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WELDING FARM EQUIPMENT

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Welding methods are classified into two groups, "cohesion caused by pressing and hammering metals while in a plastic or fusion state" and "cohesion of metals in a fusion or vapor state." Forge welding is included in the former and oxy-acetylene and electric arc welding in the latter.

Forge Welding

The welding of iron in the forge is an ancient art. Historians tell us that the process of welding was developed by the Greeks about 600 B. C. At the beginning of the present century forge welding was the only process known and it was possible to weld only relatively small pieces of wrought iron and steel. However, within its obvious limitations forge welding was developed to the point where, in the hands of a competent blacksmith, a weld could be produced which was as strong and as good as the original piece. It is not possible to weld cast iron by the forge method. Within the last few years the old time blacksmith has largely disappeared and in his place have come the oxy-acetylene and electric welders.

Oxy-Acetylene Welding

The oxy-acetylene method of welding came as a result of the discovery in 1892 of calcium carbide by Morehead and Willson of Spray, North Carolina.

These men were experimenting with an electric furnace trying to produce aluminum by fusing coal tar and lime. Instead of aluminum the result was a hard crystalline substance which we now know as calcium carbide. The acetylene gas resulting from this substance being dissolved in water was first used for light and heat.

In 1908 the first commercial oxygen plant began operation making possible welding by the oxy-acetylene method. Since 1908 oxy-acetylene welding has developed rapidly and to a great extent has replaced the forge method. While the forge man is limited to the welding of comparatively small parts of wrought iron and steel, the oxy-acetylene welder works in copper, brass, bronze, cast iron, stainless steel, aluminum, white metal, hard overlays and many others.

The oxy-acetylene flame is approximately 6300 degrees Fahrenheit while the forge produces about 2500 degrees Fahrenheit.

Previous to the oxy-acetylene welding, a broken cast iron part meant ordering

a new casting with possible delay resulting, while now a good welder will make it as strong and as good as new, quickly and usually at a fraction of the cost of a new part. Cast iron may be either welded (melting or fusing the parts together), or brazed (similar to "soldering," using brass or bronze).

Brazing

Many welders prefer to braze a casting because it requires only a red heat, while in welding the cast iron must be heated to its melting point. Brazing causes less expansion and contraction and less danger of cracking. Although bronze welding rods cost about twice as much as cast iron rods, less gas is used in brazing. Therefore, on a small job the cost is about the same. A brazed job has some advantages over a welded one in cast iron because it will bend before breaking, while the cast iron will not. A good welded or brazed cast iron job will be equally satisfactory and will not break in the repaired part if made slightly larger than the original piece. Mild steel may also be brazed, and because bringing malleable iron to a molten state ruins its structure it should always be brazed.

Electric Arc Welding

Practically anything that can be welded with the oxy-acetylene torch can be welded by the electric arc method, and in most cases the results are equally good. As yet electric outfits are not generally used in repair shops but because of their low cost of operation they are becoming more popular.

Kinds of Iron

Cast Iron contains about 3.5 per cent carbon, is brittle, will not bend, and can not be worked or shaped while red hot as can steel. Although it can not be welded in the forge, it is easily welded or brazed with the oxy-acetylene or electric arc method. A broken casting may be identified by the clean cut break showing no bending and usually by a rough outside appearance showing marks of the mold. It is often used in farm equipment.

Malleable Iron contains from 1.5 to 2.0 per cent carbon and is cast iron that has received a heat treatment for a week or more, which changes the form of the carbon, making it tough and capable of withstanding considerable twisting and bending. It can not be welded successfully, but is easily and satisfactorily brazed with the oxy-acetylene torch. It

is used extensively in farm equipment as well as for pipe fittings, harness hardware, etc. A broken malleable casting has a somewhat smoother appearance than ordinary cast iron and bends before breaking.

Wrought Iron is practically carbon-free containing about .05 per cent carbon, is tough, can be bent and twisted, and is easily welded by any process. It is sometimes used for well casings and pipe, but because of its high cost has been entirely replaced by mild steel in farm machinery.

Mild Steel carbon content ranges upward from 0.2 per cent. It is extensively used in farm equipment in the form of rods, bars, channels, and angle iron, as well as for wire, nails, screws, and sheets. It is tough, strong, and easily welded by any process.

Tool Steel for ordinary tools such as drills, taps and dies, axes, knives, and chisels contains from .80 to 1.10 per cent carbon. It is much more difficult to weld satisfactorily than mild steel. The higher the carbon content the more difficult to weld.

Hard Overlays

Hard overlays are used on plowshares, drag teeth, and road machinery. In many communities the soil is of such nature that plowshares and other machine parts are so rapidly worn away as to make it worth while to have a hard overlay put on all parts where wear takes place.

These hard overlays are applied in a thin layer, rarely over 1/8 inch in thickness. Those with an iron base are welded or fused to the surface to be protected and the other type, which contains no iron, is applied to the surface similar to brazing.

Welding White Metal

Die cast zinc and aluminum alloys are used in many automobile parts, such as door handles and radiator ornaments. They are also used in making tools, toys, novelties, and electrical appliances. Until recently it has been impossible to weld or solder these. Now they may be easily repaired with the oxy-acetylene torch using a new type white metal rod.

Selecting a Welder

Many welders guarantee their work and although their charges are usually somewhat higher, it is one way to pick the better workman and is generally worth the extra cost.