



The Month in Focus

THIS issue of *Engineering and Science* is largely devoted to a review of the ceramic research completed and in progress under the direction of the Industrial Design Section of the California Institute. Like almost all other current Institute activities, this research was undertaken in response to special needs created by the war.

During the past two years we have seen endless examples of industrial advances made under the stimulus of war necessity. There have been very rapid developments in light metals, alloys, and plastics. Manufacturing equipment and processes have been as rapidly improved. And American ingenuity and resourcefulness are challenged by the problem of substituting noncritical for critical materials in order to maintain production of essential consumer goods.

In this last field the ceramics industry has a particular opportunity. Both the materials and the labor required in the industry are, in general, noncritical. And southern California is a particularly advantageous place in which to explore the possibilities of ceramics development, because there is already an impressive industrial development in the ceramics field in this area. In view of these considerations a Ceramic Research Committee was set up under the sponsorship of the Institute's Industrial Design Section. The ceramics industry has provided both financial and technical assistance, and members of all the departments of the Institute have collaborated as a research staff assisting the students and faculty of the Industrial Design Section.

At the start, a varied and extensive research program was approved, and reports have been prepared as results were obtained. Research projects ranged all the way from lightweight refractories, low-loss high-frequency insulation, nonmetallic heaters, chemical stoneware and builders hardware to cooking ware, table ware, and costume jewelry. The articles which follow are a representative selection from these reports, designed to show some of the more fundamental, general problems investigated as well as specific designs for particular purposes.

The most fundamental problem, of course, is the nature of the material involved. Investigations of the physical composition and structure of clays provide the basis for precision laboratory techniques for the control of ceramic materials and aid in the design and manufac-

ture of new products with improved resistance to temperature and mechanical shock.

Equally fundamental, from the point of view of the sales branch of the industry, are the market surveys. An example is given here of such a survey applied to permanent roofs of ceramic material, the results of which will be useful in planning production for postwar building. And supplementing this, the analysis of types of roofing tile provides a basis for improved designs.

Examples of the solutions of specific problems are presented in the ceramic gauge and the ceramic street light reflector.*

The contributions which can be made by industrial engineering are shown in the cooperative studies made in one ceramic plant in this area. The ceramics industry, perhaps because it is one of the oldest in the world, has possibly been inclined to run in traditional grooves. The results of time and motion study of the manufacturing process and analysis of materials and products flow demonstrate how industrial engineering techniques can raise the efficiency level of the industry.

Thus the whole program of research already has accomplished several related purposes. It has added new products to and improved the methods of the ceramic industry—results which will continue after the war is won. It has offered a challenge and a stimulus to the students and staff of the Industrial Design Section. And it has demonstrated that in this as in any research the most effective results can be obtained by calling upon a variety of skills and aptitudes.

A forecast of things to come in ceramics will include lightweight refractories of California and other West Coast materials which will withstand abrasion, erosion, and higher mechanical loading—ceramics having more of the properties of metals. It will include cold set clay products which are neither strictly cements nor plastics but are low in cost and are both time and weather resistant. Soon we shall see lightweight ceramic roofing for low pitch California roofs that shelter a household heated, supplied with much of its décor, and furnished with its kitchen and table ware at low cost and using new forms of materials dug from mother earth. Ceramics will be able to deliver, even before the Axis admits defeat.

*Due to space limitations, the description of the street light reflector will appear in the June issue of *Engineering and Science Monthly*.