

SEAMLESS TUBES IN MACHINE DESIGN

An increasing amount of seamless tubing is being used for mechanical purposes. The variety of shapes and physical properties which can be obtained in tubular sections gives this product special advantages for many purposes. A large proportion of the tonnage of mechanical seamless tubing made in America goes into automobile parts, bushings, roller and ball bearing, hollow axles, gas containers, working barrels, drill pipe, etc., etc. We have compiled a list showing 300 separate uses.

A number of typical examples of the application of seamless tubing to machine design are illustrated at the end of this paper, these showing bending, expanding, swaging, tapering, deforming, closing of ends, upsetting, and various combinations of these operations.

Table III gives in brief form the physical properties of the standard steels used in the manufacture of Shelby Seamless Steel Tubing, with standard heat treatment. The low carbon grade is particularly adapted to case-hardening, and is frequently used in tubular forms for this purpose.

AMERICAN VS. GERMAN PRACTICE

The manufacture of tubes and pipe in the United States differs from the German practice, principally in that the welding process has further developed and predominates in United States; whereas in Germany the manufacture of seamless tubes has been so simplified and cheapened as to generally fill the uses to which welded pipe is more generally applied in this country. In Germany this is accomplished by the use of small cast rounds ingots which are fabricated directly into tubes without the intermediate blooming mill and bar mill rolling operations. Of course the finished product is comparatively inferior in quality and cannot be compared with the tubes made from the rolled round or cupped plate, but may be sufficiently sound for many purposes. In Germany, as here, solid rolled rounds made of selected steel are used for the better class of tubing, and in special cases the solid round is drilled through cold and then rolled down over mandrils in the usual manner. There is naturally a wide difference in price in German seamless tubes, depending on the purchasers' specification, which determines the process by which the tubes are to be made and how rigid an inspection shall be given.

SIGNIFICANCE OF INSPECTION

Investigation has shown that so far as the quality of the steel itself is concerned, our methods of manufacture give as