

PRODUCTION IN THE WAR EFFORT
3 April 1946.

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CONTENTS

	<u>Page</u>
Introduction--Brigadier General Donald Armstrong, Commandant, The Army Industrial College	1
Guest speaker--Mr. K. T. Keller, President, Chrysler Corporation	1
General discussion	9
General Armstrong	
Students	
Mr. Keller	
Colonel Robert W. Brown, Assistant Commandant (Army), The Army Industrial College	

587
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GENERAL ARMSTRONG:

Gentlemen, we have again and again emphasized the importance of the Armed Forces--industry relationship that has been built up during this war. One of the greatest American industrialists, who has done certainly more than his share in bringing that about, is going to address you this morning.

The great thing about K. T. Keller, whom most of those who know him well call "K.T.", is that he not only is a keen thinker on this problem of production, for commercial purposes as well as for war production, but he is blunt. He does not mind saying what he thinks, as you will probably find out here this morning. That is the kind of industrialist who can be most constructive in devising sound ways and means of utilizing American industry most effectively.

Mr. Keller came up the hard way--through apprenticeship in industry--until through the great value that he displayed to the companies he was with, he finally reached the very top. As you well know, he heads the Chrysler Corporation.

During the war the Chrysler Tank Arsenal, as it was first known, was the first of the big new plants that were constructed in the United States. I think it is safe to say that that plant was a model of production efficiency and of accomplishment throughout the war. I shall never forget the day that, accompanying K.T., I had the pleasure of watching the President of the United States and his official party drive through that magnificent and tremendous Chrysler Tank Arsenal.

Gentlemen, that Arsenal was a monument to Mr. K.T. Keller, whom it is my great pleasure to present to you now. Mr. Keller.

MR. KELLER:

Talking to the Army Industrial College has come to be one of the opportunities I appreciate.

The last time General Armstrong did me the honor of inviting me here was late in 1944 when the Government and industry could begin to see over the crest to victory. The forward program at that time was contract termination. The class consisted largely of men who would have to handle that task.

So I cannot let this opportunity pass by without saying to you that the job of physical reconversion that has been done in industry, since the war ended, is one of the most remarkable facts in this country today.

Reconversion has proceeded more quickly, more efficiently and more successfully than even the optimists among us had expected.

It has been done so well largely because of a really remarkable degree of cooperation on the part of government agencies.

This is a very significant thing. It was the kind of a job that, unlike the fuss that has accompanied other phases of return to peacetime activity, can put this country and its people back on the road to better things.

In our own company these things have happened: Some 200 million dollars worth of government equipment and materials have been moved out for storage or disposal. Some 17 million square feet of space have been cleared about 20,000 machines rearranged and set up. More than 17,500 of these machines that had been on war work were reconditioned, retooled and restored to civilian operation.

We bought from the Government nearly 1,000 machines that had to be tooled and placed. We bought another 1,200 from machine tool builders. More than 7,900 government-owned machine tools were moved out to storage.

I will not go into the miles of conveyors, of spray booths and ovens, the millions of jigs, tools, dies and fixtures that have been built and installed, and now put into partial production.

Here was a practical demonstration of cooperation between agencies of the Government and industry, founded on mutual understanding of one another's problems, careful study and preparation.

To all practical purposes the job is completed. So we are free now to look back over the past five years, and draw upon facts and impressions that will have a bearing on the future. These apply not only in case of another war, but what is more immediately important, to keep and build up the most effective relationship between the Armed Services and productive industry in the years of peace.

General Armstrong suggested it would be particularly useful to dwell on some of the manpower problems of the war period.

In Chrysler Corporation our prewar peak employment had been on the order of 85,000 people. The high point of employment during the war found us with 125,481 workers.

These overall figures alone are not too significant. Much greater rates of increase occurred in many other companies. Yet inside that peak figure we experienced fully as great convulsions as took place elsewhere.

We were not, of course, able to build from the 85,000 normal working force and go up from there. By March 1942, despite the fact that our tank plant was going full speed and also was being doubled in size, and that several other war contracts were under way, most of our plants were being torn up.

We were down to a total employment of 50,700. Inevitably one loses experienced people in such periods, but we weathered that, just as we

568

weathered the effects of the draft, which ultimately took from our plants nearly one third of the number of men we had had prewar.

The expansions, as war work increased, often took place where large employment had not existed before. At our plant in Evansville, Indiana, where 650 people had worked in 1941, we took on a job producing small arms ammunition. At one time employment there rose to 12,650, more industrial jobs in just this one plant than the entire city had had prewar.

In Chicago, where we never had run a manufacturing operation, the great Dodge engine plant was built. It supplied more than half the engines that powered the B-29 raids on Japan. We went from nothing to 33,200 employees in that plant. At times throughout the corporation, we were hiring from 1,000 to 1,500 people a week and losing ground. Dodge-Chicago alone had to hire hundreds of people each week to keep its working force level; invariably as it approached peak it was hiring two or three persons for each one net addition to the roll. In all it hired 70,000 individuals to get 33,000.

Those of you who had part in war procurement know that there was nothing unique about this; it came to be a fairly general condition of war industry, particularly where available transportation creaked under the unaccustomed load, while the draft made its steady inroads, and many people who had known nothing about factory work found themselves unable to take it. But Chrysler as a whole had a conservative rate of turnover in relation to conditions.

A special comment should be made concerning women. From the 2,906 female enrollment in the plants in 1942 we went up to a total of 35,313 in October 1944. We had women on almost every kind of operation. While many were employed on light airframe parts, or small objects such as .45 caliber ammunition, they were fully and ably represented in all kinds of men's jobs up and down the line. Our supervision was gratified with their performance. In many cases their production was fully on a par with that of men. In a number of cases, some said better.

We made full use of all sections of the population, our non-white employment having multiplied 17 times from low point to high. We made special and thorough arrangements to employ the maximum possible number of handicapped persons, and found it possible to place them with excellent productive results.

*Incidentally we had in our employ at the beginning of the war 3,047 aliens, many old and trusted persons, many highly skilled. All but 568 of these have since become citizens. All but 34 were cleared by the Government for continued employment on war work. Because of our methods for handling such problems we were able to employ an additional 776 aliens, most of them highly skilled.

Military service took from our plants 23,431 men, which is equal to 30 percent of maximum prewar male employment. We enjoyed an extremely satisfactory relationship in the matter of selective service. Our decision from the outset was to ask deferment only for people whose departure would actually cut high priority production, and then only for men of truly high

skill and long experience. They were very few. We did not take into any critical occupations men otherwise subject to early draft. When the replacement schedule program was developed by the Government to level out the impact of the draft on industry in general, we adapted our operations successfully and smoothly to the brief temporary deferments for which they called.

Viewed in terms of the output of our plants, it is perfectly clear that great as the difficulties were in the manpower field, they at no time proved critical. There were times when we had the utmost difficulty in keeping our plants clean, in unloading supplies, and in getting the simple chores which accompanying production performed. But even so we never fell down on deliveries because of manpower shortages. We never failed to meet specifications and quality requirements because of lack of skill and experience in the productive force.

Such a statement as that can only serve to emphasize the fact that in properly engineered production the mass problem of getting work done by previously untrained persons is not in itself controlling. The method of organizing the work transfers the real load to planning; to engineering; to proper selection of and design of machine tools and accompanying equipment; to supervision and to inspection.

It may be useful to recapitulate here what our war production was: In addition to our own 20 plants in ten cities, with a total of 17 million square feet of floor space and 20 thousand machines, we built or took over, and operated five plants with about 10 million square feet for the Government, including the Dodge-Chicago engine plant; its size is suggested by the fact that its water, gas and electrical service lines would supply a city of 100,000.

In these we made a great variety of things for practically all branches of the Armed Services, ranging from .45 caliber pistol ammunition to 43-ton tanks, and from pontoons and submarine nets to the highly complicated and micro-measured equipment for sifting the isotopes of uranium for the atomic bomb.

Of these jobs it can be said that none called for more absolute precision result than the gyrocompass. This employed no more than 1,000 people. When we got into that job the manpower pool was well drained. Experienced machinists and assembly people were absorbed in other war work. The operation had to be manned any way we could. It should be said that gyrocompasses had never before been made by production methods. We had not one man on the payroll who had ever worked on one.

We built 5,500 of these. Not one was ever returned as defective. We saved the Government 45 percent of the original competitive cost and beat delivery expectations by many months.

The thing that made such performance possible was in having a staff of men in administrative and supervisory positions who thoroughly understood production planning, precision machining, training and management of a labor force, metallurgy and the many details that go with these. These

men could and did set up the job with such equipment and supervision that persons of no previous skill or training could operate it with complete success.

The real manpower problem lay in spreading our available supervisory and specialist talent over five more plants than we operated in peacetime, and over a variety of unfamiliar jobs, almost any one of which would have taxed the ingenuity of our best men.

The operation of a successful high-volume business does not permit carrying large excess staff. That fact in itself results in very superior training for everyone on the payroll. All have to pull their weight and be able to rise to emergencies and to opportunities. It was possible to take many men who had had such experience and give them broader responsibilities when there actually was no time to give them special training. A very high proportion proved themselves competent and able to stand the load. By combing over our sales forces when the automobile business was closed down, we were able to qualify many more of our own men for nontechnical positions and for the countless forms of follow-up that are necessary to sustain the flow of engineered production. As expansion proceeded we had to find talent outside also. By combining these men with those trained on our operations we were able to carry our proven methods of management over into all new operations.

In plant supervision we had the identical expansion problem. We had to deal with the fact that, as they were to handle many thousands of people unfamiliar with the routines of factory existence, skill in human relations was increasingly important. It takes conscious, systematic application, under the circumstances that prevailed, to keep the line between adequate discipline and avoidance of unnecessary upheavals over trivial incidents.

The total of our plant managers, superintendents, general foremen, foremen and assistant foremen rose from around 3,000 in prewar operations to 5,442 at the peak.

We have for many years maintained for our supervisory personnel courses of study which would enable them to increase their skill in managing people and getting results. With the war our training problem was one of intensification and expansion, particularly for the several thousand men who had not previously exercised management responsibility. Enrollments in our several supervisory courses at one time exceeded 6,000.

The homely, simple essentials of good housekeeping, safety, first aid, keeping simple factory records, fundamentals of leadership--all these had to be instilled in brief time into considerable numbers of men.

Many services must accompany the direct manufacturing operations. A measure of their expansion is seen in our medical department, which went from 23 separate plant units to 35. The pronounced shortage of doctors had to be taken into account. We met the needs by increasing the number of nurses from 52 to 113. We had 21 physicians prewar and did not go beyond 24 during the war, despite having new plants to staff at distant points.

From Medical Department records we also find that we were able during the war to reduce by 26 percent in terms of each 1,000 manhours of exposure, the time lost from work due to injury and occupational disability. The absolute amount of lost time of course increased, but only 36 percent compared to an 87 percent increase in manhours. Coupled with the established facts of output attained, things like these indicate somewhat that in meeting the manpower problems it was possible to retain a great measure of over-all plant efficiency.

Any account of wartime manpower experience must logically include mention of the returned servicemen. We were employing men released from service as early as 1942. To date, 6,200 former employees have come back and we have hired 14,100 ex-servicemen who were not previously employed by us. In the early stages a number of these drifted away rather quickly, but that condition has pretty well disappeared with the return of men who had experienced overseas duty. Seventy-seven percent of our former employees who came back have stayed.

Chrysler's major war work, other than military trucks, really began with tank production and interestingly enough this was the last major contract to be canceled.

When first we assumed the task we knew nothing of tanks, and could undertake only to produce units of the design and specifications supplied us, without thought of contributing to their effectiveness as weapons of war. The particular thing we had to offer was knowledge of large scale quantity production methods. Our contract involved first of all the layout and building America's first, and only, self-contained tank arsenal.

Last fall, at the end of five years, having shipped out of it a total of 25,059 tanks, we were able to hand over to the Army a modern, well-equipped factory. Adaptable to the peacetime design, repair, building and testing of armored vehicles, this is a permanent addition to Army plant.

We never made a single tank of the design which was originally contracted. That was scrapped 13 days after the contract was signed. Our planning proceeded for manufacture of a tank still undesigned. Yet the Arsenal was turning out production tanks in less than a year, and it had completed the original order for 1,000 five weeks after Pearl Harbor. We were then engaged in tooling to build 1,000 tanks monthly and at the same time planning to change over to the 32-ton M4. The changeover was accomplished in July 1942, without interrupting production, although the plant was being doubled in size. The manufacture of component parts was being progressively farmed out to 12 other Chrysler plants and many new subcontractors, because the originally self-contained Arsenal could not begin to handle the enlarged volume even after expansion. Doing this had been in the minds of ourselves and Ordnance officers from the start. At one time we had a total of 25,000 Chrysler workers exclusively engaged in tank manufacture.

In all we built at the Arsenal a total of 12 different types of tanks from the 28-ton M-3, which we are told turned the tide at El Alamein, to the 43-ton M-26 Pershing.

It was not long before events enabled us to make original contributions to design and equipment of tanks. The first important one came when the shortage of tank engines became critical. There were no true tank engines then, those in use being adaptation of aircraft and other power plants. It was not possible to design a totally new engine and equip a plant for its production in time. What we developed was a combination of five standard automobile motors driving a single shaft. We built in all 9,965 of these before other sources making engines specifically for tanks were able to fill the demand. The multi-bank engine did its work with distinction on many fronts.

We established in the Chrysler Engineering Department an Ordnance Division to execute projects for Army Ordnance. In all, 1,150 engineering projects were carried out there, including design and building of 38 pilot tanks of new types, and the operation of an Ordnance proving ground. Some of the units developed there are advances on the latest equipment to see action in the war. They are the starting point for land armor development of the future.

From the time the tanks we built began to get to the field, first in maneuvers and later in battle, we undertook to have men with them who could size up the bugs reported in them by the using services, and interpret these back to us in our language.

It had been clear at the outset, and experience throughout the war only confirmed it, that successful participation by private industry in making war equipment would depend upon a very high degree of mutual confidence between the Army and industry. This confidence had to be founded upon mutual respect and a very genuine understanding of one another's problems and point of view.

From the outset our experience with army people gave us a wholesome respect for their knowledge of the joint problems that faced us; their willingness to explore facts in each problem that arose, and the fairness of their dealing with us. This came to be the most valuable ingredient in the execution of our work, and it carried right through to the stage of termination of the contracts.

The Armed Services and industry started from an extremely thin base. The period between the two world wars had seen a tragic reduction of military development work. It had witnessed a great tide of public distrust towards industry. This came first and particularly in attacks on makers of war equipment, labelled the "merchants of death," and later more generally in the political attacks that were the aftermath of the depression in the thirties.

Only the efforts of institutions such as the Army Industrial College, and the level headedness of individuals in key places on both sides, relieved this condition. Small educational orders finally came along to give industry a slight insight on military requirements, but there remained as the defense program began a widespread and serious misunderstanding of realities, especially the reality of time required to design, tool up and organize production on a quantity basis. This popular misunderstanding

affected our political leadership and so, for all too long a time, handicapped the common sense and understanding of our leaders in military procurement.

No one seriously believes today that we could withstand another major war as foolishly and tragically unprepared as we have been the last two times. The lesson is most clear that preparedness does not consist of huge armies and navies, or huge piles of weapons stacked in grease. The swift evolution of weapons during the war years shows to all who care to understand that the key to national security rests in continuing exploration and development on the forward borderline of advancing technical knowledge. Preparedness has much in common with duck shooting. You must lead the bird. The target in the sights means a lost shot.

This does not necessarily mean that I am advocating the ruthless scrapping of our best equipment. After all, it is the only equipment we have for either offense or defense. Nor do I believe that all the future military troubles are going to be dispelled by a simple boo given with an atomic breath.

We have many good tanks and guns and other weapons which should be preserved. Enough, perhaps, to put an army of two million in the field quickly, should be adequately housed and kept available. I sincerely believe that for the future of our country such surplus equipment should be in good storage even though this requires using plants on the order of Willow Run and Dodge-Chicago to properly take care of them.

Nor does the advocating of a policy of keeping such quantities of our present equipment conflict with my firm belief that development of both weapons and tactics should go forward. Again I say lead the bird.

Leading the target is wholly possible within the limitations of a sane and prudent peacetime security establishment, so long as we maintain the intimate and practical teamwork between industrial engineers and production men on the one side, the Ordnance and using services on the other

I emphasize this teamwork; because compartmentalized thinking never will yield the needed result. Weapons designed on the basis of today's engineering and production technology will be obsolete for production ten or twenty years hence, just as the tactics of one war are shelved and superseded by the shrewd and calculating commanders of the next. Industrial engineers and scientists could invent and doodle to their heart's content off by themselves and miss completely new practical requirements of the services.

Neither can succeed, by endeavoring to expert the other fellow's game. The layman does not become the master of military requirements in twelve easy lessons; the soldier does not become an industrial manager and production expert through class work and plant inspections.

Full skills on both sides rest on organizations and on living with the work. There will never be a chart or textbook to tell the art of military leadership or of industrial production.

And so the emphasis rests on cooperation, and it in turn depends upon the most intelligent form of liaison; the form that preserves and builds mutual respect and confidence; that assigns discretion with responsibility.

We turn our backs on World War II possessing a great foundation for the future. Keeping this and building on it will depend in great measure on the convictions and understanding of you gentlemen, and upon the continuing work of institutions such as this College.

GENERAL ARMSTRONG:

Mr. Keller will answer your questions.

A STUDENT:

Mr. Keller, I wonder if you would touch on some of the problems that came up in getting production started, say, at the Tank Arsenal, or as related to the Dodge plant in Chicago.

MR. KELLER:

The Dodge plant in Chicago was much tougher than the Tank Arsenal, because by the time we got the Dodge plant in Chicago into construction there were so many people around who thought they knew more about the job than we did that we had great difficulty in getting the tools we needed.

At the Tank Arsenal we had a free hand and after we had decided what kinds of machine tools we wanted, we put men out to see that we got them.

We started out on taking those machine tools, not from the standpoint of asking a supplier, "When are we going to get that boring mill?" We asked him, if he was going to make this delivery, when would he have to have the castings? Then we went to the foundry and asked them, if they were going to have the castings out at ten o'clock tomorrow, when would they have to be put in sand? Then we were there when it was supposed to be put in sand and stayed there until it was put in. When the casting hit the machine tool builder, we questioned when it had to get on the planer in order to get this job done. We would find out why it was not on the planer.

That is the way we got our machine tools. It took thirty-five follow-up people to do it, but we got the tools. We were not allowed to work so freely and effectively on the Dodge-Chicago job.

Does that answer your question?

A STUDENT:

Yes. I think it does to a large extent. I think probably there is one thing you did not touch on. That was relative to difficulty with sources in your plant with your specifications.

MR. KELLER:

They are hardly comparable, because on the tanks, when we went out to Rock Island and saw what they were building, that tank looked fairly easy but before we got the blueprints back, we had a notice that we were not going to build that tank. We had great difficulty in getting the drawings.

Now, the difficulty was not due to the fact that people did not know what they wanted to have in the tank, but it just takes a certain amount of time to lay a job out. I think they really did do a remarkable job. The tank went better than I thought it would in the haste in which it was prepared.

As I remember, we finished the first tank on Good Friday before East of 1941. That was a pilot sample, built in the tool room. Some of the important drawings we had had in our hands only a week at that time. But once they were approved, the designs went forward rather thoroughly.

Now, in the case of the Dodge-Chicago engine, that engine was put into production before any final acceptance tests had been run. It was being built by Wright and designed by Wright. The horsepower requirement was pushed up before we started to make any. We had a tremendous amount of detail changes on that job. We had to maintain a very large staff of master mechanics. The whole reduction gear was changed.

But it was just another job to be done. As I told you, if we had not gotten those changes, it would have been something else. After all, we looked upon the job as one that had to be done, and we did get out the engines and on time.

A STUDENT:

You have emphasized close liaison between the Services and industry in peacetime on technological developments. From the industrial point of view have you any suggestions as to the technique to be employed there?

MR. KELLER:

I would say the technique to be employed is the same one you employed before. When you in your staff say we should develop such kinds of weapons, why do you not come to us and say, "Work with us in developing those weapons. What have you got to contribute to this thing?"

COLONEL BROWN:

I inferred that you have done quite a thorough job in reconversion. I have this in my mind: Having done such a thorough job in reconversion, assuming that there was a recognition of a state of war three months from now or six months from now--I know you will have to make a great many other assumptions to answer the question--but how long would it take you to get back into production on the things that you have been producing so as to have a reasonable flow of those same things?

MR. KELLER:

Just as we have said, we are completely out of war business now. But there are many machine tools available. We still have a lot of them in storage. We have a number of people who understand them. Time has not wiped out the experience. Given supervisory forces, and figuring out the routing sheets and the tooling sheets, a lot of this stuff could be brought in with these machine tools in a relatively short period of time. Five years from now, with new weapons, it will be an entirely different story.

GENERAL ARMSTRONG:

And now, K.T., I want to thank you, sir, for your extremely important contribution, not only to the present generation here, but for the classes that will follow, that will have the opportunity of seeing in the records of the Industrial College what you have told us this morning so effectively.

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(11 April 1946--200)S