METALLURGY

Lead, Oxygen, Silver Make Better, Workable Steel

New Processes Just Announced Make Vital Metal More Easily Machined; Prevent Corrosion in Sea Water

A NEW way to prevent corrosion of stainless steel in salt water, long an Achilles heel of an otherwise excellent structural material, was described to the American Institute of Mining and Metallurgical Engineers in Chicago.

Dr. H. H. Uhlig, research associate of Massachusetts Institute of Technology, described long continued research to seek the causes and the prevention of stainless steel's corrosion in salt water.

It has been this handicap which has, in the past, led the U. S. Navy to regard, with only mild approval, the use of stainless steel on naval vessels where it is subjected to sea water.

Dr Uhlig's research, supported by the Chemical Foundation grants, discloses that if stainless steels are exposed to air for some hours, or if they receive treatment by an oxidizing solution directly after the pickling operation, they will be corrosion resistant in salt water.

Dr. Uhlig has worked in a cooperative research at M. I. T. which has resulted in a number of important patents on ways of increasing the ability of stainless steels to resist corrosion. The scientists who have taken part in this research include John C. Wulff, Albert L. Kaye, Prof. Robert S. Williams.

Steel Jewelry

Among the M. I. T. discoveries is the use of small amounts of the chemical that produces smoke for warfare, titanium tetrachloride, to give stainless steel a lustrous and extra smooth new surface which is especially resistant to pit corrosion. This surface has such luster that it can actually be fabricated into beautiful jewelry, rivaling precious metals in appearance.

They have also found that minute amounts of silver, as little as 0.42%, can cut down the salt water corrosion of stainless steels more than 80%. The silver, moreover, greatly improves the rolling and machining properties of the metal.

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"LEADED" steel is the newest trick of industry to increase the machinability of its product and thus bring lower production costs. But not to be overlooked in the gathering wartime tempo of the nation's industry is the thought that "leaded" steel can increase the production of machine parts that are used in a thousand ways in everything from automobiles and airplanes to tanks and tractors.

At the meeting of the American Society for Metals in Chicago, "leaded" steel passed its strength and performance tests, it was disclosed in the report of metallurgists F. J. Robbins and G. R. Caskey of Bliss and Laughlin, Inc.

What is "leaded' steel? Merely the addition of small amounts of this soft, malleable metal to batches of steel. "Leading" turns these steels into stocks that can be cut faster on the lathes, gearing, cutting and milling machines of industry.

The result is less wear in cutting tools and dies, faster production and fewer breakdowns in streamlined mass-production operations. All these factors in peacetime mean lower costs that can be translated into a cheaper product, or into increased dividends as the manufacturer chooses. In war it means more machine parts for a war-geared industry.

The question mark behind leaded steel was whether it had the strength required for its ultimate job. Did not the addition of lead weaken the steel? Metallurgists Robbins and Caskey show that the strength remains unchanged while the machining properties are increased.

Sample figures on typical steel (S.A.E. X 1015), without leading, showed a tensile strength of 109,000 pounds per square inch. With the same steel leaded the tensile strength rose to 119,800 pounds per square inch.

For another steel (S.A.E. 1115) the unleaded form had a tensile strength of 66,300 per square inch while the addition of lead changed the tensile strength to only 64,250 pounds per square inch.

Here is what leaded steels mean in dollars and cents. In making pinion gears from leaded steel the "feed" of the stock could be increased from 130 to 160 feet per minute. The time of fabrication per part dropped from 22 seconds to 17 seconds. The cost of material for a run of 6,000 parts dropped $11. Because the machine ran less time for a run of 6,000 parts the labor costs and machine overhead were lower. Total saving for a 6,000 part run was $27.46 in an outlay of $534.44 previously spent.

This is a saving of 5.1% in a day and age when 4% return on an investment looks mighty good.

All the bugs are by no means removed from leaded steel. Particularly is there a job to do to obtain a uniform distribution of the lead throughout the steel. In some cases it now has a tendency to concentrate in spots that, under piercing X-ray examination show up like dense dark spots in the otherwise uniform gray of steel in X-ray pictures.

That is a problem for the steel men, however. The current report simply removes one of the major objections (lack of strength) raised against this newest, and valuable, addition to the great family of steel.

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NO APOLLO

No Apollo with classic profile is this sharp-nosed Greek face made of terracotta, now in the Metropolitan Museum of Art. It looks more Syrian, at first glance. Pronounced something of a puzzle, the head is tentatively dated about the end of the eighth century B. C. or dawn of the seventh, and it apparently shows Greek art in an early experimental stage. The head was thrown on a potter's wheel like a vase, and chin and cheeks were pushed out. The big nose was an extra chunk of clay, the mouth skimpily cut with a tool. Separate rolls of clay made eyelids, ears, long hair, fillet and necklace, and the cheeks were painted brownish red, hair black. It is almost life-size, and once was joined to a body.