have psychological problems changing. Your better golfers may not want to change. For the most part, though, investment casting gives you the opportunity to sell a set of clubs with the knowledge that they'll help the individual buying them—and that's no small selling point. □

Author's Note: My thanks to Bill Winquist, who supplied the facts on the forging and casting processes.

APPROXIMATE MECHANICAL PROPERTIES OF SOME FORGED AND CAST ALLOYS REPORTED BY CLUB MANUFACTURERS

Alloy Type	Forged, Plated Steel	Forged Stainless Alloy Steel	Investment Cast Stainless Alloy Steel	
Tensile Strength lbs./sq. in. (psi)	1018-1020 64,000	416 70,000	17-4 180,000	431 125,000
Yield Strength (psi)	54,000	40,000 (1)	150,000 (2)	110,000 (2)
% Elongation in 2" (ductility)	15	22	6	18
Capable of bending to adjust lie	readily	readily	with caution readily	

(1) Bending strength of material adequate if one uses large diameter hosel over shaft

(2) Note: cast clubs require higher strength material if one uses short hosel with small diameter pin inside shaft