



## THE DRIVER OF CHAMPIONS

# Science Behind Building a Precision Engineered Golf Club

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Apart from the few club builders who still handcraft persimmon woods, today's driver and fairway woods are produced by metalworking processes and clubheads are fabricated from multi-alloy materials. Early on, irons and putter heads primarily were made by blacksmiths who skillfully heated iron bars until a glowing piece of metal was malleable enough to be hand-hammered into the appropriate shape. Nonetheless, from day one, golfers have constantly debated and argued over techniques that designers and manufacturers use to produce their golf clubs.

### So, what has changed from then to now?

Originally, any club builder involved in the production of metal heads, irons, or putters had limited options from which to choose when fashioning component parts. In fact, before the Industrial Age had such a major impact on metallurgy, the Holy Grail of materials for a driver was the persimmon tree. As a raw material, persimmon was hard enough and dense enough to be carefully shaped into a shock-resistant head. But, at the very heart of the head was a cavity that often contained a surprisingly large quantity of lead surrounded by a thick glue used to hold the artificial weight in place.

Unless incredible care was taken to protect a wooden driver from moisture and heat, hidden stress points in the clubhead could split or crack causing the lead center to loosen and move about. Permanently weakened by the slightest movement of the weighting material, someone's favorite driver could unfortunately reach the end of its lifecycle with a single swing. As for metal irons and putters, until the later part of the twentieth century, the choice manufacturers had for working with bulk metal materials was mostly limited to either forging or casting using molds with a limited life expectancy.

### Which Process Is Best: Forging, Casting, or Machining?

From the beginning, metal stock was heated to near molten temperatures as voids, cavities, and impurities were hammered out on the blacksmith's anvil by hand. Quality control of the material depended upon the fabricator's expertise and experience and mass production wasn't an option. Discussed below are the modern day processes and applied technologies that play a role in your game:

- Forging – Initially, metal clubheads were hand-forged from iron billets by blacksmiths. Manufacturing golf clubs no longer relies on hand forging as red hot carbon steel is drop forged using progressive dies with precision processes that deliver value-added performance attributes.
- Casting – The first oversized metal drivers were cast with a hollow center using a process similar to making ice cubes. Molten metal was poured into a form and machining processes created the finished club. Although casting is less expensive nowadays, air bubbles in the metal can still affect feel, accuracy, and durability.
- Powdered Metals – Powder metallurgy is a fabrication option used in metalworking that allows manufacturers to produce high quality parts with tolerances that minimize machining. Common uses for golf clubs are weighted inserts for Titanium drivers or diamond powdered iron faces.
- Boring & Turning – Both boring and turning are machining processes where the material rotates, and the cutting tool remains fixed. Typically, boring is done using pre-drilled holes to remove precise amounts from the interior, whereas turning operations removes an excess amount exterior material.
- Milling & Drilling – For milling and drilling operations, the material remains fixed, and the cutting tool or bit rotates. Computer numeric control processes have improved machining performance as well as the economic feasibility for precision milling, drilling, surfacing, and boring.

Since the industrial era gave way to the age of technology, new processes continue to pave the way with unlimited possibilities. Innovative, creative design engineers understand that each process has its place, and the end goal is to incorporate the collective knowledge into designing and building a unique golf club that matches its intended purpose. Today, the design and manufacturing of golf club from multiple composite and metallic materials is both an art and science.

### Dedicated to Improving the Game for Recreational Golfers

Although most club makers rely on CAD designs and automated manufacturing processes to spit-out hundreds of thousands of cheap golf clubs a year, Krank Golf relies on the design experience gained from decades of research and development as well as the hand-crafting skills needed to build custom clubs that match the golfer's swing. Moreover, as the number of recreational golfers has rapidly increased, Krank has focused on delivering a driver and fairway clubs that makes the game more enjoyable for the average golfer. Lance Reeder, president of Krank Golf, understands that recreational golfers are seeking different things from a day at the links. It isn't always about the score or who won the bets. For most recreational golfers it is more about getting outside with friends and the satisfaction that comes from hitting better shots, especially off the tee box. Despite objections from the purists, Krank will continue to develop game-improving features like micro milling of the face and maximum hardening to optimize the spring effect of each personalized driver's clubhead.

*What you truly seek from your next round of golf should drive your equipment choices. If you are tired of leaving hundreds of yards in your bag, the right Krank driver will allow you to hit the ball farther off the tee box and straighter down the fairway. To schedule a custom fitting and start designing the driver that is right for your swing, [click here](#)... and stop giving away distance off the tee.*



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