THE IMPORTANCE OF STANDARDIZATION TO OUR AMERICAN ENTERPRISE SYSTEM

19 February 1948

CONTENTS

Publication No. L48-89

THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

WASHINGTON, D. C.

It thus appears that any plan for industrial mobilization has to deal in a very acute form with the problem of standardization. The first of these functions is the establishment of a fixed and solid basis to serve for coordinated planning of details. This "stabilization" calls for strict specifications. The second function of standardization, which actually is its essential purpose, is the coordination of human efforts with the machine operations in order to develop maximum output.

Too rigid stabilization is antagonistic to progress. It tends to preserve the designs, operations, and processes that are valid today but outmoded tomorrow. It also tends toward the continuation of existing production equipment, such as patterns, tools, dies, and gages, and thereby fails to take advantage of the most up-to-date equipment and techniques.

Effective coordination should indicate the importance of shifting periodically from one standard level to the next better one. In warfare this may happen rather frequently. Therefore, it is important that the caisson on which the coordination is erected should not be "anchored" too heavily, lest a change in level, when it becomes imperative, cause too great a disturbance.

In the modern technique of writing standard specifications, several principles should be observed in order to keep the standards as flexible as possible. Some of these requirements will be discussed here with a special view to the coordination of military requirements and industrial capacity to meet these requirements.

To be flexible, a standard should not contain more requirements than are strictly necessary to secure the performance at which it aims. Any requirement written into the standard that is superfluous in this respect must be considered as ballast. It reduces unnecessarily the number of sources which can meet the standard. This may apply to contractors asked to supply the product, manufacturers called upon to make it, or distributors asked to stock it.

Standards for military equipment should be confined so far as possible to specifications normally used in regular industrial production. This will go far to minimize the difficulty of shifting from peacetime to wartime production.

Special items required by the military forces (and there are inevitably many of these) should be designed to permit the application of regular manufacturing practices if at all possible. This will shorten greatly the time required to get into production when the emergency arises.

THE IMPORTANCE OF STANDARDIZATION TO OUR AMERICAN ENTERPRISE SYSTEM

19 February 1948

GENERAL McKINLEY: Gentlemen, this subject of standardization is rather like the weather. Many people discuss it but few do anything about it. Our speaker today is one who has done something about it. He is one of the rare individuals who has what we consider an ideal background to discuss the problems of standardization. He has had practical experience in some of the highest positions in industry and administrative experience in the Government and in industry in an active standards organization. At the present time he is Chairman of the Executive Committee of the American Standards Association and President of the International Standards Organization, which he helped to found. I take extreme pleasure this morning in introducing to you Mr. Howard Coonley. Mr. Coonley.

MR. COONLEY: Gentlemen, I am always concerned about these introductions because they indicate that I have knowledge that I do not possess. I am not a really good engineer and I don't know very much about standards. But, I have made a beginning and having had only forty-five years experience in industry, I still have time to learn.

I thought as I stepped up to this platform of a story that really illustrated my position today and where you may find yourselves sometime in the future. In World War II I was Vice-President of the Emergency Fleet Corporation. My responsibilities included all phases of administration. The other vice-president was in charge of construction.

Charles Schwab, who was one of the most lovable and ablest individuals I have ever met, when he turned these positions over to us, gave us just two bits of instruction. One of them was that he didn't want to have us come to him with anything that was important. The other one was that he didn't want any important letter to go out of the Emergency Fleet Corporation that was not signed by one or the other of us.

During my first month I sat up until about three o'clock every morning going through a great stack of mail that I had to sign. After I had worn myself out I realized I didn't know very much about the subject matter of the letters I was signing. But I had gained a knowledge of the ability of the individuals who wrote the letters. One of those individuals was Daniel Cox, of the firm of Gibbs and Cox, who were then the greatest naval architects in the world. So when Dan Cox's letters came to me, I just put my name on them and shipped them out.

discontent over the volume of operations in the black market. My American friends, who had been residents of Paris for many years, told me they feared a swing toward communism and felt that the only hope of preventing such a surge would be the materialization of the Marshall Plan which had just been announced. I am confident that it is the increasing hope for the realization of that plan that has brought to France the recent Rightist movement.

In a brief talk of this kind I can touch only lightly on the world situation. I am sure that it is evident to all, however, that more than ever before, complete preparedness at this time is the best assurance of continuing peace. It may be that only the growing realization of the devastation that a war in the atomic age would bring will prevent another world catastrophe.

Modern war is total war in the sense that the entire nation is transformed into an arsenal. Mass production methods, which are the only ones that can cope with the required volume of production, cannot be applied effectively without the greatest possible application of standardization.

History shows that standardization always has been an important factor in warfare, as well as the preparation for warfare. And conversely, that military preparation has greatly influenced the development of industrial standardization. Yet, even in the years prior to World War II, not sufficient attention was given to the value of industrial standardization to military preparedness. It has been reported that after the First World War Lord Stevenson, Vice-Chairman of the Ministry of Munitions Advisory Committee in Great Britain, said, "If simplification and standardization had not been adopted, we would have lost the war." It is true that on the first page of the Industrial Mobilization Plan 1939, published in this country, the statement was made "War is not longer simply a battle between armed forces on the field--it is a struggle in which each side strives to bring to bear against the enemy the coordinated power of every individual and every material resource at its command." However, this statement obviously had not been observed in practice. Witness the statement made by Henry L. Stimson, who became Secretary of War in July 1940. In 1943 Mr. Stimson wrote "When I came here in July 1940, we didn't have enough powder in the United States to last the men we now have overseas for anything like a day's fighting...We had no facilities for manufacturing weapons, except our six little Government arsenals whose capacity is only five percent of the facilities we have today."

As we see it now, the problem of organizing industrial mobilization consists of two major steps which have to be carefully coordinated. One is the establishment of standards for military equipment that will give

Here then is where the American Standards Association performs its most useful service in the area of national security. As the central coordinating body for the processing of standards for military as well as industrial requirements, it is an ideal agency to perform the functions which national security requires.

Before I leave the subject of national standardization I should like to touch upon those benefits that have accrued over a period of years to our peacetime economy, and which are still available in broad areas, to make possible more goods at lower prices to a greater number of consumers. I shall give a few examples from my own experience.

I returned from my responsibilities with the Emergency Fleet Corporation in World War I, greatly impressed with the importance of standardization, particularly in the fields of specifications to provide interchangeability, simplification to make possible mass production, and substitution to make use of material that is available in place of that which is in short supply. I found that the valve fittings industry, of which my company is a member, had done little or nothing in any of these fields. A brief study of 22,000 finished items which my company produced, developed the unpleasant fact that 64 percent of our tonnage was confined to 1,500 of these 22,000 items. A campaign was immediately started for the education of our industry and of our customers, which ultimately resulted in the elimination of a large portion of these short-run items. The War Production Board estimated that this type of simplification made possible an increase of 25 percent in World War II output, to say nothing of the savings in inventories and transportation.

Some fifteen years ago six of the major oil companies notified the valve industry that they had set up individual specifications for all sizes of the 150 pound and 300 pound pressure steel valves and steel fittings, and that within a comparatively short period of time only products made to these specifications would be acceptable. An estimate by the engineering department indicated that the cost of patterns, tools, jigs, and fixtures to make these lines would, for my company alone, involve an investment of more than two million dollars. This was out of the question. Fortunately, the valve industry had set up a Standardization Society of its own which was cooperating with the standardization groups of the American Petroleum Institute in other fields. A proposal by the Standardization Society of the Valve Industry to the American Petroleum Institute, that a jointly sponsored committee be set up under the procedure of the American Standards Association to develop a single standard for these important lines, was immediately accepted. Within two years the new American Standards were issued. The cost to my company for the changes amounted to only $36,000. Naturally the cost of the valves to the petroleum industry as well as to other industries has been far below that which would have been necessary had the six individual sets of specifications been insisted upon.

and the enthusiasm of the new organization will mean much to their progress. Many of the projects are in fields of great importance to international trade in times of peace. Some of them will be significant for international security.

DR. HUNTER: Back in the thirties, if I recall correctly, standardization activities met with some difficulty due to the antitrust provisions of the law and the Department of Justice's opposition to industries getting together. What is the case in that situation at the present time?

MR. COONLEY: The Department of Justice has investigated ASA procedures on several occasions. While the Department never gives blanket approval to procedures of any kind, it has appeared favorably impressed by ASA's democratic methods. It has made no objections.

One criticism of standards has come about through a misunderstanding. There has been in the past considerable feeling that standardization meant regimentation; that it prevented ingenuity and inventive genius. If it does that, it is not proper standardization. In my written speech I said something about the fact that it is just as bad to over-standardize as it is to under-standardize.

I want to give you some instances of what I mean, because my comments may be also comments on human nature.

The ASA is made up of about 112 engineering societies and trade associations. In 112 groups of individuals you get all sorts of attitudes of mind. It has been my experience that those societies or trade associations that are the most effectively integrated are the ones that are most jealous of anybody stepping into their areas of activity. Two of our member bodies which are most efficient in their own areas are ones that are very reluctant to come to the ASA to get help in bringing into their standards development all of the groups having a major interest. Of course that is basically the purpose of ASA. No American standard can be created that has not been submitted to all the groups concerned and which has not had a pretty complete consensus of approval.

Now, one of these two member groups that I have in mind is one from which, frankly, we have had difficulty in getting enough money to pay for even a portion of the cost of the work we are doing for them. They claim that they don't need the American Standards Association on most of their activities because their own society can do the job. In many cases they can. But recently in talking with a special subcommittee of that industry, which has been appointed to consider the relationship between that industry and the ASA, they literally raised

these ISO meetings, I think that world peace and world understanding would not be difficult to attain." But, of course, that is not true when it comes to politics. But the Russians were most helpful.

Of course, they are doing a tremendous job of standardization in Russia, because there it is a matter of mandate. They are turning out about two standards a day. The French are turning out about one a day.

QUESTION: From the point of view of national security do you think it is wise to standardize with Russia?

MR. COONLEY: Not too much. Of course, I think basically the world is pretty much an open book.

You all know that Germany had done a tremendous amount of standardization before World War II. I think, and authorities with much more intelligence that I have believe, that it was the fact that they had standardized almost completely before the war that brought about their effectiveness during the first few months.

Now, of course, the Russians are doing the type of standardization that we are against, that is, inflexible standardization. But I think we get more out of international standardization than we lose. I think many of you know that there was a really effective accomplishment in the standardization of certain components between Great Britain, Canada, and the United States during World War II. This was particularly true of the standardization of acme threads, buttress threads, and cylindrical fits. We started on the standardization of fine screw threads. That is still going on. Sometime we are going to complete these standards. I think the dangers of helping the enemy more than ourselves are not very great, because we had very serious difficulties in producing parts, for instance, for Great Britain's airplanes, tanks, and trucks because of the lack of standards in such simple things as gaging practices and inspection practices.

QUESTION: You have spoken about flexibility of standards and specifications. Isn't there a problem there of the interchangeability of parts between articles which conform to the old and those that conform to the new specifications? If you have thousands of machine guns out in the field and you want to adopt an improved design, you might get noninterchangeability of parts between the new and the old. You have to balance the economic and strategic factors, don't you?

MR. COONLEY: I tried to bring out the fact that before any changes of that kind are made, the balance as between the effectiveness of the change and difficulties brought about by the new design and the objection of production people to the new design ought to be weighed. But if you

During the war there was evidence that the Department of Commerce wanted to take over the whole job of standardizing. That resulted in an investigation by the Under Secretary of Commerce, Wayne C. Taylor, which in turn brought out a recommendation by his special survey appointee and later by a committee of industrialists that the responsibility for standards should be vested in private enterprise through the ASA, and that the Department of Commerce should confine itself largely to the fields of research and advice, but not refuse to develop standards where the group which came to them did not want to go to ASA.

Frankly, for the first year and a half that did not work very well. Naturally the Department of Commerce men were reluctant to give up some of their authority. More recently progress has been made in a very natural way. There is no conflict left of that kind. Dr. Crittendon, who is Associate Director of the National Bureau of Standards, is now the chairman of the ASA Standards Council. He himself believes very definitely in private enterprise doing this job, and is lending all of his influence in that direction.

I am glad to say that Dr. Condon, who originally was very reluctant to see the Bureau of Standards lose some of its prerogatives, and Secretary Harriman, who couldn't understand why a change was needed and who thought we were trying to toss the Bureau of Standards men out the window, have come to see the light. There is no controversy between the National Bureau and the ASA today. They are supplementing each other very well. There are certain areas in which they coordinate closely with ASA. Certain of our committees are chairmaned by members of their staff.

GENERAL McKINLEY: That was the point I was making. You very wisely integrated them into your organization so you could work together.

MR. COONLEY: Yes. And it is working very well.

QUESTION: How are you getting on with the question of standardizing drawing procedures?

MR. COONLEY: We are taking a new "lease of life" on standards for drawing-room practice. From 1946 until a few months ago progress was infinitesimal. But recently the ASA membership has shown great interest in this project and the Sectional Committee is being reorganized.

Another tremendous piece of work which we have undertaken, which is going to progress well, is standardization of office supplies and equipment. That subject, as you can imagine, covers a large area. Again we don't want to tell the producers of office equipment just what they shall make. Any standardization that is done, however, along certain basic lines, will add greatly to speed and efficiency and moderate cost. But standardization of drawings is coming along very nicely.

Significantly enough, we found during the war that we were desperately lacking in capacity in certain items. While it is true that we built practically every type of machine tool that was needed, there was a great lack in certain areas. Particularly was this true in some of the very heavy tools--large planers and large boring machines. As a matter of fact, in the United States today there are only two manufacturers of very heavy planers, very heavy turning lathes, and very heavy boring machines. You may be surprised to learn that at about the time we entered the war we had to obtain a number of very heavy boring mills from England in order to get into production ourselves in some very vital naval and army ordnance work.

What is the situation in general with respect to our machine-tool industry today? Let me give you some over-all figures that I think will clarify it for you. At the beginning of World War II there were in existence in the United States approximately one million individual production machines classified as machine tools. We produced during the war years a total of about 1,100,000. Let me go back further and say that two-thirds of the machines that existed at the outset of the war were more than ten years old. We were heading toward a serious degree of obsolescence. At the present time, having kept in this country over 800,000 of the 1,100,000 we produced during the war (the remainder having gone to our allies) and having disposed of a large proportion of those since the close of the war through disposal of government surplus, we have in the United States, either in the hands of the Government or in private use, about one and three-quarter million machine tools. More than half of those machines were produced during the war or since. To that extent we more than doubled the productive capacity of the country in general.

Here is the disturbing situation, it seems to us, from the standpoint of our future defense program as it relates to industry: These machines are, to a large extent, out in private enterprise. Experience at the beginning of the war and all through the war showed that it was extremely difficult to pull these machines in for emergency war use. It is true that we finally made use of practically every facility in the country, but it took a long time to accomplish this. It was very difficult to bring these types of machines together and put them into plants where we could really use them. Now, after much effort, after agitation on the part of the Services for reserves of machine tools, and after consideration by Congress, we have finally set up a reserve of 90,000 machines in this country--90,000 machine tools. It seems like a good many; but when you consider that we produced during the war 1,100,000 machines and that we also used a large proportion of all those that existed in domestic plants in the country, you will realize what a small proportion of what is required for war production that little figure of 90,000 represents.

MACHINE-TOOL PROBLEMS

19 February 1948

COLONEL CRANE: Gentlemen: I think most of you realize by now that you cannot get very far in the study of wartime production problems without running head-on into the problem of machine tools. Securing early delivery of machine tools in 1940 and 1941 was very much like trying to get early delivery of an automobile in the last year or two--only infinitely worse. Everybody was ordering machine tools and wanting them the "day before yesterday." The manufacturers had many headaches because they could not get the machine tools, and the machine-tool builders had many more headaches trying to meet the demand.

Today we are very fortunate in having with us a man who can discuss the problems which the machine-tool industry faces in time of war, with a broad background of knowledge as a result of his experience as a machine-tool builder. During World War II he also served in the Tool Division of the War Production Board and was, thereby, very familiar with the problems of the various armed forces. He will talk to us on "Machine-Tool Problems."

I take great pleasure in presenting to you Mr. Alexander G. Bryant, President of the National Machine Tool Builders' Association. Mr. Bryant.

MR. BRYANT: Colonel Crane and gentlemen: It is a pleasure to be here. It is a pleasure to speak in a room of this type to a group that I know has some understanding of our industry's problems and some appreciation of the thinking of our group. I appreciate this opportunity of consulting with you and should like to ask that you look upon the remarks that I am about to deliver to you as being merely introductory and of such a nature as to permit development of the points covered by questions and discussion later on. It may interest you to know that I testified before the House Foreign Affairs Committee yesterday. I hope to share with you some of the observations developed at that time.

I have been told that you would like to know something of the machine-tool industry, its outlook, the problems that it met in the late war, the problems it will face in the future, and something of the technical phases of design and production that have occurred during and since the war. I hope you will pardon me if some of my comments at the outset appear to be elementary. I really feel, however, that even in the circles of our own industry we have to reiterate certain facts about our business that have not been too well understood or appreciated and which are fundamental if we are going to make use of our industry in the future in an efficient way.