After metal is heated, it is hammered to form a desired shape.
CHANGES

The growth of cheap industrially produced items greatly reduced the market for the blacksmith's products. Although their merchandise is superior in quality, the higher labor costs of individually produced items put blacksmiths at a disadvantage. Some blacksmiths are employed in fields in which their services cannot be replaced, such as shoeing. Most have moved from the manufacture of utilitarian items to specialty work. In particular, blacksmiths are employed for producing ornamental pieces or for reproducing antique hardware for restoration of historic houses. Recent increased interest also is seen in manufacturing high quality handmade knives.

The declining need for blacksmiths has created additional difficulties for those who choose to remain in the field. One primary obstacle is attaining proper materials and tools. Wrought iron is very hard to acquire and is quite expensive. Most wrought iron sold today, in fact, is mild steel. Blacksmiths often find themselves searching through scrap dealers' inventories to locate true wrought iron. Since much of the available wrought iron was produced before 1910, the supply is dwindling quickly.

The necessary tools also are often hard to acquire. Unfortunately the growing use of old tools as antique decorator objects has put blacksmiths at odds with antique dealers for the few useful tools still available. A working blacksmith requires a wide range of specialized tools. As these are seen as oddities rather than as functional pieces by much of the general public, blacksmiths find themselves being squeezed out of the market for the tools of their trade.

CONCLUSION

Regardless of the changing nature of the field, blacksmithing has not passed into history. As modern blacksmiths redefine the nature of their work, they are finding more students to ensure that the art will continue to change and evolve into the next generation.
Forge welding requires a high degree of skill as precisely the right temperature must be reached for the two metal parts to fuse properly. If the temperature is too low, the weld will be weak. If it is too high, the iron or steel will be damaged. The blacksmith must have a proper feel for when the metal has been heated correctly. As the iron heats, it begins to react or oxidize with the air, creating a scale that will prevent a good weld. To avoid this the blacksmith often uses a flux, which combines with the scale to remove it. There are a number of different ways to make a weld.

A third method for joining metal is riveting. Pieces of metal are riveted by placing a heated rivet, which resembles a bolt, through holes in two pieces of metal. The rivet is then struck from the side opposite the head to flatten it. Prior to the availability of manufactured rivets, the blacksmith often would make individual rivets from cut pieces of stock iron.

Tempering is another important technique used by the blacksmith. Tempering is a form of heat treatment that controls the toughness and hardness of steel. Wrought iron cannot be tempered because its carbon content is too low. A piece of steel is tempered by heating it to a high temperature and then quenching it in water or oil. It is then heated again to the desired temperature and quenched once more. The process of tempering increases hardness, but the hardness always comes at the expense of resilience. The higher the carbon content of the steel and the faster the cooling, the harder the tool will be.

All too often a piece of metal will be made too brittle through repeated forging. The alternate heating and cooling, as well as the blows of the hammer, create stresses in the structure of the tool. When this happens the blacksmith may reverse the process by annealing. One anneals iron or steel by once again heating it and then allowing it to cool slowly. Often it is buried in a pile of ashes to protect it from drafts and make certain that the cooling takes place slowly. This allows the crystals in the metal to once again form in a looser configuration, thereby increasing its flexibility. Often a tool is annealed after forging and prior to its final tempering.

A blacksmith does not perform all of his work with heated metal. Cold metal may be sawed, drilled, punched, and chiseled. Cold work, however, is primarily for shaping. Without the use of heat, the blacksmith is not able to alter the nature of the metal itself.

One often cannot appreciate the amount of labor needed to produce items with the handwork of blacksmithing. One example would be the amount of work needed to make a simple chain. To make a chain the blacksmith first heats a slender iron bar and cuts it on the anvil into the correct lengths needed for the links. The links are then heated and shaped with blows from the hammer on the anvil. One method calls for two shoulder joints to be struck on each link to make the tips of the opposite ends cross. The links are then heated again on the forge to a red heat and welded by hammering on an anvil. A few more blows are needed to make the final shape of the link. Usually the blacksmith will first make half of the links without connecting them. Then the individual links will be connected with links forged from the remaining pieces of bar stock. One of the main activities that consumed the time of early blacksmiths was the manufacture of nails. Each nail had to be individually shaped by hand from iron stock. Nail manufacture did not require a high level of skill and therefore was often performed by individuals who were not full-time blacksmiths.
properties. At this point metalwork was more an art than a science as the blacksmith guided his work according to the texture, color, and feel of the metal.

Wrought iron is a nearly pure form of iron that has as little as 0.01 percent impurities or slag. These impurities create a horizontal pattern or grain in the metal. The treatment of the metal determines the formation of the crystals in the finished product and therefore dictates the properties of the iron. If steel is heated and cooled quickly, for example, the steel will form many small crystals. This makes the steel very hard but brittle. If the steel is cooled more slowly, larger crystals will result. This steel treatment results in metal that is more easily worked and manipulated.

Forging, which is one of the blacksmith's primary techniques, takes advantage of this crystalline structure. Blacksmiths forge metal by first heating and then hammering it. In part this is done simply to form the iron into its desired shape. Forging also flattens and elongates the crystals in the metal to form a sort of tightly knit grain. These interlocking crystals impart a greater resilience to the iron. Tools created by forging have a greater strength in that the grain follows the shape of the tool and binds the metal components into a single unit.

Although the blacksmith makes a wide range of useful objects, the majority of these items are created with only a few methods. Most of these methods are performed hot on the forge. Forging is one of these techniques. Through this method metal can be formed into a variety of shapes. A piece of stock metal can be drawn by heating it and hammering it until it makes a thinner and longer piece. Upsetting is the opposite technique in which a longer piece of metal is made shorter and thicker by heating it and then striking its end. This method often is used for making rivets. Bending the iron and punching holes are often done after the metal is hot.

Welding is another technique performed on the forge. Until the advent of oxyacetylene or electric arc welding, the blacksmith had to unite pieces of metal with forge welding. To forge weld, a blacksmith heats two pieces of iron to a white heat in the forge until the surfaces are partially melted. The two pieces are then fused together with a few correctly placed blows with the hammer. If completed properly, the weld is nearly invisible and as strong as the original pieces of metal. The blacksmith often needs a helper to hold the iron sections together for forge welding.
The most important single tool in the blacksmith's shop is the anvil.
this premium iron already commanded in Europe. By 1722 small smelting furnaces were being built along the eastern seaboard to take advantage of surface deposits of iron ore. The ample forests also provided charcoal, which was preferred for burning in the small furnaces used at that time. These furnaces produced batches of iron using a very labor-intensive process. It was a very simple procedure that relied more on the experience of the ironworker than on any scientific formula. Under the direction of skilled individuals, the process could yield an extremely high-quality product. Iron ore was mixed with charcoal and fired in small blast furnaces. The charcoal served to heat the ore and combine with impurities to draw them away from the iron. More of the slag, as the impurities are called, was squeezed from the hot iron with repeated blows from a heavy trip hammer. The operation of these small furnaces reduced the colonies' reliance on Europe and provided most of the iron they needed in the early years of settlement.

BLACKSMITHING TOOLS

At the heart of the blacksmith's activities is the forge. Although blacksmiths perform much of their work with unheated metal, the forge is needed for their day-to-day operations. The forge is required to make metal hot enough to be shaped easily and is also used to alter the nature of the metal through processes such as tempering. A forge may be made of any nonflamable material, such as brick, metal or concrete, or may be constructed of wood with earth packed inside of it for fireproofing. A forge also must have a bellows or blower to control the admission of air to the burning fuel to regulate its heat, and it must have a means to take away the smoke if the forge is located indoors.

The most important single tool in the blacksmith shop is the anvil. It may be made of cast iron or steel, but steel anvils are superior by far, as only steel may be properly hardened. The heated metal is shaped on the anvil, often by hammering. For this reason the flat face of the anvil must be tempered so it will be harder than the material being formed. The horn of the anvil is used to curve objects and is not tempered. The pritchel hole is used with a punch to make holes in metal so that the punch will not make an impact directly on the anvil. The hardy hole is used to hold specialized tools such as the hardy, a small wedge mounted on the anvil used along with a hammer for cutting metal. The hardy hole also can be used to hold a swage block, an iron block with a number of differently shaped grooves and holes used to shape metal.

TYPES OF IRON

Although there are many grades of iron, all can be grouped under three broad categories, each being determined by the amount of carbon found in the finished product. Of the three, cast iron contains the highest proportion of carbon. Although it is very hard, it also is brittle and is therefore not suitable for most of the blacksmith's work. Steel contains less carbon than cast iron. Steel is very hard and versatile, making it an excellent material for tools and items that must withstand higher levels of stress and impact. It is too hard, however, to be worked easily and is therefore not favored by blacksmiths for many of their projects. Wrought iron has the lowest carbon content. It can be pounded, twisted, and formed into a wide array of forms without breaking or splitting. Wrought iron also is remarkably tough and resistant to rust. Its main drawbacks are that it cannot be hardened or tempered. For many centuries wrought iron was used to create most of the everyday metal items. Because of its versatility, it is highly favored by blacksmiths.

BLACKSMITHING TECHNIQUES

Until the founding of the science of metallurgy, little was known about the actual mechanics of metalwork. Rather, blacksmiths and the smelters who provided them with their materials carried out their work with a personal understanding of iron and its
THE HISTORY OF BLACKSMITHING

One of the greatest turning points in human history came when man acquired the knowledge of metalworking. The strength of metals, coupled with their ability to assume virtually any form, allowed people to create new technologies that had not been imagined in the Stone Age. At first all metals were precious, and metal was used only for the most important tools and personal ornaments. Later, metal became a part of everyday life. When iron replaced bronze, the hardness of the new metal began yet another technological revolution. Iron soon proved superior for tools and replaced bronze for activities such as cutting wood and stone. The blacksmith was an indispensable part of this revolution. From its place of origin in the Mediterranean, blacksmithing spread throughout the Old World.

Through the ages the blacksmith’s work often has been surrounded by an air of mystery. This may be due in part to the nature of the art. Working with fire, the blacksmith transforms hard, unyielding metal into a variety of forms. Undoubtedly, the mystery also was created by the often secretive practices of the blacksmiths themselves. Trade secrets often were guarded jealously. Throughout the Middle Ages, blacksmiths frequently belonged to guilds that punished members who revealed their secrets to nonmembers.

Blacksmiths were essential members of any community. Prior to the Industrial Revolution, they created all iron or steel tools. The relatively high cost of such tools meant that most were repaired rather than being discarded. Local blacksmiths were responsible for these repairs. Without the blacksmith, no community could have survived for long.

Until the arrival of Europeans in the Western Hemisphere, the use of iron was unknown in that part of the world. Blacksmiths were among the first colonists in the New World, and initially they repaired the tools and gear brought from Europe. As the colonies achieved permanence, blacksmiths were needed to fashion new items for their communities.

In the early New England settlements, iron was a very precious commodity. Most of it was imported from Sweden and Russia. The shipping costs only added to the high prices that
Cover photograph: Jim Bevan of Valley Falls promotes the art of blacksmithing.

Back photograph: Historically blacksmiths did not share their trade secrets. Today blacksmiths such as Jim Bevan are eager to share their traditional skills.
TRADITIONS

Kansas has a rich and diverse folk art heritage. Within the state, artists continue to
practice art forms that are passed on from parent to child, worker to worker, and neighbor
to neighbor. Knowledge is taught by word of mouth or by example. Our folk arts are tra-
ditional in that they are part of an unbroken thread that can be traced back through time.
No set time period is necessary, however, for a particular behavior to become part of our
folklore. Instead, an art form must have existed long enough to enable variations to de-
velop. Once something is “in tradition” it no longer exists in a standardized form. Instead
local variants can be found.

Folk art is community bound. We all belong to many groups or communities
throughout our lifetimes. Ethnic, religious, occupational, and familial are but a few of
the communities in which we maintain memberships. To provide continuity in our lives,
some communities extend over time and distance thereby creating a traditional culture.
The folk arts of a group have been selected and supported by a number of people within
the community. A folk art is the product of a series of choices made by individuals which
in turn have been accepted by the group. Folk culture therefore represents the sum total
of a community’s choices, linking the present to the past.

Traditions is a series of brochures that focus on the folk arts of Kansas. The series
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FURTHER READINGS


A working blacksmith requires a wide range of specialized tools.