

RESTRICTED

PRODUCING MACHINE TOOLS FOR DEFENSE

1089

5 February 1952

CONTENTS

	<u>Page</u>
INTRODUCTION--Commander E. H. English, Jr., USN, Member of the Faculty, ICAF	1
SPEAKER--Mr. Frederick U. Conard, President and General Manager, Niles-Bement-Pond Company	1
GENERAL DISCUSSION	13

Publication No. L52-91

INDUSTRIAL COLLEGE OF THE ARMED FORCES

Washington, D. C.

RESTRICTED

RESTRICTED

1100

Mr. Frederick U. Conard, President and General Manager, Niles-Bement-Pond Company, was born in Brooklyn, New York, on 17 December 1891. He was graduated from Brooklyn Manual Training High School and he attended Stevens Institute of Technology from 1911 to 1915. He was employed in textile manufacturing, Brooklyn, in 1915-1916 and by the Public Gas Company, Newark, N. J., in 1916-1917. During World War I he attained the rank of Captain, USA, and from 1920 to 1939 he rose to the rank of Lieutenant Colonel, AUS. During World War II he was Brigade Engineer and Chemical Officer, Connecticut State Guard, and presently holds the rank of Lieutenant Colonel in the honorary Reserves. Mr. Conard is a trustee of the Hartford YMCA and Fairfield State Hospital, Newton. He is Director, Hartford-Springfield Post, American Ordnance Association, and is Chairman of West Hartford Board of Education. Mr. Conard is Director of various outstanding companies, banks, and other business interests in the Hartford area. From 1919 until 1947 he was employed by Works Underwood Typewriter (later Underwood Elliott-Fisher Company and now Underwood Corporation) and has held the positions of engineer, manager, and vice-president. At present he is President and General Manager of the Niles-Bement-Pond Company.

RESTRICTED

RESTRICTED

PRODUCING MACHINE TOOLS FOR DEFENSE

110

5 February 1952

COMMANDER ENGLISH: Gentlemen, our studies in production would not be complete without a full consideration of the problems of the machine-tool industry. By now many speakers and your own studies have indicated that the machine-tool problems lie at the very heart of our production problems. Just last Sunday the "New York Times" magazine section carried an article entitled "Bottleneck No. 1--Machine Tools."

Our speaker today is President of the Niles-Bement-Pond Company, of Hartford, Connecticut, one of the oldest and most respected names in the machine-tool industry. You know the machine tools that his company produces better by such names as Pratt and Whitney, Keller, and Potter and Johnston.

In looking for a man to talk on the subject of "Producing Machine Tools for Defense," the general consensus was, "Get Mr. Conard--he is the biggest man in the machine-tool business." I therefore take great pleasure in presenting to you, Mr. Frederick Conard.

MR. CONARD: General Holman, Commander English, and gentlemen: It is a pleasure to be with you this morning and to have an opportunity to say a few words on the subject of "Producing Machine Tools for Defense." To me it is like coming back home. Almost 35 years ago, as a young second lieutenant of engineers, I was assigned to the Sixth U. S. Engineers, stationed at Washington Barracks. As officer of the day I frequently had the responsibility of inspecting the guards at the War College. I never expected that some day I would have the pleasure and honor of entering these portals for the purpose of addressing a class of selected officers on the problems of planning for defense. But here I am and I shall try in the time allotted to give you some thoughts and some information that may prove helpful in your future service to the Nation as you develop plans pointing toward the preservation of our American way of life.

You are all selected by your various services on the basis of mature experience and judgment. I am sure that you recognize the fact that plans must always permit of certain flexibility and be continually revised and improved as changing world conditions require.

It is fitting that we think back to experiences of the past, learn from the mistakes that have been made, and attempt to estimate and properly evaluate the problems of the future, in order to develop plans that may be put into effect with as little delay as possible when an emergency arises.

RESTRICTED

RESTRICTED

1102

During World Wars I and II, due to the fortunate circumstances that pertained, we had a period of time in which we could do the tremendous variety of things that had to be done in order to construct, equip, and tool our industrial machine for maximum production. Never again, if we in the foreseeable future become involved in a major war, will we have this respite. There is no question but that the emergency, if it comes, will be precipitated either by an attack upon our Nation directly or upon one of our allies or dependents, none of whom are capable without a large amount of support and assistance from us of protecting themselves.

In the remarks that I am going to make I wish it clearly understood that, although I may appear to be critical of some who have held important positions of responsibility and authority in our Government, my intent is to be entirely objective and to eliminate any flavor of acrimony or specious criticism.

Previous speakers representing the machine tool industry, in addressing similar groups of the Industrial College of the Armed Forces, have pointed out the basic nature of the machine-tool industry, with simple illustrations. I can do no better than to refer to the remarks of one of them, Mr. Lloyd D. McDonald, who, in his address of 7 March 1949, as president of the National Machine Tool Builders Association, used the simple loaf of bread as an illustration. The machine tool, like the air we breathe and the water we drink, is so fundamental to our economy that it is taken for granted.

To return to the loaf of bread, a very simple item, few people realize that the wheat required was probably produced by using tractors, plows, harrows, reapers, and so on. The flour from the wheat was milled by machinery, sacked by machinery, transported by train, and distributed by truck. The components were mixed by machinery in the bakery, "untouched by human hands," baked in an oven, and finally wrapped by machinery, sorted by machinery, and again transported by machinery ultimately to the shelf of the grocer. Every one of the automatic and semiautomatic machines involved is a product of a multiplicity of machine tools and operations performed by machine tools. As one speaker remarked many years ago, the machine tool is the only inanimate object that is capable of reproducing itself. To be sure, human brains and hands are necessary to this accomplishment. I do not want to belabor the point, but it must be recognized by all who think about it that the machine-tool industry is the one industry that has contributed the most to the development of the standard of living that we have all come to take for granted in our Nation.

Back of every machine tool ever conceived, designed, and constructed was a dreamer with a gleam in his eye and a determination to develop a

RESTRICTED

RESTRICTED

1108

means for performing some operation better, easier, and faster than had ever been done before. The company that I have the privilege of representing was founded by two brilliant mechanics and engineers, Messrs. Pratt and Whitney, prior to the start of the Civil War. They were inspired with the idea that in order to produce quantities of similar items it was necessary to develop means for accurately processing identical interchangeable parts. We in these days take for granted many of the means that we use as a matter of course to accomplish our specific mission.

Few people think of the fact that in 1860, when Pratt and Whitney organized their business, there was no such thing as a commercial standard inch. The length of the commercial standard yard varied with the number of yardsticks. As the entire mechanical field is dependent upon accurate dimensions, it was first necessary to develop basic standards of measurement.

During three years, beginning in 1879, Pratt and Whitney created a comparator, under the leadership of George M. Bond and Professor William A. Rogers of Harvard College. This comparator was taken to London by Professor Rogers, who obtained a reliable transfer of the British Imperial Yard, and later to Paris where he obtained a similar transfer of the French Meter d'Archives. This comparator was also used to obtain a duplicate of the American standard of length known as Bronze No. 11. The comparator and these famous bars are still among our most-prized possessions.

The result of this research reconciled the differences between the British and American inch and eventually brought about the development of the Pratt and Whitney standard measuring machine, which is accurate to one one-hundred-thousandth of an inch. This work was completed in 1885.

From that successful project stems all of the present mechanical development of the English-speaking world and the whole program of interchangeable parts manufacture.

So much for the fundamentals. Now for the subject "Producing Machine Tools for Defense." First we must have a plan. What products will be required for defense? Of what materials will the needed products be composed? What quantities of such products should we schedule? What facilities will be necessary?

Here I shall pause and quote from an article in the January 1952 issue of "Fortune," page 56, subject, "The Machine-Tool Fumble." Except where noted, I am quoting verbatim excerpts from this article:

"But it is possible to order the basic tools themselves with only an approximate knowledge of what they will be called upon to make.

RESTRICTED

RESTRICTED

1104

"Such an opportunity occurred with the Korean outbreak, when an enormously expanded weapons output was clearly in order. The technique, tried and tested in World War II, was also at hand, in the shape of pool contracts."

Had this program been followed, the design of weapons and the entire weapons program could have been handled concurrently with the fabrication of the machine tools that eventually would be needed. Again quoting:

"The machine-tool builders spotted this opportunity as soon as the Korean war began. 'We hotfooted it down to Washington,' recalls Frederick Blackall, of Taft-Peirce, who also heads the National Machine Tool Builders Association, 'and told them for heaven's sake to get some pool orders out. We were told down there--believe it or not--that "You fellows are no different from the pots-and-pans manufacturers."' That haunting line was delivered by General Harrison.

"But the machine-tool fumble provides no satisfactory personal devils. As one high NPA official now states bluntly, 'There was no apparent understanding on the part of either the military or the planners in Washington of the urgency of machine tools until about six or eight months after Korea.'"

This, gentlemen, happened in spite of the fact that the machine-tool manufacturers as individuals and as an industry had been sounding constantly since World War II the warning of exactly what would happen in an emergency.

I commend the article as "must" reading. It may guide you in avoiding some of the errors of others in authority.

Incidentally, I have files of letters written to our Senators and Congressmen since 1947 urging them to do everything possible in the interest of defense to avoid the very pitfalls into which the program was forced by unwise decisions and domestic political considerations. Nothing, however, was done to indicate that any heed was paid to such warnings, due probably to complete lack of understanding on the part of many in the various divisions of our Government.

In the early stages of any defense program, the only sound planning must call for a balanced reserve of standard machine tools of basic classes and various sizes. When needed, these may be assigned and used for the production of a number of types and initial small quantities of ordnance--arms, armament, ammunition--aircraft, naval ships, and controls, means of propulsion for all, and so on.

RESTRICTED

RESTRICTED

1105

The machine-tool industry of the Nation, if encouraged, and I might even say, permitted, to grow in strength and development during peacetime, should be adequately equipped and manned to take care of the initial upsurge in the need for standard items, recognizing that a program that would result in such growth and strength would necessarily stem from the encouragement of all industry to continually modernize their plants and maintain their equipment. If this condition could be established, it would result in there being scattered throughout our entire Nation, metalworking plants equipped with the most modern, up-to-date types of standard machine tools, which in a sudden emergency could be promptly put to work on the needs of the armed services with slight delays incident to conversion.

As an illustration of the state of flux that exists so far as the design and operating characteristics of standard machine tools are concerned, you will be interested to know that the bulk of the machines that my company now has orders for on its books--standard, cataloged machine tools of our design and manufacture--did not exist prior to 1947. Some of these machines were in the process of design as late as 1949. In fact, the design had not been frozen on some of them until the latter part of 1951, although they had been planned for two or three years prior.

In order that you may be aware of the time element involved in the machine-tool production program, you should know that for a complete redesign of an average complicated standard machine tool in peacetime it requires the following:

To prepare the drawings and check same	9,600 man-hours
To prepare material lists and check same	100 man-hours
To prepare the necessary assembly and inspection instructions	150 man-hours
To make the patterns	7,500 man-hours
Obtain the first sets of castings, items of critical material, motors, controls, etc.	6 months
To machine and check the initial quantity of parts	2,850 man-hours
To assemble and test the first lot of machines	2,350 man-hours
To perform engineering tests	200 man-hours

This totals 22,750 man-hours exclusive of the six-month period necessary to obtain the castings, critical materials, and so on. Figuring 2,000 man-hours per year per man means that 10 qualified and experienced men would have to work for more than one year or one man for more than 10 years.

You will note, I am assuming that while this program is progressing, concurrently the orders will be placed for castings, critical

RESTRICTED

RESTRICTED

1100

materials, motors, and so on; so I am not adding the six months required for that phase to the elapsed time.

The figures quoted above are actual compilations of what was involved in developing one of our standard machines, not the largest, by any means, but one of the largest, which was completely redesigned subsequent to 1948 and is now in production. We have a number of orders for this design and have already shipped a sizable quantity for the defense program.

On completion of a development program, a field test is necessary, which should be the equivalent of several years of use, and in peacetime we like to have such field test carried on in a customer's plant where the user will develop any weaknesses or deficiencies. In time of emergency no field test can be permitted.

After this field test in peacetime has been tabulated and the results studied, if no changes are necessary--most exceptional--it is then planned to process production lots. The number will depend upon the estimated potential market for the machine in question and the amount of cash that the machine-tool manufacturer can afford to lock up in inventory for an indefinite period, pending sale of the finished machines.

If you could see a curve of the activity of the machine-tool industry from the early days to the present, you would note at once that, aside from the very gradual rise due to growth of the world's economy, this industry has been subject to violent upsurges which coincided with every period of war or preparation for war. Then, with the promise of peace it has quickly sagged back to a rate of activity that was insufficient to sustain a healthy condition.

During these periods of emergency we have all experienced a burden of high taxes. In the last decade there was conceived the program of renegotiation. These factors have made it impossible for the machine-tool industry to build up adequate reserves to carry it over the lean years.

During these so-called lush periods, it has come to be recognized that it is fair and proper and good economics to allow accelerated amortization of investments in plant. This has been considered as an inducement to the entire industry of our Nation to modernize and equip its plants for maximum production.

If that philosophy could be carried over into peacetime, such a program would be a tremendous incentive to metal-goods manufacturers to maintain their plants in top-notch condition. It could, therefore,

RESTRICTED

RESTRICTED

1107

result in increased activity in the machine-tool industry during peacetime, leveling out the hills and valleys of the historic curve. This would produce a strong machine-tool industry, well equipped, and manned with experienced engineers and producers, capable of quickly absorbing sudden loads of increased demand for machines in times of national emergency.

If it should ever come about that in time of peace the metal-working industry of our Nation should be encouraged by the Government, not by subsidies, but by proper allocation of depreciation and the acceptance by the Treasury Department of adequate write-offs to modernize and maintain their equipment, this time element for jumping production could be reduced and the machine-tool manufacturer would be able to finance development programs in a manner that he has never been able to do in the past. He would also be able to maintain his level of employment to a point where the impact of a sudden emergency would not throw such a strain upon him.

As an illustration of the violent fluctuations in manpower engaged in the machine-tool industry, I shall quote some figures from our own experience. On 1 January 1936 we had 722 employees engaged in our machine-tool program. On 1 January 1939 this number was 861. These figures that I am quoting refer solely to the Pratt and Whitney division of our operation. At the peak of the machine-tool production in World War II, this number had increased to 2,400, plus 1,565 in subcontractors' plants. After the shooting war stopped, the number decreased to a low of 756. Just prior to Korea it stood at that figure; now it stands at 1,502--this was written a month ago; it may be a little different now--and in addition there are 2,210 employees in plants of subcontractors engaged in producing our products.

So, putting it another way, using 1936-1937 as a base, we find:

	<u>Percent</u>
1936-1937	100
1939-1940	119
World War II peak	549 Including subcontractors
Post World War low point	105
Pre-Korea	105
Now	514 Again including sub- contractors

In our program of stepping up production since Korea, most machine-tool plants have greatly increased the hours worked per week by overtime and by wherever possible working two shifts of 55 hours each. With respect to additional manpower, it has been necessary to resort to the program of hiring inexperienced help and training them

RESTRICTED

RESTRICTED

for their specific jobs. This, of course, has resulted in delays; but there are few, if any, experienced employees available for machine-tool production. During the low spot in 1949 we had laid off men with between 10 and 15 years' experience.

Lest you take away the impression that not much has been accomplished, I can state that in my company, Pratt and Whitney, machine-tool production increased in 1950 over 1949 by 32 percent, in 1951 over 1950 by 100 percent; in 1952 it will increase over 1951 by 120 percent. We can put that another way. If we use the year 1949 as a base, 1950 would be 132 percent of the base, in 1951 we produced 264 percent of the base, and in 1952 we will produce 600 percent of the base. These figures through 1951 are not far from the story of the entire machine-tool industry.

The question is, Will this be enough; and, if not, what planning can be done to make sure that never again do we get caught off base? That, gentlemen, is where you must understand the ramifications of the problem and clearly prove the case to those who can make or break any plan by how they allocate the money and how they spend it or waste it.

Immediately after the shooting stopped in World War II, our Administration proceeded to make all the mistakes that could be made and some that are inexcusable. It might well be that the worst mistake made, aside from cozying up to the Soviet, was in the deliberate destruction and liquidation of our tremendous industrial potential and the hasty and ill-conceived liquidation of war assets. The machine-tool industry went on record time after time after time with sound advice and words of caution, but were politely, some times, told to mind their own business.

Eventually, some small impression was made after irreparable harm had occurred and a relatively few machines were finally set aside in strategic reserves. Some of these inventories of machine tools were well selected and well cared for, but far too many were selected hit or miss from the dregs of a once superior pool of the latest machines; then, all too often they were stored under conditions that were deplorable.

Now think! Suppose you had a large surplus of new trucks or jeeps and decided they should be preserved for later emergency use. Would you expect that you could place them in an open lot, some covered with canvas or waterproof paper, let them stand there four years with no attention, no inspection, no care whatever, then four or five years later decide to drive each one away, and have anything but a piece of junk? And yet, gentlemen, in effect that is what was done in too many cases with machine tools, which are to a truck or a jeep as a beautiful watch is to a Mickey Mouse toy watch. I know from sad experience the

RESTRICTED

RESTRICTED

1109

condition of many machines in storage. One of our divisions had to draw on these strategic reserves; of the 227 machines shipped to it, 227 had to be overhauled, some completely. Some even had cracked beds. Some were so rusty inside and out, including having a mixture of oil and rain water in the oil pan, that they must have had no care or attention while in storage. Those machines are supposed to be fully automatic machines.

One of the most constructive bits of planning for defense that could be initiated and continued would be to maintain at all times in peacetime a surplus reserve of modern machine tools and to require a regular inspection of the storage facilities and the items stored therein. If the taxpayers are going to pay for such a program, they will be getting their money's worth if, when the emergency arises, the machines can be put directly into use.

I suggest that the Defense Department initiate and execute such a program--that there be created a commission representing all the services, which will have the authority to obtain and preserve a strategic reserve of basic machine tools of various sizes and types, which should be frequently subject to inspection. What I visualize in that respect is a program patterned after the Navy program of moth-balling our ships and ordnance. True, if an emergency does not occur for a long period, some of these machines will be outdated; but right now all metal-manufacturing industries throughout our Nation are using many, many obsolete and outdated machines, and will have to continue to do so until the machine-tool industry can catch up with the tremendous backlog of machine orders which stems from new types of aircraft and engines.

To summarize "Producing Machine Tools for Defense," we must so far as standard items are concerned follow the advice of our first President of the United States. George Washington, addressing Congress on 8 January 1790 said, "To be prepared for war is one of the most effectual means of preserving peace." A conservative peacetime plan will result in a strategic reserve and the creation of a modern industrial plan designed for peacetime products, scattered over our 48 States, which can be put to work under war conditions with a minimum of delay.

This should be the program: Almost the entire capacity of our machine-tool industry will be needed in time of war to produce the standard and special machines and equipment required for the manufacture of new designs of arms and armament.

Take, for instance, the big bombers and the jet engines now scheduled in our defense program. Here we are dealing with size, materials, and processes which were not in the picture during World War II.

RESTRICTED

RESTRICTED

Early in my remarks I pointed out that we of the machine-tool industry, in order to do the best and quickest job, must know:

1. What products are required.
2. What are the specifications of these products.
3. What quantities are scheduled to start and at what accelerating rate.

The jet engine is an outstanding example. The materials involved are among some of the most difficult to process, and the large number of parts of varying shapes and sizes present new and interesting problems to the manufacturer. Add the matter of the tremendous quantities of certain members, such as the turbine blades which must resist heat, all kinds of new stresses, and require a high degree of dimensional accuracy and a high grade of surface finish, and you will realize some of the problems posed to the manufacturer who has to call for all sorts of assistance to meet a steeply ascending curve of delivery.

The machining of the rings alone in the quantities called for has placed a tremendous burden upon the particular machine-tool companies whose product is best adapted to do this job. In fact, so many of those large mills have been required that the principal builder has been pressed to put other companies outside the machine-tool industry to work building complete machines.

As to the blades, my company started working on the problem of producing jet blades in 1948 and found that there were many different opinions among engine manufacturers. These opinions varied widely as to the material, dimensions, shape (airfoil), finish, accuracy, and every element that enters the product. Finally, we became convinced that until a better material could be found, the majority of engine manufacturers would be using one of the high-strength stainless steels such as No. 403; that until a better process could be developed, the blades would be either precision-forged, with attendant limited die life, or rough-forged and finish-machined; that either program would require finish-grinding to obtain required airfoil, to clean up the blade edges, and to give necessary surface finish.

Compressor blades are commonly made of stainless steel to A.I.S.I. (American Iron and Steel Institute) specification No. 403. This material has an average composition of .10 percent carbon and 12.50 percent chromium. This is similar in analysis to A.I.S.I. specification No. 410, but the No. 403 type is a selected quality for blades.

For the hot end of the engine the turbine blades are made of highly alloyed materials, one of the most prominent being Niomonic No. 80. The average composition of Niomonic No. 80 is as follows:

RESTRICTED

RESTRICTED

	<u>Percent</u>
Carbon	.04
Chromium	21.00
Nickel	74.00
Aluminum	1.00
Titanium	2.50
Iron	1.50

1111

You will note, if you add those up, they total a little over 100 percent. That .04 percent of carbon is necessary. The difference is taken out of one of the other alloys.

There are, of course, other highly alloyed materials also being used, such as Inconel X, Vitallium (a cast product), as well as materials having appreciable percentages of cobalt, chromium, nickel, and tungsten. All of these highly alloyed materials are most difficult to machine, principally due to their work-hardening qualities, but are excellent for resisting deformation at high temperatures, as well as having good creep properties so necessary in the hot end of the jet engine.

There is also considerable experimental work going on regarding the use of sintered titanium carbide having about 6 percent nickel as a binder for turbine blades. Unfortunately, this material does not have the desired toughness found in the high-temperature alloys previously mentioned; but if the same is found to be practical, there will be a marked saving in the critically short alloying elements.

Having arrived at these conclusions with respect to the composition and processing of blades, we proceeded to design a line of duplicating surface milling machines, four-spindle to be used for duplicating forging dies, eight-spindle for milling eight blades at a time from rough-forgings to a hardened master.

It is common practice today to rough out the forging dies with our three-spindle EL-3620 Kellers, finishing on the four-spindle duplicator. This practice has resulted in a reduction in time of well over 50 percent.

Where dies distort in hardening, an additional cut can be taken on the four-spindle duplicator with tungsten carbide burs, bringing the airfoil section within plus or minus .002" of the master.

To complete the program for producing blades, we designed a finish contour grinder, three dimensional cam controlled, synchronized speed, automatic to the extent that one operator can load and watch several machines. The developing and testing of these three machines were well

RESTRICTED

RESTRICTED

1112

under way when Korea occurred. For months after that date, we continued our studies and last spring began to receive orders for quantities of all these machines. As the program grew we realized that if any kind of delivery schedule was going to be developed, we would have to subcontract complete machines. We have, therefore, established five subcontractor on this job alone, who, starting the first quarter of this year, will begin delivering these machines in increasing quantities each month until the needs of the jet engine program for our products are met.

Gentlemen, you who will be responsible for planning for defense have a weighty responsibility. You can use your influence to the end that there be available a backlog of standard machine tools in great variety in the established manufacturing plants throughout our country, together with a high-grade strategic reserve pool of standard machines in first-class condition in government storage, to be drawn on in case of emergency. Our leaders in the Federal Government must be brought to a realization of the fact that only by being strong can we remain free; and that our strength lies in our industrial plants, in our diversified metal-working plants, which must be encouraged to maintain their equipment and modernize it constantly. Many of the industrialists would be glad to do this at no expense to the Government, provided adequate depreciation charges are allowed. Then when an emergency occurs, our machine-tool industry will be manned with experienced personnel and can quickly turn all its resources to the problem of greatly increasing the quantity of the standard items needed, and at the same time undertake the designing, developing, and building of new special equipment which will be required for producing in large quantities new weapons as yet undreamed of.

In the beginning of my remarks I stated that plans must be flexible and be continually revised.

Within the past week I have been encouraged to learn that progress is being made toward a clearer understanding on the part of the legislative and administrative divisions of our Government with respect to the dependence of our defense program on a healthy, virile machine-tool industry.

Within the same period we learn of changes in materiel programs which may affect the details of production schedules of some machine-tool builders. However, let me end my remarks on this note; We machine tool builders are accustomed to adjusting ourselves to change; and, if you who want the materiel will give us a clear idea of what you require and how much, we'll produce the machine tools necessary. We've done it before and we'll do it again.

COMMANDER ENGLISH: Gentlemen, at the beginning of our question period I want to take the opportunity to introduce to you Mr. Tell Berna, General Manager of the National Tool Builders Association, from Cleveland.

RESTRICTED

RESTRICTED

1113

QUESTION: Mr. Conard, as you well know, arguments have been going around here for a long time in Washington as to whether we should mobilize completely or whether we should not mobilize at all in between this police action in Korea and all-out war with the Chinese. I think it probably has been settled now that the Air Force is going to have 143 groups, or something like that, and be in an expanded procurement cycle for two or three more years in the future--to spread it all out. Is the machine-tool industry over-extended now on that basis, or do you think that it is just about right?

MR. CONARD: Just as I came in here, General Holman said to me, "What is the situation in the machine-tool industry now?" I said, "The only thing I can tell you, General, is that it is different from what it was last week."

The machine-tool industry has a very large backlog of unfilled orders; at least it had when I left home. My own company has a backlog of just about a year's production of machine tools. However, with all the changes that have taken place, that is not a frozen backlog by any means. Now that we have started to take on subcontractors, which we undertook a little over a year ago when I saw this thing coming up, I think we will be able to clean up the present backlog in much less than a year.

We had some cancellations; we expect them. As I said, we are accustomed to change. Last week we had a cancellation of a million dollars worth of machine tools. But that still leaves a big backlog.

I would say that if we are going to develop a program and be called upon to produce 3 billion dollars worth of machine tools in 12 months, it is going to take some doing. I think that if the plans can be stabilized--I understand from the recent releases that the thinking now is that the program will be stretched out in all its various angles--I am not afraid that the machine-tool builders can't take care of it under those conditions.

If, however, we should have an all-out war, a shooting war, we would be for a few weeks at least in a scramble. Of course, other conditions would come in then, because there would be an immediate curtailment of certain civilian production that is now being encouraged.

Frankly, I don't know what is best to plan on now--how much civilian production there should be and how much defense production. It is hard to set the balance of the thing.

In case of a shooting war, of course, some of our problems would be reduced. The manpower problem would be reduced very quickly.

RESTRICTED

RESTRICTED

1114

The material problem might be simplified some, although we have not suffered--I didn't touch on this in my talk because I was dealing more with generalities--in the machine-tool industry from material shortages. In fact we read in the papers about shortages of materials, but we have none in our industry.

QUESTION: Do you get any competition from foreign tools--the Swedish, Germans, Swiss? Second, if time and not money were the controlling element, and we wanted some very precise machine tools, can these foreign manufacturers produce machines to the required exact tolerances that your own machines have?

MR. CONARD: We have some competition, of course. We aren't afraid of competition, we like it. If there is competition, that is an indication that it is an interesting problem and worth while getting at. Specifically, my company's competition is limited pretty generally to the Swiss.

We have competition for foreign business but not for domestic. I presume you meant competition for domestic business?

QUESTION: Yes. Could we reduce the backlog by buying foreign machine tools?

MR. CONARD: There has already been a pretty big program embarked on in that respect. Some of our aircraft manufacturers have spent millions of dollars of the taxpayers' money in the purchase of foreign machine tools. I understand that one of the leading manufacturers in Germany is sold out for four years ahead.

I don't believe that this can go on very long, however, because I don't see how the foreigners delivery program can meet the needs of our defense program. When it was first started, the foreigners, of course, were anxious to get dollars; and they made a special effort to make deliveries. But my guess is that it won't be long before they will be loaded to capacity and our domestic deliveries will be just as prompt as those from abroad.

As to accuracy, I know very little personally about the foreign machines that are being offered at the present time. I visited Toronto last year and the year before, during its industrial exhibition, which was in large measure a machine-tool exhibition. There were British-made machines on display. Generally the reaction of the Canadians and the Americans who saw that exhibition was that the British-made equipment was very much underpowered; that the electrical specifications do not meet the specifications that we have to conform to over here, and that the machines were light. There were some very nice-looking machines, some apparent bargains from the standpoint of price; but I don't think that we have to fear them very much.

RESTRICTED

RESTRICTED

1115

So far as accuracy is concerned, there is no reason why the British can't make as good machines as ours. Of course, we don't think they do.

QUESTION: During the postwar period has your industry had any organization in Washington endeavoring to collect information of the machine-tool industry, as to its going capacity, what its strategic capacity would be, and other information that would be useful in case of an all-out mobilization?

MR. CONARD: I will pass that question to Mr. Berna.

MR. BERNA: Yes. The National Security Resources Board had a voluntary group of gentlemen from the machine-tool industry, largely from among those men who had worked in the Tool Division of the War Production Board. They set up machinery and procedures and wrote the regulations and the rules that could be immediately put into effect in case we got into a war. They also studied this question of capacity versus demand. Unfortunately, the President appointed Mr. Wallgreen as chairman of the National Security Resources Board but the Senate didn't agree with that appointment. The result was the suspension of the National Security Resources Board for a long time, and I believe that all the work that was done by these men went into the wastebasket.

QUESTION: Mr. Conard, what are your personal views on the JANMAT program and its effect, and is a program of that type the answer in this so-called peace period?

MR. CONARD: Do you have anything to say about that, Tell?

MR. BERNA: The only thing I can say is that a JANMAT Committee was set up late in the disposal program.

We have to remember that when Congress passed the law under which the surplus was disposed of, it gave first priority to about five different groups, which gave the War Assets Administration a very neat little problem. The first priority was given to the defense industry, but no person could be given any higher priority than small business, and so on. It was very complicated.

The first disposal was made by people who did not know anything about machine tools. I don't say that as any criticism. It would be very difficult to imagine a group that could sell machine tools properly. It is a specialized activity. A great many machines were disposed of. Then, as the pressure from Congress grew to "Close the thing out; get rid of those things right away," I think that was one reason for it.

RESTRICTED

RESTRICTED

It seems that they went at this thing backward. We conceived of the JANMAT as a joint Defense Department committee that would work out advance historical determinations on the distribution and storage of these machines, decide on storage methods, and it could do its work without being under this terrific pressure to dispose of these things in a great hurry.

Don't you agree with that, Mr. Conard?

MR. CONARD: Yes.

And this reminds me that during World War II I had the responsibility of running the largest small arms plant that probably ever existed. At the peak of production we were turning out 7,500 rifle barrels per day. That was for the Cal. 30-MI carbine. To accomplish that, of course, we had a pretty sizable installation of machine tools.

When the war was over, we were instructed to pull those machines out and turn them over to a contractor who was going to take them to storage.

Since Korea occurred I have tried to locate some of those machines. In fact before Korea occurred I looked into the problem. Many of them were Pratt and Whitney machines. I could find no information about them at all. I don't know who got them. I know who the contractor was that took them out of our plant, but I don't know where they ended up eventually--whether they were scrapped or whether they were sold to Joe or what happened. They just seemed to melt away. And this was a plant which was producing more small arms per day than had ever been produced anywhere in the world.

QUESTION: If the defense effort should slow down and we had to put these machines on ice again, what program do you recommend for keeping them up to date with changes in design, so that in case of another shooting war you could cut down the lead time by having tools that could be used right away in the production of new weapons?

MR. CONARD: Well, any strategic reserve program should be divided into two distinct compartments. One would have to do with standard machine tools--automatic turret lathes, engine lathes, shapers, jig borers--these standard machines that are used by the hundreds of thousands in any plant for any product.

Those machines, of course, do grow obsolete in time; but not much obsolescence takes place in them. Some may be underpowered for use with the new cutting techniques or the high speeds that are now coming into demand for processing nonferrous metals and that sort of thing. But at the same time, you can get by.

RESTRICTED

RESTRICTED

1117

Those machines can be safely put into storage. So long as they are not permitted to deteriorate, if they are properly stored and inspected periodically to make sure that they are not rusting, that the motors are not shorting, that they are in operable condition, they could be pulled out in case of an emergency and put to work at once, instead of having to go through the rebuilding or overhauling program that has been so widespread in the present emergency.

The other compartment--and I might say I referred to that in my talk--that those machines will be just as modern as the majority of machines that are working today in our metalworking plants. But if they are available, that will relieve the machine-tool manufacturer from the tremendous upsurge in demand for those standard items and permit him to turn his time and his designing, engineering, and producing talent to work in producing special items and large machines that are necessary--for instance, in processing the members of a large airplane, the special machines necessary for processing the new materials used in jet engines, and things of that kind.

When it comes to the special machines, there is more of a problem. I would visualize a reserve composed of a modest quantity of established special machines; for instance, a reserve composed of a complete list of machines that are necessary to produce a 30-caliber rifle--all the drills, reamers, chambering, and rifling equipment, some of the heat-treating equipment--which deteriorates and might be of a special design and which, because of the large quantities that have to be passing through, might be conveyORIZED. That equipment could be preserved for a matter of years and then could be put to work. Some of the tooling might have to be changed if the guns are changed, as they would be; but the equipment could be used.

Then on such items as ammunition, there are many special single-purpose machine tools. It might be fitting to have stand-by plants on that. During World War II we had some large plants out through the Middle West. Those plants never should have been dismantled. We should just have turned the key in the door and had the necessary custodian to keep an eye on the building; they could have been put to work in this emergency.

The same thing is true in certain areas of the aircraft industry. I was thinking of a plant not very far from my own which the Government did its best to sell. It pulled all the equipment out and scattered it to the four winds. It is now operating again as an aircraft plant. The Government did try to sell it but couldn't find anyone to buy it. The plant was too big and too much money was asked for it. It could just as well have been preserved in status quo, and the company that is now operating it would have been much happier. It had to re-equip the plant.

RESTRICTED

RESTRICTED

1118

QUESTION: In 1954 or 1955, when the present levels of production have built up to their peak and we go back to civilian production again, when we emphasize the civilian economy again, would it be feasible for the the industrial manufacturers of machine tools to keep abreast of the changes and developments in weapons and other items that they are going to manufacture for the services, so that special-purpose machine tools could be more or less planned in the blueprint stage without being actually made, so that the lead time in between the time when the first shot is fired and we go into all-out mobilization can be cut down? Is there any means whereby from the industrial point of view, working with the services, we could have some degree of industrial preparedness for mobilization and cut down the lead time between when the first shot is fired and all-out mobilization?

MR. CONARD: It would be very desirable to have such an agency. I don't know how completely it could be planned, because even today the industry is in a state of flux on the Korean program. I referred to cancellations this week or last week. Those are not the only cancellations we have had in the present program. Some changes are due entirely to changes on the part of manufacturers as to how they are going to process those parts.

It is very desirable to have adequate planning. If the Defense Department through some of the Government agencies could set up such a program, it would be very helpful. I don't know how it could be accomplished so far as the machine tool builders are concerned. We like to have advance notice as to what the Defense Department is going to require, so that we could be thinking about it ahead of time, instead of chasing the tail of the wagon, which is what we are doing now.

QUESTION: Could you do it without any cost to the Government? Would you be willing to plan with the Government without cost to it?

MR. CONARD: We are doing a lot without cost to the Government; we always have. We have to be planning ahead. As I indicated in my remarks, the bulk of the orders that we now have in our company are for machines to go into the defense program that did not exist actually in 1947.

But take a large special machine as an example. Until somebody tells us that they want a machine that has a 24-foot travel in order to mill a wing member or something of that sort, we don't stock or start to design a machine with a 24-foot travel, because there isn't any market for it. But right now we are working that out.

QUESTION: A recent report by the Department of Labor indicates that it has made a current survey of the machine tool industry from the personnel standpoint, The comments from, I believe, 140 firms in the

RESTRICTED

RESTRICTED

industry ranged from a shortage of personnel that wouldn't affect production at all for one or two years, to one in the Cleveland area that said, "Yes. Shortages of personnel are affecting our production as much as 50 percent." Can you tell us from the over-all point of view if there are any real serious personnel shortages and to what extent they are hurting our present production?

MR. CONARD: In my part of the country, in the New England area, I would say that there is no serious shortage. When you are busy, you are always short of something. When you aren't busy, you are always long on something. You may be long on labor, material, or inventory. But I don't think that at the present stage of the program labor shortages, certainly in New England, present any problem.

As I said in my remarks, we cannot get any more experienced machine-tool workers, because they don't live forever. We were out of the machine-tool business for several years. It sagged way down. We did all sorts of things to keep our employees busy. We did not have any subcontractors work for us until Korea came on. We did all we could to hold together a nucleus.

We have increased our employment from 756 to some over 1,500 since Korea in that area alone, and that is only in one division of the company. We have more than doubled our employment since Korea.

QUESTION: I understand that prior to the war the Germans not only had tax provisions which assisted them in keeping their machines up to date, but they also had provisions which sort of forced industry to keep up to date. Do you feel that in this country proper tax laws which would permit it would be sufficient, or should we go a little further and enact provisions which would force business into keeping up to date, with some penalty if they didn't?

MR. CONARD: My thought is that all you need to do is to encourage industry. My industry, of course, is unique. Most of our industry enjoys competition. We all like competition, as a matter of fact, whether it is on the polo field or in business. Our whole life is built on competition.

Therefore it is my very strong opinion that if industry were encouraged to keep its plants modern, it would do so. Each industry would want to have as modern a plant as possible and as modern a plant as it could justify and afford. I don't think that you need to enforce anything. But we get no encouragement now.

QUESTION: In shifting from peace production to war production, in gaging material shortages and personnel shortages, what is the best index that will enable us to find out where we can get something produced cheapest and fastest? Would an inventory of the machine tools that they

RESTRICTED

RESTRICTED

1120

possess be a good index? And is the nomenclature between the different machine-tool manufacturers interchangeable, so that you could provide such an inventory? Could you get such an inventory here in Washington of the different plants?

MR. CONARD: I doubt whether such an inventory is available. That is quite a question--as I understand it, if you have an item to be produced, where can it be done cheapest and fastest?

Well, I would first try to visualize what peacetime production is more normally like the article to be produced, with all the production that may be available. For instance, if it is an item in the electronics field, you would naturally probably go to one of the companies in the radio or television field. If it is an item in the electrical field, you probably would go to one of the big electrical manufacturers.

I think what is much more important than the equipment in the plant is the organization, because you can have the best-equipped plant in the world and not produce a thing. We have had that happen. Some of the best-equipped plants I ever saw never produced anything.

The first thing you want is a successful organization; one that has experience in the line in which your product falls. Then you would check with the company to see whether it can handle your product or whether it has a suggestion of someone else to handle it. It may be that the company has the equipment or that it will get the equipment, or it might not be able to get it. The plant might feel that it is overloaded, in which case it will probably refer you to someone else.

QUESTION: You must receive numerous requests for reports from different government agencies, particularly from Washington. To what extent are you duplicating reports to the different agencies? Do you find that your own system of fiscal control can be used in preparing these reports or do you have to set up a new system just especially for these reports that you have to send to Washington?

MR. CONARD: Well, so far as reports that are useful and helpful in the machine-tool program are concerned, there is no problem. There are very few of those. The reports that we are called upon to make--I don't think any of them go to the Defense Department. They are a burden, sure; but it is no different from the experience in World War II.

Do you have anything to say on that, Tell?

MR. BERNA: Before any department of the Government can send out a questionnaire to the machine-tool industry, it has to get the approval of the Bureau of the Budget. The Bureau of the Budget consults its advisory committee on Federal reports, which is made up of groups that

RESTRICTED

RESTRICTED

go over the questionnaire. For example, a couple of weeks ago the Government wanted to send a questionnaire out to the machine-tool builders, so that the metal-working division of NPA would have a report on what each machine-tool builder is building, how long it is going to take to clean up the orders, how many men he has, and things of that sort. So the Bureau of the Budget collects a group from the machine-tool industry, and that group goes over that questionnaire and tries to shorten it, and tries to put it in terminology that the machine-tool builder will understand, which is one of the important things about questionnaires, oddly enough, so that the guy knows what you want.

The Advisory Committee in the end recommended in this particular case that it thought the questionnaire should be sent out. The committee may recommend it and the Bureau of the Budget may say "No. The Department of Labor has part of that information and somebody else will get the rest of it soon. We are not going to ask the machine-tool builders to report again." It is a very sound system. This is not limited to the machine tool industry.

Of course, we have to realize that all government departments want to get in on the act. So the first thing they have to do to get in on the defense program is to send out a questionnaire asking how many women are employed or some other noble purpose like that. If that is allowed, pretty soon industry will have no time to do its work.

QUESTION: Would you care to hazard a guess as to the size of the reserve that we need in terms of dollars or numbers of machine tools?

MR. CONARD: As to the number of units of machine tools, I would say probably 100,000 units.

MR. BERNIA: We had 130,000 in the present reserve, and we used up about 66,000 of them.

MR. CONARD: And of those 130,000 only a small percentage of them were in good shape. I would say 100 or 200 per thousand.

QUESTION: How much would they be worth in dollars?

MR. CONARD: I would say practically a million dollars.

MR. BERNIA: They are worth about 10,000 dollars apiece on the average.

MR. CONARD: Yes. But the machines that we have not are the larger ones.

MR. BERNIA: I mean the average price of the machine tools now being produced for the defense program runs around 10,000 dollars--this amount times 100,000 would be a billion dollars.

RESTRICTED

1132

MR. CONARD: It should not exceed that amount.

MR. BERNA: It is practically a situation where the military needs are matched against what is available. You have to imagine how many tanks you will need, how many guns and what caliber, how many planes and what description. Then you look at your manufacturing resources, at your plants that have been kept intact, like the Dodge Chicago plant, for manufacturing machine tools. You add those up and see if you have sufficient capacity for the machine tools that your outline plan calls for from the machine-tool industry. Those have to go into the warehouse. You can't very well start by saying, "We will put aside so many dollars worth of machine tools." That means beginning at the back end.

I would like to interject another thing. There was a time before World War II when my industry was asked if we could manufacture a certain type of shell, with the understanding that if we got a telegram from the War Department, we would immediately begin making that shell in quantity--x per hour. Some machine-tool builders had some such plans for doing that. It is perfectly possible to conceive of making up very complete plans, working with the district offices. Industry working with the district offices could work up lists of what equipment it has available. It might even go so far as to make up some tools in advance.

We also have this suggestion for the dual-purpose plants from Mr. Wilson. There is a sweeper plant in North Canton where its people put up another building and equipped it with machine tools that they are not using now. The plant would be a great advantage there, because management could immediately shift its men from peace to war employment without having to find housing for them. They don't have to leave North Canton.

That does tend to freeze your design on military hardware and that is a very serious objection, as you know. The Defense Department is constantly improving weapons; it should. It would be tragic if a better weapon should be devised and then it couldn't be used because the plants were all tooled up for the old one.

COMMANDER ENGLISH: Mr. Conard, I thank you very much for your very fine talk. I also thank you, Mr. Berna, for your assistance.

(8 May 1952--350)S/ekh

RESTRICTED