

General Production Processes for Horseshoe Nails by Bill Kleist

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A book could be written about the history of horseshoe nails, but the intent here is to clarify some aspects and characteristics about today's horseshoe nails and the way they are produced.

Short Background

Iron nails for holding horseshoes are found as early as 500 B.C. by the Celts in Britain. In the 1700's horseshoe nails were hand-made by Journeyman Nailers. From the mid 1700's to early 1800's nails were produced in a variety of machinery. Typically all these machines used heated iron or steel in their production process. The development of better steel wire in the late 1800's eventually allowed the development of cold forging processes where the horseshoe nail could be produced without having to heat the base material before forming the nail.

Current Processes & Nail Brands

Today, horseshoe nails sold in the North American market are produced by three distinct methods:

1. Rolling Process: **Vector**, **Izumi**, Capewell, Cooper, Delta (yellow box), Save-Edge
2. Forging Process: **Liberty**, Mustad, Equiclavo, Naula, Mondial, Delta (gray box)
March & Max (same manufacturer)
3. Stamping Process: Australian Nails (no longer in production)

Rolling Process:

Rolling machines were first developed in the late 1800's. The process to form the nails consists of a wire of a specific cross section being fed to a machine that has eight consecutive sets of roller dies that form the shank of the nail from that blank piece of wire. The process is very gradual in forming the shank of the nail. Subsequent steps in the same machine will form the bevel and the point of the nail. The head of the nail is the last step before exiting the machine.

Forging Process:

In the forging process the nail blank is formed in a machine called a swedging machine. In this machine, wire of a specific cross section is fed through one set of swedging hammers that work simultaneously on all four sides of the wire while the wire is advanced through the striking point. Three or two distinct simultaneous die blows, depending on the machine design, form the shank of the nail. The process in this machine to form the shank and also the displacement of the material is much faster than rolling. The blanks out of this machine are then fed into a different machine to finish the heads and to make points of the nail.

Stamping Process:

In the stamping process the nails are made from sheet metal in large stamping presses with a progressive stamping die. In this process a strip of sheet metal advances in timed

steps through a complex die that gradually forms the entire nail. In the ending step the nail is cut out of the sheet of metal. This process also requires the finished product to be heat treated so that the end product has the necessary metallurgical properties to perform correctly and to homogenize the material and release the inherent stress of this process. One can notice the shear marks left on the sides of these nails by the cutting dies.

Conclusions:

The final product produced by these three different methods produce a product that is very similar in appearance, but field results and lab results show that the products are very distinct in their physical properties. From the metallurgical point of view the rolling process produces the strongest nail of these three processes. The reason for this is the shank of the nail is gradually drawn resulting in a much more uniform granular microstructure. This gradual drawing of the shank increases the tensile strength of the final product. This can also be attested by the practical fact that rolled nails can be produced in very narrow shank sections and the resulting nail is still capable of holding the shoe to the horse's feet.

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