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The Month in Focus

Engineering Materials

IN the normal course of events during peacetime the engineer is prone to follow in the rut of his predecessors. A few individuals are farseeing enough to visualize the opportunities that lie in the development of new materials or the improvement of standard ones. During peace times we have seen some outstanding developments which have contributed to improved efficiency. But on the whole, there have probably been fewer changes in engineering materials during the period between World Wars I and II than within either of the war periods.

In time of war it becomes necessary to expend an unusual amount of energy on the development of new materials. Often it is not only improvement that motivates this development, but the unavailability of certain materials which are necessary in the construction of war materiel. When the enemy takes over territory which supplies essential materials, it is necessary to produce substitutes. Demand for these substitutes is immediate; and it is imperative to the war effort that these developments come rapidly so that they can be utilized in the construction of war goods.

During the past two years we have been witnessing very marked developments in the application of such new materials. The tremendously increased requirement for aluminum and aluminum alloys in the aircraft industry has brought about great development and expansion in the aluminum industry, but apparently this has still not met the requirements of the aircraft industry for lightweight alloys. The situation has thus led to the development of magnesium resources in this country. However, the development of material production facilities alone is useless unless the engineer is provided with technical information concerning the properties of the new material. When one develops or finds a material which can be used as a substitute he has reached only the beginning point. Before industry is able to make use of this new material, much time, money, and the best technical brains must be utilized before the material can be employed for engineering applications. Take magnesium, for example. It has an entirely different structure from that of aluminum or iron or copper and thus it performs quite differently. It has many properties of which we would like to make use, but until we learn all of its characteristics its engineering application will be limited.

Other interesting developments have occurred in the field of alloy steels. Prior to the war the engineer was accustomed to the utilization of steels with quite high alloy content. With the advent of war many of our alloying elements became very scarce, and some could be obtained only in very small quantities. Careful study and the utilization of residual elements present in scrap steel showed that proper combinations of alloying elements in much smaller quantities produced steel of very satisfactory characteristics. It is barely possible that by virtue of this wartime shortage of alloying elements, we shall have alloy steels of lower alloy content, but with as satisfactory engineering characteristics. In wartime it is definitely true that "necessity is the mother of invention."

Plastics, whose accelerated development has been another result of wartime needs, are believed by some people to be capable of replacing metals in a great many cases. Careful thought, however, will show that plastics cannot supplant the metals in every respect and that undoubtedly, our metals will continue to be used in about the same tonnage as heretofore. Some very important advancements have been made in the engineering application of plastics. Other developments have led to the production of plumbing parts, sprinkler nozzles for the garden hose, and other common items formerly made of metal. If war produces any benefits other than the winning of peace, it certainly can be stated that war is a tremendous stimulus to the development and improvement of materials and to pioneering in their uses.

Production Processes

What has been said for the development of engineering materials in time of war may also in certain degrees be said of the development and improvement of production processes. War necessitates a great increase in the rate of production. From this it does not follow that the efficiency of production is increased. In these times when unskilled labor must be trained to take the place of the younger men who are called upon to enter military service, and when women who have never done production work before enter industry by the hundreds of thousands, it is difficult to increase production rates unless improved methods are developed. These process developments naturally will carry over into peacetime production methods.