MULTIMET® alloy

Heat Treatment and Fabrication

Forging

Ingots should be hot-forged, using an initial maximum of 2200°F. If the ingots are heated to higher temperatures, they will rupture at the surfaces and become badly oxidized. The minimum temperature at which MULTIMET® alloy should be forged is 1700°F. Forging at a lower temperature might have an adverse effect on the high-temperature strength of the alloy, especially if it is to be used at temperatures of 1300°F and above. The ingots should be thoroughly soaked at about 2200°F, after which forging can be conducted at a relatively fast rate. MULTIMET® alloy does not rupture easily and, in most cases, it is not necessary to use light hammer blows to break up the ingot structure. When reheating is necessary, the forging should be permitted to soak thoroughly to make sure that it reaches the proper temperature.

Forming

Cold-worked is the preferred method for such operation as spinning, drawing, and dishing. As the alloy work-hardens to a considerable extent, solution heat-treating between various stages of forming may be required to soften the material and restore the ductility lost in the cold-working operations.

Heat Treatment

Optimum properties can be developed in MULTIMET® alloy sheet by a solution heat-treatment at 2150°F for a time depending on the section thickness. This is followed by either a rapid air-cool or a water-quench. Bar stock and plate (1/4 in. and heavier) are generally solution heat treated at 2150°F and then water-quenched. Most wrought products are shipped in the solution heat treated condition.

Stress-relieving the metal after hot-working is advisable to eliminate internal stress. Heavy or intricate forging may warp during machining unless stresses are remove. The recommended stress-relieving procedure is to heat the alloy two to four hours at temperatures corresponding to the maximum service temperature to be encountered. The heat-treatment brings about a mild precipitation hardening effect simultaneously with the removal stresses.

Bars and forgings that have been solution heat-treated may be aged at 1500°F for four hours followed by an air-cool. This increases the Brinell hardness to a range of 192 to 241. Since bar in the aged condition is difficult to straighten and form, it is recommended that the bar be purchased in the solution heat treated condition and then aged after final fabrication.