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mills that we used for tank construction are absolutely useless. Many of them have been scrapped. We recommended that they be scrapped. You won't be building tanks of the types that we built on those special machines. The same thing applies to the whole field of armament. Always rely, just as peacetime production relies, basically upon the standard, general-purpose machine tools; and from that, let us develop the special machines that we need to have.

Le me call your attention to the fact that, necessarily, ours is an industry that requires a long-time production cycle. You cannot turn out any type of machine tool in a few weeks' time. In normal times, when supplies of steel and other materials are normal, the cycle ranges from four to six months. And we must have the opportunity to accelerate, to gradually get under way, to develop our engineering, and to develop our sources of supply so as to build up production.

That is one of the great difficulties we experienced in World War II. There was talk of the bottleneck created by machine tools. Actually the production of machine tools was rapidly accelerated. The real bottleneck came from the lack of instruction, the lack of forewarning, and the lack of preparation for the building of the tools that we needed. As a matter of fact, however, from September 1939 it took until December 1942 for us to reach the real peak of war production of machine tools, a period of over three years. We greatly expanded our capacity, of course, during this time. Our industry ran from an average of about 100 million dollars a year to 1 billion 320 million dollars in war production of machine tools in 1942. It declined in 1947 to 300 million dollars. We still have a capacity of about 600 million dollars in our industry.

You say, "Well, that was certainly a bonanza business." I think I may be pardoned if I call your attention to the fact that it was not a bonanza business, gentlemen. I wish some of you could have reviewed, as I have personally, the figures of some of our companies. In the first place, we took on tremendous risks, and today a large percentage of the machine-tool builders of the country are operating in the red. If any of them are making any money, it is very little. They have plants that were built during the war which they now have to maintain and in which they are having difficulty making both ends meet. In 1942 and 1943 typical machine-tool builders in this country, with the greatly inflated volume that they had, actually had net profits of about three cents on every dollar of sales. So when you hear about excessive profits, do not tie them up with the machine-tool industry. The facts belie them.

One of the means of enabling the machine-tool industry and many companies on the fringe which were not actually producing machine tools to get into war production, a means that really was effective and practical, was the pool order. Possibly some of you have heard of that. It was simply a device whereby the Government granted orders to individual companies to proceed to build certain types and quantities of machine tools and guaranteed

QUESTION: Usually the manufacture of machine tools is considered to be a highly skilled art. You said some new firms were brought in during the war. Could you tell us whether they were successful in such manufacture and, if so, what was their previous product, what type of engineering were they doing?

MR. BRYANT: I should say that in most cases they were quite successful, and for two or three reasons. I can think of one company, for example, that engaged in the building of can-making machinery. Another company was previously in the manufacture of paper-making machinery. It was successful to a large extent because in pretty nearly every instance it was fostered by some existing machine-tool builder and part of his organization had moved over there to carry the job through-they were primarily subcontractors. In our own case, we are a small manufacturer; we could not possibly have built the number of machines we were asked to produce. We induced a very large can-machinery manufacturer to take over the building of some of our machines. That was done without any profit to us. We furnished the drawings, the patterns, the jigs, the fixtures, the supervisory help, the engineering talent--everything that was required for them to go into production and get these machines out--simply as a contribution in the war effort.

Does that answer your question?

QUESTIONER: Yes.

QUESTION: You stated that since the war, although there has been considerable retrenchment, the profit margin has been rather small. Have you any recommendations as to any action that should be taken in order to insure the maintenance of a war potential for the manufacture of machine tools during the peacetime period?

MR. BRYANT: Do you mean a war potential of profit?

QUESTIONER: No; I mean a war potential of manufacturing facilities.

MR. BRYANT: That is a very vital matter. You opened your question with the comment about profit. Let us have this clearly understood--the machine-tool industry is primarily a group of private individuals. There are about 200 companies; many of us are small concerns. We still believe in the good old American principle of standing on our own feet and getting along in some way or other, no matter how hard the going may be. We have never asked for any subsidies; we have never asked for any favors; we have never asked for any support at all. We have asked for fair treatment. I think that is only right and in the public interest.

We think that is conservative. We think, therefore, that we can in the future, if we employ modern machine tools, look forward to a more efficient production period than we have had in the past, applying to peacetime uses as well as to wartime emergencies.

When we refer to this over-all improvement in machine-tool design, let us recognize that machine tools are unusual in this way: All we can hope to do is keep on improving in the five basic arts on which the whole machine-tool industry is established--the art of turning on a lathe, the art of milling on a milling machine, the art of planing on a planer or shaper, the art of grinding, and the art of boring and drilling. You cannot change the fact that it is still a turning operation, and so on. No great revolutionary invention has come about or is likely to come about that will dispense with the necessity for turning, planing, boring, milling, and grinding. All we can do is refine our methods.

Let us compare the development of machine tools with that of the automobile. Our cars of today are entirely different from the flivvers that some of us drove around twenty-five or thirty years ago. Actually and fundamentally, however, they are simply refinements. They still have four wheels. There have been some suggestions about three-wheeled automobiles, but I am sure most of us expect to use four-wheeled automobiles for a while. They still have a steering wheel. They still have an engine, although some people are talking about putting it in the back of the car instead of in the front. We still have those fundamental elements in the automobile, just as we still have the basic elements in machine tools. It is a development of refinements in each case. We hear much talk about revolutionary automobiles. You and I know, however, that actually the automobile manufacturers are just changing the fender, or they are just refining the engine a little, or they are improving the transmission, or they are doing something to the differential. Basically, all they are doing is improving an automobile, and that is what we are doing with machine tools. Let us get it down just as simply as that and not fool ourselves into thinking that a remarkable invention is being developed in a back room somewhere that will do away with all this machine-shop equipment that we have been using in the past. That is not the case. We hope to keep on improving them and we hope to keep on making them more efficient, but actually we must continue to use our basic machine tools.

I talked with one of the leading engineers of our industry awhile ago and tried to get from him for my own benefit a perspective as to the thinking in the fields of advanced engineering in our industry. He said, "Actually, how can there be much of anything but a very gradual improvement as we go along? There isn't anything that is going to change the basic arts that we have to use in making things." I give that to you for consideration when you contemplate some of the possible developments of the future.

There has been a shifting of the labor force due to the war dislocation of industry. There are some places in which there is a tremendous shortage of the kind of help that we need. We need the ultimate craftsman. We have just one man in my plant who puts the finishing touches on the spindle of a jig borer before it goes out. It is a matter of craftsmanship, not mass production. We do not have production lines like those of the automobile industry.

QUESTION: I go a long way with you on your machine-tool program for ERP, but I think those nations will need a little coal-mining machinery soon because it will take some time to build the coal-mining machinery themselves with machine tools; and they need it urgently. I think the answer is "half and half."

During your talk you said there are now about 75 percent more machine tools in this country than there were before the war. The question I want to ask is: If there is another emergency within the next five or ten years, shall we have the same machine-tool bottleneck we had in World War II?

MR. BRYANT: Do you mean because of the fact that we have perhaps one and three-quarter million machine tools today as compared with a million before the war?

QUESTIONER: That is right.

MR. BRYANT: Keep in mind the fact that we are constantly developing technologically and that our peacetime requirements are enormous. They are not continuing as they were before the war. We want to produce items now that people did not dream of before. We have the tremendous employment of over 60 million people today, and our plants are being utilized. If we have a war emergency, isn't it reasonable to expect that we are going to have a great demand for additional facilities? It seems only logical.

QUESTIONER: I agree, but is there going to be the bottleneck that was so serious at the beginning of World War II?

MR. BRYANT: Let me put it this way: We were fortunate that we had some preliminary time from September of 1939 to build up our production rate in machine tools. I do not think anyone can foresee whether we will have as great a relative demand in addition to our peacetime potential production strength next time as we had last time. That is difficult to foresee. I don't know. Can you tell me what has to be produced in the next war? I'm completely in the dark. All I am saying is that after the First World War the people said, "We went through this thing. Believe me, that won't happen again. We will know how to do it next time." I do not have to tell you gentlemen what happened "next time," and you are just as good guessers as I am about the third time.

The situation is this: The European Recovery Program is something in which we are all vitally interested. Those of us who have any understanding of the situation at all are not debating the need for it. That seems to be fundamental to any thinking American. I am glad to say that most of the public leaders with whom I have talked in the last few weeks feel the same way about it. But here is the surprising thing: In the report that was submitted by the Secretary of State to the President last September, which is a very thick volume and which I have examined carefully, there is an outline of the requirements of the sixteen participating nations in, for example, mining machinery, agricultural machinery, logging machinery, and railroad facilities. I shall take one case. The requirements for coal-mining machinery in the sixteen participating nations were listed as being about $3,400,000,000 for the next four years. The report said that these nations can produce a considerable quantity of this machinery themselves but that they will still need about $687,000,000 worth of American coal-mining machinery. If you will look into the situation and will talk with the people in the coal-mining-machinery business, you will find that almost equals the entire capacity of the American coal-mining-machinery industry--the entire capacity.

Now, one of the congressmen from West Virginia spoke up. He said, "Wait a minute. I'd like a little more information on this coal situation. We are interested in that down in my territory. Do you mean to say we won't be able to get coal-mining machinery? Why, we need it; every mine in the district needs equipment that we haven't been able to get during the war. What are we going to do about it?"

I said, "Here is the point we are trying to bring to your attention. In the whole report outlining requirements, not one single mention was made of machine tools. Our suggestion is this; why not let some of the plants now in existence in France, in Switzerland, in Belgium, in Holland, and in the Scandinavian countries utilize American machine tools and some of the materials they have, to produce some of the coal-mining machinery they cannot now produce? We know they are short in materials, just as we are, and perhaps more so in some cases. But they have labor and other resources that can be used. Those plants today are crying for those machine tools. They actually want them. They are ready to place orders. They would do so if they were not limited by export limitations and by the dollar shortage at the present time. We say that it is in the American interest to ship machine tools over there so that they can produce some of these things that they want, some of the end products, and thereby hold for our economy the coal-mining machinery and agricultural equipment that we desperately need. Let them use their labor, let them use these machine tools, and let them help themselves."

You might be interested in this: One of the Congressmen asked yesterday, "To what extent has Russia developed its machine-tool-building capacity?" We do not know exactly, and I presume you gentlemen too do not know much about what is going on behind the iron curtain. But we do know this, that when we still were able to travel and had some of our engineers moving around during the war and at the close of the war, we saw that they had made tremendous developments. They had plants at that time in which they could build large quantities of milling machines and other plants where they could build turret lathes and engine lathes. I presume they have not been asleep at the switch since then. They unquestionably took the machines that we sent over under Lend-Lease and had sent previous to that and simply copied them. It will probably take them quite a while to get into real production. I do not think their production or potential even compares with ours at the present time, but they have made some strides. There is no question about that. We do know that one of the important European centers of machine-tool manufacture was Czechoslovakia. I presume you know as much as we do about what happened there.

QUESTION: Could you discuss the apprentice-training program that was established in the machine-tool industry to replace men as they get older?

MR. BRYANT: We have some very intelligent and forward-looking apprentice-training programs. I am going to take the liberty of asking Mr. Berna, General Manager, National Machine Tool Builders' Association, to tell us something about that.

MR. TELL BERNA: Gentlemen, there are several different ways in which we approach that problem, depending on the size of our companies. A larger company, let's say with five or six thousand employees, of which we have a few, will set up a separate training department under the competent supervision of a man who has nothing else on his mind. Such a company has three kinds of training.

First, there is the college graduate with an engineering background who is destined for the engineering department for supervisory work or for work on the sales staff. He is given an accelerated course through the shop so that he may become thoroughly indoctrinated with respect to the policies of the company and thoroughly familiar with the machines and with the sort of work that they do.

Second, there is the apprentice. He is typically a high school graduate, a youngster, who goes to work at less than the specialist's rate of pay. He is given a three-or four-year course. The tendency is now toward a three-year course because these boys learn much faster than I did in my day. They are trained in the fundamentals of shop mathematics, English, drawing, with the emphasis on reading drawings, and the operation of the fundamental types of machine tools. Then each individual is diverted to that type of work for which he seems to show the greatest aptitude. That is the training given to our all-round mechanics, our demonstrators, and our foremen.