

# INDUSTRIAL DESIGN ENGINEERING

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Whatever may have been true in the early days of American industry, the pressure for enormous production rates and low cost leaves no place for designs that ignore the latest products of the chemist, the toolmaker and today's habits of living. Manufacturing facilities involving millions of dollars of investment and the productive ability of thousands of trained workmen cannot afford to guess at public acceptance of their products. A new profession resting on the shoulders of the engineer, guided by the needs of the merchandiser, and seeing with the eyes of the artist, is making industry more productive and its very output more attractive, more effective for those who must live and work with it.

From time to time in ages past, some outstanding genius has combined the (1) knowledge of the science of his time with (2) a feeling for materials, (3) an understanding of the needs and the habits of his time, all held together with (4) a constructive form of art, and the result was a Leonardo da Vinci or a Christopher Wren. Many others more obscure because of a weakness in one or more of these four qualities, have lived to make some additional small contribution to the progress of the world. But only in the age of mass production, low manufacturing and distribution costs and startling new materials like the plastics can the work of one person really affect every one, quickly and decisively.

The economical, efficient use of material always is a thing of beauty, certainly to the engineer. The proper forming and application of those materials as applied to everyday living goes far to make such a product sell in vast quantities. A visit to those stores specializing in articles of mass distribution and low cost indicates the trends in habits and the buying preferences for graceful, light, colorful, inexpensive, practical objects. No longer is it the privilege only of the wealthy to have beautiful things, new things — unless the very possession of those things is indeed a new form of wealth.

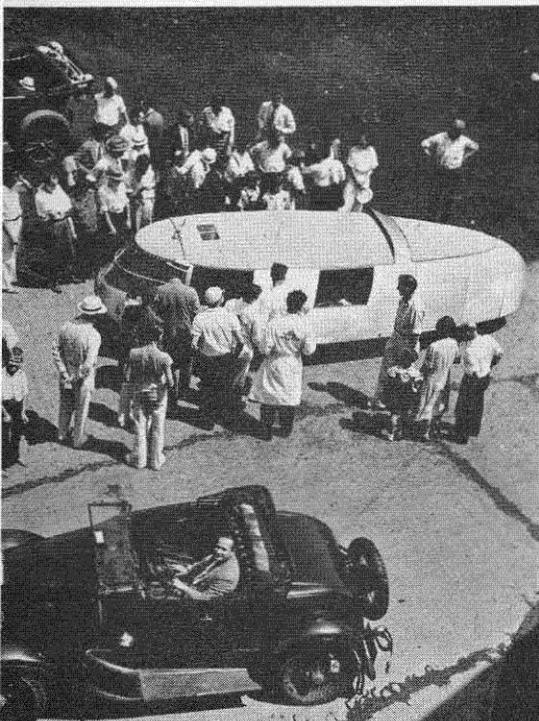
The United States of North America is a new country as a nation, new in its ideas, its method of life and its wants. We

who live within its boundaries have no interest in or reverence for antiquity for its own sake, but we will often go to the extreme for some new development. In fact, the whole world is rushing for something new, a new color for milady's toenails, a new coiffure, the latest in clubs and restaurants, books, autos, homes, "New Deals," "New Orders," and new debts. Obviously these are not all better, cheaper, or larger, and frequently they are even masquerading under a false use of the word "new." Nevertheless we all recognize the word "new" as potent in everything from a real estate subdivision to an Easter costume.

Much waste can occur when newness means only something different. To be different may mean only being odd, not better. However, a better thing will not be odd for long, and it is the Industrial Design Engineer's job to see that all our new things are really better so that our quantity production experts will never have to face the high cost of a few odd sales but rather only the problems and economies of mass acceptance.

An artisan takes pleasure and pride in a well-conceived and well fabricated object, but his pride continues on to its successful performance in service. While art for art's sake may teach us to make clay birds to ornament the chimney tops of an office building or a museum's shelves or even the odd corners of the home, the *artisan* has given us the flight of birds for our own locomotion, including unfortunately all of nature's problems with the predatory varieties. Art patrons today are the masses who work with their hands to buy labor-saving devices, instead of those who are wealthy but no longer care to fill a vast dwelling with art bought and executed on commission. Today real art is in the mail order catalogue, because of mass production and efficiency born of low prices; in fact, it was there well before it found the exclusive shops. Art is no longer a thing for the few, the product of those remote from modern life, working by whim, starving for fame. Today lawn-mowers, refrigerators, autos, office equipment, labor-saving devices for the home are beautiful, not with only a shell of beauty, but designed to be a harmonious unit, doing their work efficiently and looking smooth and business-like.

The few hundred autos that were in fact horseless carriages were queer things even when thought of as oddities, and oddities they would have remained except for the halting year-by-year struggle of mechanics and salesmen and owners to re-design them, and the last six years' efforts of artists to re-style them. Today one large motor manufacturer alone will employ hundreds of designers trained as artists, and many *retrained* as engineers, making the product a harmonious whole, "fitting the purse," satisfying a love for beauty and color, and offering the elegance of the salon. The first auto no doubt gave its inventor worry enough without considering balance of form and harmony of color. The engineer, by making functional improvements, simplified the manufacturing operations and made a smoother, better balanced product. The designer contributed a better balanced exterior and thus forced the use of still better balanced mechanisms. Thus the two have steadily grown to-



Left: *An interesting example of the product of the inventor and designer contrasted with the contemporary product of the engineer and manufacturer, 1933.*

ward each other.

Many years ago a much revered professor of machine design at the Institute cautioned his class that many things that looked all right might be quite wrong, but nothing that looked all wrong could possibly be all right, at least mechanically. This strong appeal for the approval of the eye is a powerful appeal to the pocketbook — witness the beauty shops and the benzine buggies — and of course a real sales appeal does much to keep the factory running at a profit.

Back in 1920 industrial design came from artists, architects and sculptors, even stage and costume designers. The manufacturers were nearly forced to give up design attempts because of the mannerisms of the designers and their pride in a complete lack of knowledge of engineering and production problems. But a few designers were quick to learn, and the factory heads have been patient teachers.

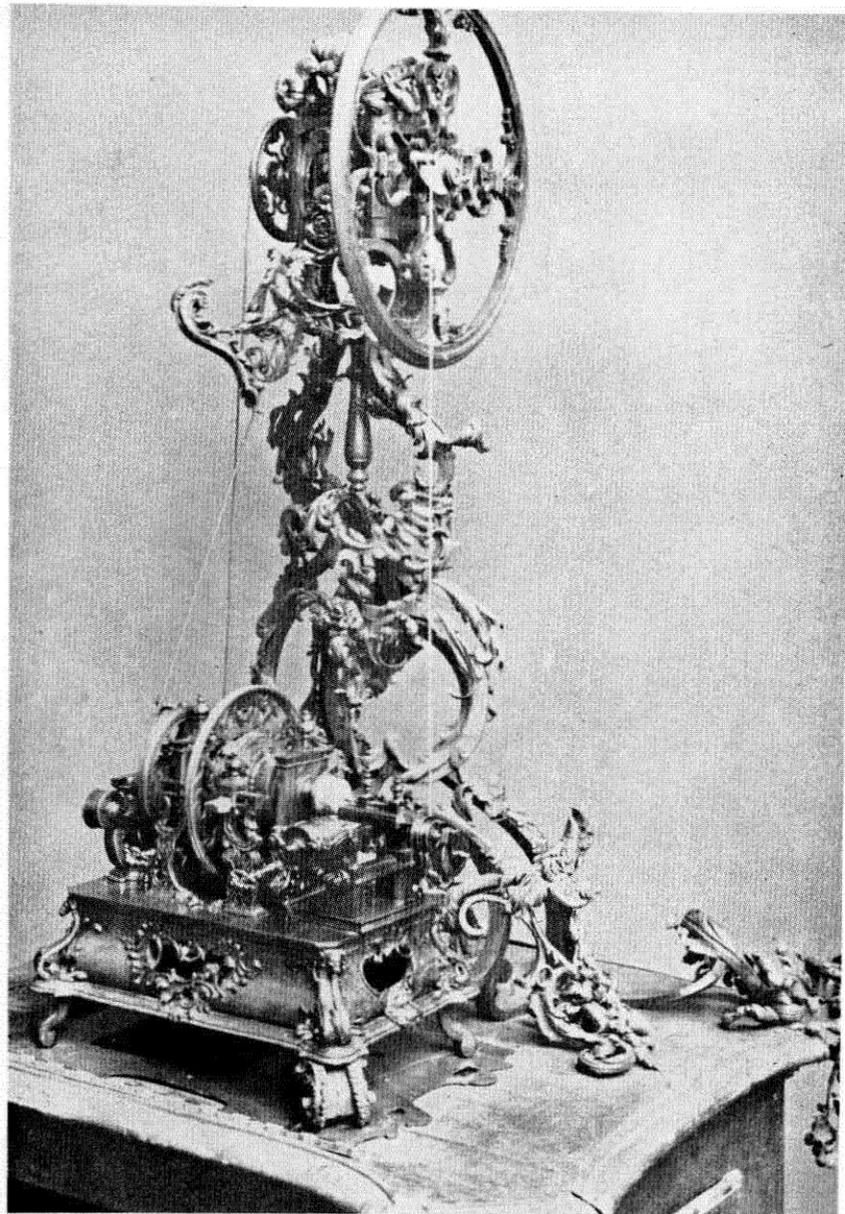
Many are the industrial stylists and far too few are the real industrial design engineers — but while the first, like the stage designer, may change the American scene with a new wrapper for the old locomotive, the real industrial design engineer understands the problems of the mechanical and the structural engineer, the production man and the sales engineer, and works with them on the design just as an electrical or civil engineer must work with the related branches on the plans of a power plant, factory, or school.

#### “EYE APPEAL” IN DESIGN

Many engineers, and in fact most of the buying public, today cannot tell you just what constitutes good design. When asked, they will most often describe “eye appeal” for their definition. If they mean the factors of good taste that appeal without imposing on our consciousness directly, they are partly right. If they mean a device which works smoothly, silently, efficiently, and looks the part, they are again partly right. When you get the comments of the production man in the tooling division, you will appreciate the following from the magazine, “Product Engineering,” written by Ken Lane:

The designer bent across his board,  
Wonderful things in his head were stored.  
And he said as he rubbed his throbbing bean,  
“How can I make this thing tough to machine?  
If this part here were only straight  
I’m sure the thing would work first rate.  
But ’twould be so easy to turn and bore  
It never would make the machinist sore.  
I better put a right angle there  
Then watch those babies tear their hair,  
Now this piece won’t work, I’ll bet a buck,  
For it can’t be held in a shoe or chuck.  
It can’t be drilled or it can’t be ground  
In fact the design is exceedingly sound.”  
He looked again and cried — “At last —  
Success is mine, it can’t even be cast.”

Industry rightly expects a real job of good design to mean low cost production for volume sales. Ask the salesman and you will find he thinks of “good design” as something that makes people have a friendly feeling toward the product, a



Above: An intricately ornamented “rose engine” designed in Germany in the Seventeenth Century for metal engraving. The ornamentation was intended to disguise the nature of the machine in a mistaken effort to “beautify” it.

desire to have it near them, that offers something new and fresh in style, that fits into the purchaser’s scheme of living, and keeps them as good repeat prospects.

The “something new” design period (even when the selection, color scheme and all, was referred to the new girl in the file room) hit American industry about 1934. Judging from some of the results, especially as to color and balance, quite a number of talented young ladies must have worked for the many heavy industries, because many of the results were a big improvement over the ideas of the superintendent of production. After spending thousands of dollars on new drawings, contemplating thousands more in new jigs and tools, occupying the best minds in financial, sales and production departments on the problems for weeks, it was indeed fortunate that the file clerk could be familiar with buying habits of the nation, the preference for color in each geographical district and price class, that her knowledge of form and balance had been perfected by careful study, her judgement well-trained to decide whether the banker, the sales manager or the sales superintendent was backing the wrong design.



Above: *An illustration of the progress in design from the inventor's model (on right), through the merchandiser's improved type, and finally to the industrial designer's finished container in plastics (on left), which combines distribution packages as well.—Designed by Virginia Merrill.*

Good tools are obviously beautiful to a good mechanic because of their ability to turn out the work. Their appearance, due to the utilization of new processes and materials such as profiled steel and electric welding with their resultant lighter weight, lower cost, quicker delivery, does not directly concern the mechanic. Yet offer him a job in a new plant where they have all the latest tools, and he will think and speak first and often about the *new* plant, brag about the *latest* thing, etc., even though the new tools may not turn out more or better work than he turned out on the big, heavy and expensive power wasters he used before. If he does turn out more work and take better care of his tools, it will be largely because of some change the new surroundings have produced in him. Living with modern design produces a feeling of which we all are capable but the exact reasons for which few can analyze, and it is no doubt this for which we strive in our search for the "New."

#### DESIGN AND PERSONALITY

The household reflects the personality of those individuals who form its very heart, but the surroundings, in turn, influence the personalities in their daily contacts with each and every function contributed by these minor items. The pleasure and convenience of a well-equipped establishment often are responsible for the pleasing personality ascribed to the hostess. Articles of good taste and good design, satisfying proportions and over-all attractive appearance cost no more to manufacture than many of the atrocities marketed for those who do not appreciate simplicity and the straight-forward application of sound functional principles.

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For those who do not now appreciate these advantages, the design engineer makes it possible for the manufacturer to offer the appeal of a saving in cost and a more efficient and more durable product. The builders of early steam engines, faced with a pride in their product and in a distorted sense of the methods of improving that product, tried giving the customer vast expanses of cast-iron scroll work, elegant capitals and pedestals on fluted columns instead of truly structural parts designed for their function in the machine. Early German machinists so embellished their tools that it was quite impossible to discover their purpose for many years after they had been incorporated in the collections of some of the large museums. The engineer is primarily interested in function, and his task and that of the industrial design engineer are much alike; namely, that of getting the lowest cost and the greatest efficiency available to the greatest number. The techniques of the designer, the renderings of the artist, the dreams of the inventor, and the analysis of the merchandiser are all vital parts of an industrial engineering design project.

Design applied to aviation finds function, freshness, and simplicity an essential part of the engineering. In fact, aviation has taken up all the tools of the Industrial Design Engineer as its own, not as a guiding method, as in the automotive industry, but as the underlying expression of all its design and presentation. It is fitting that America's newest and most vital industry should have taken advantage of the forward steps offered by the methods of the Industrial Design Engineer in studying and presenting his problems and their solutions. As time goes on, all industry will benefit from the more graphic and exact expression of functionalism.

Below: *Design of a complete line of gas heating equipment showing two automatic water heaters and two circulating heaters, one designed for recessed installation in the building wall. These products were designed to eliminate the need for castings and expensive details.—Courtesy Day and Night Water Heater Company, Designed by Baermann and Lewis.*

