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THE IRON AND STEEL INDUSTRY

7 February 1956

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Mr. James E. Lose, Assistant Executive Vice President in Charge of Operations, United States Steel Corporation, Pittsburgh, Pa., was born in Osage County, Kansas in 1891. His early education was received in Pittsburgh Public Schools and Carnegie Institute of Technology. For the past 45 years Mr. Lose has been with the U. S. Steel Corporation in an operating capacity, holding many important positions. In 1910 he started work at the Blast Furnace Department of Homestead Steel Works as a tracer in the Engineering Department and occupied the successive positions of Assistant Superintendent, Blast Furnaces, Superintendent of Blast Furnaces, Assistant General Superintendent and General Superintendent of Homestead Steel Works. In 1933 he became Vice President in Charge of Operations of Carnegie Steel Company, a subsidiary of U. S. Steel, and in 1951 became Assistant Executive Vice President in Charge of Operations. This is his first lecture at the Industrial College.

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ADMIRAL DEUTERMANN: Good morning, Gentlemen. This morning we are going to consider the Iron and Steel Industry.

Our speaker was born in 1891 in Kansas and early shifted his scene to Pittsburgh. He attended the Carnegie Institute of Technology in Pittsburgh and 45 years ago went into the steel industry. He has moved in that time from Superintendent of Blast Furnaces to the position of Assistant Executive Vice President for Operations of the U. S. Steel Corporation.

He is a very busy man, and we consider it an honor and a privilege that he has consented to come down to be with us. This is not his first visit. He has been here in seminars before. This is the first time he appears on the platform.

It is a great honor and privilege, Mr. Lose, to introduce you to this year's class.

Mr. James E. Lose.

MR. LOSE: Thank you Admiral Deutermann, General Hollis, General Calhoun: It is a great pleasure for me to be with you. I might say that, if I make any mistakes or anything, I have an excuse. I think it is a very good excuse. So, instead of telling a story, which is always proper on the part of the better speakers, and not being one in that class, I will tell an experience.

When I have a date made, an important date such as this, I always try to make it by train, because that is the sensible and sound way of being sure to get there. I return home by plane, in order to get home as fast as possible. So, last night, according to my usual method, I took the B&O out of Pittsburgh. Thirty miles out of Pittsburgh the train left the tracks, and that being about two o'clock in the morning, I started to figure out how to get to Washington for this very important meeting.

I finally spent 11 dollars in taxi fare to get over to the airport. I got to the airport all right, but there were 32 passengers out of Pittsburgh on the six o'clock plane to Washington, and I was quite sure that one of the 32 would not show up. They all showed up. It was six o'clock in the morning. I did not know that people got up that early in Pittsburgh. However, my company has a little stand-in with Capital Airlines, and I got hold of the Director of Flights and told him my predicament. I told him how important you people are, and he decided that he would get me on that plane, and he did. So, for that very good reason I am here, and if I should miss a few words in this speech that I have, you know why.

The title of it is The Iron and Steel Industry in Time of War--Its Performance and Its Problems.

The steel industry recognizes the increased importance its products assume in periods of war, when the greatly expanded requirements of the armed services must be supplied promptly, with minimum loss to the civilian economy. Extensive economic dislocation can do the country as much harm as the loss of a battle, and, unless military requirements are met skillfully, along with civilian production, one or the other is certain to suffer. To complicate the task, there is no sharp line of division between those civilian needs which are important to the overall effort and those which are not; the real questions are not so obvious as a choice of tanks versus toys.

The steel industry is continuously concerned about these responsibilities to the Nation in wartime, and about its ability to meet them. Its representatives, therefore, welcome every opportunity to discuss these matters with representatives of the Armed Forces, such as you who are assembled here today. By discussing them frequently, we both should be better informed about the problems that will be thrust upon us in the event of a military emergency.

Today I intend to discuss a few of the basic possibilities and problems of the steel industry which are important factors in planning for national defense or war. By understanding them in advance of a national emergency, we can avoid the cost of a timeout for study when our national safety demands prompt, intelligent action.

I can best talk with you from the production viewpoint, with which we in the industry are necessarily familiar. From this viewpoint, I intend to discuss the basic question of how far the steel industry is

presently able to meet the production requirements of foreseeable military emergencies. For the purpose of clarity, I will subdivide this question into four phases:

1. Our ability to produce an adequate volume of steel.

2. Our ability to channel steel quickly into the specific products needed.

3. Present problems requiring consideration.

4. Future problems that may arise.

With respect to our ability to produce an adequate volume of steel, we are in a more fortunate position than any other nation on earth. A first consideration in this ability is a sufficient supply of good raw materials, and our supply is not only good but is rapidly being made better by the intensive efforts of many segments of the industry.

The basic raw materials for making steel are iron ore, coke, limestone, and scrap. Until recently the supply of each of these components, sufficient for all needs, has been available within the limits of the United States. For the past several years, however, the industry has realized that the supply of local, high-grade iron ore is not inexhaustible, and has located extensive deposits in Venezuela, Peru, Labrador, and Liberia. These deposits are being developed rapidly. Twelve million tons of high-grade ore were imported in 1953, and 18 million tons in 1954. Last year's figure, which I do not have, is expected to exceed 1954 substantially.

It is important to realize, however, that the growing use of foreign supplies of iron ore will introduce a new factor not in the control of private enterprise, particularly in time of war. In the last war, foreign ore shipments were cut off to save ships. This will hardly be possible in the next war. The Armed Forces will have a special interest in this problem.

In the field of alloying elements used in the manufacture of specialized grades of steel, we are not in as favorable a position as for other raw materials, being largely dependent upon foreign sources. While the Government's stockpiling program is expected to alleviate many of the critical problems in this area, there are still vital

reasons for continuing conservation measures. This is particularly true in the case of nickel, which, even under present peacetime conditions, remains inadequate to cover current needs.

On the plus side of the ledger in this field is American ingenuity, which during World War II greatly alleviated the shortage of strategic elements by developing National Emergency--NE, as we call them--steels. NE steels use from 40 percent to 80 percent less alloy than used formerly with no loss in physical properties. By the end of the war, these steels, which were developed under the sponsorship of the American Iron and Steel Institute to conserve nickel and chromium, were used for 30 percent to 40 percent of all constructional alloy requirements. Further conservation measures necessitated by the Korean conflict brought about the development of Tentative Standard (TS) steels and boron steels. As a result, in 1952, the combined usage of the conservation steels amounted to 43 percent of the constructional alloy-steel requirements.

Other developments in the conservation field include notable accomplishments in the reduction of the nickel content of stainless steels for specific applications. Outstanding in this respect was the development of a 4 percent nickel stainless steel, and a "no nickel" stainless steel for Navy nonmagnetic minesweepers. Previous compositions required 8 percent nickel for this application.

While the development of these conservation steels has served, and is continuing to serve, an essential role in our national economy, their real significance lies in the fact that they offer potential solutions to serious conservation problems in future emergencies. These steels have passed the test of experience, but their general acceptance is still limited. If they are to serve our needs effectively and efficiently, now is the time to test them and qualify them for the known needs of today and the anticipated needs of the future. I heartily recommend this course of action to all branches of the Government as well as to industry as a whole. In this way we may be able to avoid the mad scramble when an actual emergency is upon us and the decision might be "too little" and "too late."

A second consideration in our ability to produce an adequate volume of steel is the overall capacity to produce ingots and steel castings, which are the necessary first forms of every steel product.

Steel capacity in the United States reached a new high in 1955--an annual capacity of somewhat more than 128 million tons. This is an impressive figure, far ahead of any other nation on a total basis, and fantastically ahead of most other nations on a percapita basis. This figure represents the ability of the steel industry to reduce and melt raw materials into acceptable grades of ingots and castings.

In 1940, the same capacity figure for the industry was about 82 million tons. Our Nation, therefore, has experienced an increase of over 50 percent in capacity in the past 16 years. This is a rate of growth of almost 3 million tons per year, and the growth is soundly shared by virtually every segment and company in the industry. In fact, the larger companies have the lesser part of that growth. In addition, plans have been recently announced by a number of steel companies to further expand ingot production by 15 million tons over the next three years. Thus our Nation's commanding lead in this vital area is being maintained.

As of today, the steel capacity of the United States would adequately care for any known or anticipated military need, and at the same time allow for essential civilian needs. Records show that in 1943, a year in which we were engaged in the biggest war of our history, only about 13 percent of the steel supply went into direct military consumption. Of course, much of the remainder did go for uses related to the military need, but even in those days of lesser capacity than we now enjoy, essential steel needs in our civilian lines were met, and thus disastrous civilian dislocation was avoided.

A third consideration in our ability to produce adequate volume in wartime is the protection of facilities from enemy attack. The United States in the last two wars has been almost free of the threat of large-scale enemy attack; but our relative security from this threat appears to have vanished completely. Protection from attack, and operation after attack, therefore, become of prime importance to any consideration of overall steel supply.

The steel industry in the United States is located geographically so as to afford a great measure of protection of our steel supply in case of enemy attack. In fact, there are very few major manufacturing industries in the United States which are more widely dispersed than the steel industry. Many apparently dispersed industries are not really so, because the individual locations are incapable of independent production; whereas the predominant pattern in steel is one of integrated, independent production at each location.

I am well aware that, in locating the industry's earlier production sites, the thought of the fantastic destruction which can be wrought by modern weapons was not the guiding motive. Rather, it was the economic desirability of the location, occasioned by the proximity of the supply of raw materials, as well as the market for products. But our country has grown and expanded geographically and populationwise; and the steel industry has kept pace, not only by increased tonnage, but also by following the spread of the population. As a result we have come close to achieving the dispersal that a planner would have achieved had one been given the responsibility of starting at the beginning and locating the industry's 128-million-ton capacity so as to afford a continued supply of steel in case of a devastating enemy attack.

To be more specific, let me mention a few statistics regarding location of steel-producing plants. The largest concentration of the industry is in the Chicago area. This is 20 percent of the country's capacity. In addition, the dispersion of the facilities within that area is such that it might be considered doubtful that a single attack would make the industry there totally inoperable. The same is true of Pittsburgh, where 11 percent of the industry is concentrated. But, in assuming the worst, if all 20 percent in the Chicago area, and all 11 percent in the Pittsburgh area, were wiped out, we would still have well over 1-1/2 times the estimated annual capacity of the second largest steel-producing nation, Soviet Russia. And even more important, the remaining 69 percent, or 88-3/4 million tons, are produced in 27 major locations, with no single location contributing more than about 5 percent and many of them being considerably smaller.

Economics of steel production are such that most of these areas are fully integrated, so as to be independent of other areas as to source of supply of raw materials, ingots, or semifinished steel. Plants are operated by 82 steel-making companies in 118 communities, in 27 states, located as widely apart as the Pacific is from the Atlantic. I think it becomes obvious that no one enemy attack is going to knock out the entire steel industry.

It is sometimes suggested that for defense purposes the size of individual plants could be cut down to a fraction of present size, so that still greater dispersion might be gained. There are, however, very realistic production factors which dictate the size of a plant. A single production unit requires major tonnages of steel. One blast furnace, for example, will support a million tons of ingots. One

primary blooming mill may consume 2 million tons of ingots. One 80-inch hot-strip mill may require as much as 4 million tons of ingots. These practical economic factors indicate that integrated steel plants must be fairly substantial in size.

Volume of steel will not, in itself, serve our wartime needs. That volume must be quickly channeled into the right shapes; it must be channeled into the right grades; it must be channeled into the hands of the right fabricators.

What is our ability to shift products and distribution quickly?

An examination of the major product shifts in World War II will serve to illustrate the problems and the possibilities. Of the nine general product groups on which tonnage figures are published by the AISI, only three required major shifts; these three were plates, sheets, and semifinished. Plate volume was radically increased to serve the sudden need for shipbuilding and for armor plates of all kinds. Most of the plate increase was provided by a corresponding decrease in sheets, whose predominant use had been for automobiles, home appliances, and other consumer items. Semifinished was sharply increased to provide the many varieties of shell steel needed for projectiles. A comparison of the full-scale war year 1943 with the full-scale peacetime year 1953 will show the extent of these shifts. Plates took only 9.6 percent of the available steel in 1953, but in the war year 1943 they took 20.8 percent more than double the peacetime share. Sheets and strip took 33.8 percent of total production in 1953, but in 1943 they took only 17.7 percent. In the case of semifinished material, 11.8 percent of our total product was required in 1943, contrasted with only 5.5 percent in 1953. Output of the other six major products was not substantially different during the war than is normal for the industry. As a matter of interest, these six other products are: bars; pipe and tubing; structural and piling; tin mill products; wire products; and railroad materials.

These changes were readily made, not because the industry had consciously prepared for such a requirement, but because the peacetime facilities for these particular products happened to coincide with the need. The shipment of semifinished required mostly for shells can be increased to almost any desired level at any time, because all steel goes through the semifinished stage in its manufacture.

In the switch from sheets to plates, the product in demand, plates, was similar enough to sheets, in both semifinished required and facilities needed for production, to make the change. Both happen to be flat products, needing only flat-rolled reduction and no form shaping. Both require semifinished steel in the form of slabs. Both can be rolled on hot-strip mills, though only the lighter plate gauges are usually assigned to strip mills, thus leaving the plate mills available for heavier sizes.

You may rightly wonder how the steel industry came to have such a number of hot-strip mills. It was, we must admit, almost entirely without a foreseen military demand. The demand as such had not been made known. The advent of the high-speed hot-strip mills was brought about during the 1930's because the automotive and other like industries required large tonnages of sheets.

Prior to this time, sheets were all made on handmills. This method was slow, cumbersome, and costly in manpower. The modern hot-strip mill emerged as an industry development to meet a widespread industrial demand. Thus it was by mere happenstance that the steel industry was able to promptly meet the tremendous demand for plates in World War II.

Along with these product changes, the other major shift was in grade and quality. As an example, there was a sharp increase in the need for alloy grades. In peacetime 1953 only 18 percent of our ingot and semifinished shipments was of alloy grade; in the war year 1943 it was 28.5 percent. Alloy bars in 1953 amounted to 23.5 percent of bar production; while in the war year, 1943, it was 31.6 percent.

This increase in alloy grades was accompanied by sharply increased demands for hot topping of carbon steel. Since hot topping requires separate, limited facilities, and since virtually all alloys are hot-topped, there was an immediate conflict between the carbon and alloy requirements. This widespread increase in the demand for the higher quality grades created bottlenecks all along the production line, because at each point the handling and the equipment time are greater than for ordinary grades. Though these higher quality grades of steel were quickly increased in volume, they remained a serious problem throughout the last two military emergencies. Even though industry ingenuity made it possible to meet the essential needs in this area, adequate preplanning of the military requirements could have done much to ease the transition period.

Thus, in meeting the military emergencies of World War II and of the Korean conflict, the steel industry was by nature equipped to make the big product shifts demanded of it quickly and effectively, even though some of these shifts were largely unforeseen. In future emergencies there will be the necessity for even tighter time schedules, which make it essential that required changes be planned and prepared for in advance.

The Government can make a very important direct contribution to our ability to change product and maintain production. I have in mind the effect of Government specifications upon steel production.

Historically, Government agencies, including the military, have followed the policy of establishing specifications to cover their own specific needs. Inherent in this policy has been a general tendency to overspecify, and to place their requirements on a "custom made" basis, overlooking, in many instances, the fact that an available standard product was adequate for the job. As a result, many existing specifications contain undesirable and unnecessarily restrictive requirements when compared to industry standards covering the same or similar end uses. Examples include complicated nonstandard testing methods and procedures, excessive testing and inspection, restrictive tolerances, restrictive chemical and mechanical properties, and excessive marking and identification requirements.

It is recognized that many military applications have no counterpart in civilian production, and, because of the critical end uses, require higher standards, closer tolerances and limits, and more exacting testing requirements. The steel industry is in complete accord with the necessity for the restrictions imposed in order to assure the high quality of performance which is essential in such applications. However, even in this field current review can be fruitful in keeping the restrictions to the minimum essential to assure satisfactory performance.

Unfortunately, the practice of overspecifying was in full force during World War II, while England, suffering under a similar situation, found it desirable to relax restrictive specification requirements in order to conserve vital tons for defense.

The experiences of World War II and the Korean conflict have brought to the attention of industry and Government alike the penalties in cost of production, and the loss of essential tonnage, due to

unnecessary requirements which slow down production and delay the shipment of vital war materials. We are aware of the steps being taken within the Government agencies to correct these conditions. Their efforts to provide interchangeability of products and specifications between the various services, to promote the use of standard products, and to establish a unified catalog for all services' procurement which should lead to economies and reduce waste.

During the past few years, and particularly since the end of the Korean conflict, the new look on specifications has been evidenced in the number of Government specifications submitted to the industry through the American Iron and Steel Institute for review and comment. As a result of this activity, more practical specifications have been issued which are acceptable to both the industry and the Government. However, activity in this field has been slow, as evidenced by the many Government and military specifications yet to be reviewed and revised. There is apparently a need for even a greater recognition of the benefits to be derived from this joint action.

It is my personal opinion and one equally supported by the industry, that simplified, realistic specifications are essential to our national economy and security. Every evidence points to the necessity for continuing the good work already accomplished, and expediting the work yet to be done. The final payoff will be measured in terms of steel which will do the job, in larger quantities, when needed most, at less cost to the Nation, and with effective conservation of our national resources.

I have spoken so far only of the production side of our national flow of steel, and have said that the large shifts in the last war were largely confined to three of our nine general classes of product, plus a considerable shift in the grade and quality of products. There is another kind of shift, on the distribution side of the steel picture, which also poses great problems for the industry. The amounts and kinds of steel needed by individual consuming industries changes almost from top to bottom during a major mobilization effort. And since the production of most steel is tailormade to the individual order of the individual customer, there is turmoil in all of our industry planning until the new pattern is firmly established, and until that pattern is expressed in individual orders.

During World War II, the pattern of distribution of products among consuming industries, and among individual customers, had to be

completely changed to take care of the requirements of our war effort. Reports of the American Iron and Steel Institute make the extent of this change quite apparent. For example, for the war years 1942 through 1944, 18 percent of the shipments of steel mills went to the Shipbuilding and Aircraft Industries. In 1953, a comparative peacetime year, only 1 percent of shipments were for this use. Export shipments during the war were three times as great a percentage as in 1953, and shipments for ordnance, projectiles, and tanks were nearly four times as large. Since the war, these shipments have reverted back to the normal peacetime steel markets such as automotive and household appliances. These markets were practically nonexistent during World War II.

These great changes in distribution of products, coupled with the usual war demand for maximum production, created a major problem in controlling the distribution of steel. At the start of World War II distribution was initially controlled by so-called "industry programs." These consisted of voluntary undertakings by each steel company, at the request of the President, to provide stated amounts of tonnage each calendar quarter, to builders of freight cars, ships, tanks, and such other items as were recognized to be needed by the armed services and supporting industries. After a few months' time, these arrangements were recognized to be inadequate for full mobilization, even though the steel producers had performed well on these specific undertakings.

The industry programs were followed by priorities systems supported by an act of Congress. These systems started with the creation of a set of symbols which could be used to identify the orders that must be given preference by the steel producer in scheduling his production. Orders not marked with the priority symbols were to be produced as and when the producer could accomplish it after first providing for the marked orders. After a few weeks the set of symbols was expanded to include priority for additional classes of business which were feeling distress; and in a relatively short time the unmarked orders represented a constantly shrinking minority of the total tons the producer was expected to supply.

Priorities regulations often were issued piecemeal, and, in many cases, long after the steel orders which they affected had been accepted and scheduled. In this sense much of the regulation actually attempted retroactive control. The result was that individual orders were booked and rebooked, scheduled and rescheduled, so that the steel producers were uncertain about their plans and obligations, and unable to perform

the maximum job of which they were really capable, in production and service.

Continued unsatisfactory performance of the priority system forced a search for better methods of control. This resulted in a study relating the productive capacity of the entire metal industry to the needs of all of the country's metal users, so that a realistic balance between military and nonmilitary requirements could be established, and so that the tonnage available after direct war needs were met could be distributed among civilian claimants to the maximum national advantage.

The result of this study was the development of the Controlled Materials Plan, which accomplished the regulation of future plans, rather than attempting the regulation of past actions. The Controlled Materials Plan proved during World War II to be a fairly workable system of regulating steel distribution in time of war.

However, it still had many problems and required an excessive use of manpower both in Government and in industry for its execution. Present studies by the Government and the Industry through the Steel Products Advisory Committee are aimed at directing the distribution of steel through the control of end uses in times of emergency, with the direct Military Program having the only real priority. Such a plan offers much in simplicity and in reduced manpower requirements, and it should be pushed to completion.

As related to you throughout these pages, the steel industry was able in time of war to supply the needs of the country in quantity, quality, and types of product in a substantial measure. However, it was noted that in some instances, such as the great demand for plates, our ability to supply this demand was the result of fortunate circumstances rather than careful planning.

Nevertheless, this historical background of satisfactory experience enables us to make the following statement: The steel industry need have no great concern for its ability to switch to wartime production and meet those needs successfully so long as the requirements of a war are reasonably comparable with those of World War II or so long as the requirements are such that in the very nature of the industry they can be met. We do, however, have a concern for the unknown--that is, those things that are still in the development stage and which may suddenly emerge in large volume demands with requirements of

width, gauge, quality, strength, or other characteristics, which we may find ourselves inadequately equipped to produce.

In this area, the supersonic aircraft and guided missile program may be a good example. Currently, titanium and titanium alloys are apparently playing the major role in this new development. However, as temperature requirements increase, it is not inconceivable that steel might be required in order to solve the high temperature problem more effectively, and with fewer complications. At least it would seem desirable to have an alternate material developed which could be used in an emergency; and yet we in the industry are not aware of any positive steps being taken by the Government in this direction.

To further complicate the picture, indicated requirements for material to do this job exceed the steel industry's ability to fully meet these requirements with present facilities. Consequently, the problem is not only to develop the steel to do the job, but also to develop and install the facilities which may be necessary to meet the restrictive requirements such as flatness and uniform thickness in abnormally thin gauges and in widths not commercially available from existing equipment.

There are probably other important areas where problems of this nature exist or may at any time develop. It would seem to me that the Armed Forces must constantly check the potential requirements of each new development with the steel industry's ability to meet these requirements in product, grade, and productive facilities.

The American Iron and Steel Institute is a proper body to work with in solving any technical problems dealing with steel. Likewise, the Steel Products Advisory Committee, operating under Business Defense Services Administration, is a proper body to advise on problems of production and distribution. These two groups stand ready to serve in every way possible to better prepare the steel industry to meet the Nation's needs in time of emergency.

Thank you.

MR. HENKEL: Mr. Lose is ready for your questions.

QUESTION: As I recall World War II--I had no personal experience with it--there was considerable to-do with the Government and the steel industry about whether there would be enough steel capacity. Can you give us something on what happened at that time?

MR. LOSE: The first thing about capacity was in 1938, when we were blamed for having too much capacity. We received a lot of remarks along those lines. The second thing was, during the beginning of the war, and during the five years intervening in those two periods, we were criticized for not having enough capacity--that we should expand. The reason for steel capacity, and how much capacity, is found in whether you fully employ your people, because steel, after all, almost spreads clear across the basic employment in the country.

So I say, let's not argue about whether we had enough steel. Were the people fully employed in wartime? The answer obviously is, they were. Had we produced any more steel, I don't know how we could have gotten more people to use it.

QUESTION: Mr. Lose, I happen to be quite familiar with your plant in Pittsburgh, the businesses and all the mills there, and also your problems in getting ore from the Mesabi Range. In view of your Venezuela ore and the establishment of the Fairless Works, if the Soo Locks were knocked out, would you be able to bring in enough Venezuelan ore by rail to keep your Pittsburgh plants operating? Or are you building up stockpile for that purpose?

MR. LOSE: Well, that's a very large question. As far as the railroads are concerned, I am reasonably certain that we could get the railroads to deliver enough ore from the Eastern Seaboard. We have at least four major railroads that could be utilized, and the railroads have tremendous tonnage possibilities.

Shipping might be another problem. There might be difficulties there. I am not familiar with the maritime situation to the point that I can discuss the difficulty of providing shipping. There are great unloading facilities in Baltimore and Philadelphia and, at our Fairless plant and at the Bethlehem plant, I think there could be a great deal of unloading done. You could also unload in the south and ship the ore north. Mobile is a great unloading point. But you would have a tremendous problem, a great problem.

If you stop the movement of lake ore, you will require a substantial railroad movement. It is possible from the lakes that the Great Northern and other railroads can handle very substantial tonnage--and railroads can do tremendous things when they have bulk handling. In handling a train load, or two train loads, as a minimum, they can do a great job.

QUESTION: Mr. Lose, in one of our seminars an opinion was expressed that in a future all-out mobilization we would run into trouble in having enough scrap; therefore, a likely bottleneck might be the production of the basic iron itself. Can you comment as to how the blast-furnace capacity would handle it? What are the possibilities in that field?

MR. LOSE: Well, there is probably no more argumentative subject than that of shortage of scrap. During this past peacetime year of big production, there was about 4 million tons of scrap shipped out of the country. I don't think any open-hearths were shut down as a result of that.

It is a complex problem. I can't say that is the answer. It is merely one indication. You go by indications in these things. I would say that in almost every area of the steel business a very interesting thing is developing. At the present time our foreign ores are superior in iron content to our Lake Superior ores. The taconite ore is superior in iron content to our usual direct shipping ores. The average iron content of ores being consumed in the United States is increasing. That means an increase of pig iron production in the same blast furnace. So, in short, you have a substantial increase in iron, which would tend to offset any shortage of scrap. So, adding all the pluses and minuses up, I think we will get by.

QUESTION: I have some experience only in tin plate. In this question that I am going to ask, during World War II we substituted pretty largely electrolytic tin plate for the hot-dipped tin plate. There are not very great savings we can make by keeping down the amount of tin we can put into steel in order to accomplish some purpose. Are the substitutes we have made, and the other methods and alloys used to save steel, reducing the area in which we can make savings in the future? Or do you think there is still room for a lot of improvement?

MR. LOSE: Well, in alloy steels we are getting close to the bottom. I think Mr. Parker can well answer that question. Will you stand up, Charlie, and say how far you can go in that?

MR. HENKEL: Mr. Charles Parker is from the American Iron and Steel Institute.

MR. PARKER: I don't think we can go much farther in saving alloy, in the conventional sense. However, the question which the

gentleman asked had in it inherently a state of statustism which we in the steel industry can't accept. That is, you are presuming things as they are. We don't expect the future to look like that at all. We expect new methods to be devised to handle the type of problem which we have to handle. Things are coming along in our field, as well as in yours, and some day they are going to meet and develop successfully. The standard alloys--nickel, chromium, molybdenum, and so forth--are now being utilized in the so-called NE steels to about the limit of their ability, but we do have coming back of that the so-called "addition agents"--it is a bad term, but it is being used--such as quantities of boron and vanadium, which are increasing the ability of steel to harden in depth, and are therefore increasing its value.

On the other hand, there are heat-treatment procedures and fabricating procedures coming along which we are sure are going to be successful, which will make it unnecessary for us to alloy below certain diameters or certain thicknesses, because we will achieve with the heat treatments what we are presently achieving with the alloys.

We can put a theoretical limit on it as of the moment, at about 1-1/4 inch. When one of these goes below 1-1/4 inch for a number of parts--tank parts, tractor parts, and so forth--that are not exposed to ballistic conditions, we can make them out of plain carbon steel by the new heat treatments coming along. The same thing is true in many other fields.

QUESTION: You mentioned the problem of determining requirements, and I would be interested in your comment as to just where this problem lies. The military services have mobilization dealings with industry where they plan for the production of end products, in which case the industry apparently places a requirement on the subcontractors and, in this case, maybe the steel requirement.

I am wondering if the answer to the problem of determination of requirements is to be liaison with the Government or with the producers of end products.

MR. LOSE: The problem of requirements of the Government for direct war purposes is not a problem insofar as tonnage is concerned. It takes only 12 percent or 13 percent of the steel production for all such purposes, through the subcontractors, and so on, for direct military requirements. The problem is that every business in this

country thinks it is important in the war effort and wants to run three shifts instead of the single shift it used to run. When they all do that there is not enough steel to go around.

They are all important in the war. Who can say freight cars and pipelines are not important? We built the Big Inch to help on transportation. Who can say they are not important? That is a great problem, the distribution of steel to these particular areas. If you remember what I said--only the Government would have real priority and could get its steel just when it wanted and just the shape it wanted. The rest are really supporting our civilian economy so that the country will not suffer in an economic way during the war period.

There is only a small percentage that goes into the things that you really wage the war with. You might need cars to take them to the coast line, and so on, and ships to take them elsewhere. In the last war we had a tremendous demand for ships; even then those ships took only 15 percent of our steel. We can add that on to the 13 percent and we have 28 percent.

QUESTION: Is there any way to expand the production capabilities of the industry without adding any substantial new plant facilities, by minor additions to the existing plant?

MR. LOSE: Well, that is a very good question, and that is one of the things that I think our industry has done year by year. I would say, of the 40 million tons that was added between 1940 and 1955, one-third was added by increased production out of existing facilities. That is constantly going on.

It is like Mr. Parker's use of alloys. He claims we can use less and less. We claim that in the open hearth we can make more and more. We expect them to do it.

QUESTION: Mr. Lose, you expressed yourself quite plainly on the Government specifications, and I can't say I disagree with you greatly, except in the area of the marking of steels. As you know, partly because of the way steel is developed, through jobbers, there have been some serious failures in installations because of inability to positively identify the steel used in fabrication. I know there has been some talk about standardized markings of steel by the makers. It would seem to me that in time of war that would be of tremendous importance.

Can you tell us what is being done about that by your company?

MR. LOSE: I think everything has two sides. I have often listened to a debate on the part of two fellows. When I hear the first fellow I can't imagine how the other guy could knock him down. When I hear the second one, I am absolutely sure that the second fellow is right.

Now I will start on a tough subject. The marking of all our steel would cost this country a billion dollars a year. I am not sure it would be entirely practical, even though they wanted to spend a billion dollars, because the production in many of our units would be substantially held up by having to mark little 3/8 inch rounds or narrow strip--how often?

MR. PARKER: Eighteen inches.

MR. LOSE: Every eighteen inches--miles and miles and miles. One producer stated that a certain section cost him 110 dollars a ton to mark. That is manpower. When do you need manpower?

QUESTION: Mr. Lose, how much of your production would be cut off by the loss of your South American steel supplies in case of submarine warfare?

MR. LOSE: Ore supplies?

STUDENT: Ore supplies. Have you done anything about putting a railroad through?

MR. LOSE: To tell the truth, I think they have a hard enough time flying airplanes over that country, without putting railroads through. At the present time about 15 percent of our steel requirements is expressed in the Venezuelan ore. Am I right?

MR. PARKER: Eighteen percent total foreign in 1954.

MR. LOSE: Venezuelan, 15 percent.

MR. PARKER: That's right.

QUESTION: Sir, I wonder if you can give us some indication of what you might call production lead time in steel. How long does it take, if you are asked, to increase production with existing plants? Do you get into raw materials and into the cost of manpower, and so on, to increase 10 or 15 percent?

MR. LOSE: Our maximum production we are capable of reaching in a rather short period of time. To increase over that maximum production requires the expenditure of many millions of dollars in facilities.

STUDENT: Speaking of existing plants, sir?

MR. LOSE: With the existing plant, if you want shells, we will ship them within this week if we have specifications on hand. If you want plates, and we have specifications in the plant, we will ship them next week. If you want armor plate, it will take three months to ship armor plate. It will take weeks, maybe months, to get facilities to turn out shells. So the initial shipment of steel to the customer who is going to turn it into the part that you want, I think, is by far the shortest period that you have involved in any of the manufacturing cycles.

QUESTION: This 15 million increase that is coming up, will that be a net increase, or will it be an increase from the old plants?

MR. LOSE: No, that will be all new additions. As I understand it, it will be additional capacity.

STUDENT: A following question is, if we get into a depression or a downturn in business, is there any possibility of these older facilities being scrapped, thereby decreasing the capacity of industry?

MR. LOSE: That is more or less gradually going on in the industry to a degree that is scarcely noticeable. I think our increase in capacity is so substantial that the minor dropoffs have little effect on the net increase.

QUESTION: Is it true that your expansion of the steel industry was accomplished primarily by private funds?

MR. LOSE: I am proud to say, entirely by private funds. You bear me out if I am right, Charlie.

MR. PARKER: That is correct.

MR. LOSE: Mr. Parker answers for the industry, while I am just a member of a single company.

QUESTION: Toward the close of last year we read that for quite some time the steel industry was putting out at virtually maximum production. Your comments a while ago indicated that we had plenty of capacity in the steel industry to support not only a military war effort but at the same time to take care of the civilian requirements. Are these two compatible?

MR. LOSE: They are not additive. You don't add your military requirements on top of a full peacetime civilian requirement. You take 10 million people out of civilian activities and they are not consuming anything. They are not consuming steel. So you take out about as many people as you then draw steel to your direct war effort.

In other words, the civilian force is now 60 million. War is declared tomorrow. In a few months the civilian force will be 50 million. You will have drawn 10 million out. The total requirements of civilians and military--I may be wrong in my viewpoint, but this is my viewpoint--will be about the total full peacetime requirements.

QUESTION: Mr. Lose, what operational stockpile of raw materials do you keep at the plant site, and has the industry any specific mobilization plans for increasing the stockpile of the ores and limestone on a separate basis?

MR. LOSE: Well, take limestone; we ordinarily keep a very limited stockpile, except at the lake-front plants, where we get our stone by boat. There we put enough stone in stock so that when the boats are down we don't have to ship by rail instead of boat.

At the inland plants, where we get our stone by rail from inland quarries, there is no need to have any substantial stock, except against a strike or something that might occur in the limestone quarries while our plants were still operating. A 2 to 3 months' supply of limestone is sufficient for those needs.

Due to the lake movements being inoperable in the wintertime we have to stock ore to carry ore over the winter, and try to stock enough so that we are in fairly good shape--that is, by springtime.

But there has been no general stocking, because of the costly condition sometimes surrounding such stocking. There is no general stocking greatly in excess of economic needs.

QUESTION: Would you comment on some of the new techniques being developed, such as continuous casting? Isn't it true that the development of such techniques would tend toward decentralization, or smaller plants, with less substantial investment?

MR. LOSE: That's a very good point, and I think it must be agreed to that if continuous casting becomes a success, an every day possibility, in the direct production of ordinary grades of steel, why then, with some specific exceptions, you could have smaller plants.

A specific exception is this: Most of your steel must be made from a pig iron source because of the scrap shortages you speak about, and the small plants are generally electric furnaces using scrap. They are not using material from a pig iron source. So you can't expect to increase those to a great degree. As soon as you build a blast furnace you must support a million tons of ingots. That is not a small plant.

Majorly, the steel in this country must be made from a pig iron source because the scrap supply is limited.

QUESTION: Mr. Lose, it is my understanding that the reserves of coking coal are short in relation to other metals used in the steel process. Is industry making any study anywhere to provide for the flow of coal and coke?

MR. LOSE: The reserves of coal are very substantial insofar as coal in general is concerned. However in some specific coal used in coke making, particularly low volatile coal, there is quite a shortage. Insofar as high volatile coal is concerned I do not think we have a shortage. The best coke is produced from a mixture of high volatile and low volatile coal. The industry is giving this matter attention and has already developed a product from high volatile coal called char, which can be used to replace low volatile coal in the mixture. By the time our low volatile reserves are exhausted I am sure industry will have solved the problem.

MR. PARKER: That is very apparent in our statistics. If one of the students will take the figures on coke consumption per ton of iron produced, you will see rather a steady climb from the early thirties

to about 1944, when it levels off and starts to drop. We are actually using less coke per ton of pig iron used today, because of technical developments of this type, than we were using five years ago.

QUESTION: Mr. Lose, you mentioned the desirability of testing and qualifying the war emergency with tentative, specific steels in advance of any future emergency. Would you say just what is involved in getting these materials tested and qualified? Is it something more than getting an SAE practice?

MR. LOSE: Well, the problem is something like this. If I am a manufacturer and I have used a certain grade of steel for a certain part, and it has performed well, and I can get it for about the same money as I would have to pay for a low alloy steel, I don't want to be worried. I don't want to have to change my practice. I have no good reason for it.

If I am in some part of the Government service and I have known this specification to work, and the steel fellows come and say, "We would like you to try out a low-alloy specification," I say, "I don't want to, because of the difficulties here. We might get into trouble in this process and I am not sure of it. I know I am sure of this other. I have tried it out. I have used it a long time."

Those are human equations. I think the major thing we are faced with is trying to get more low-alloy users. Maybe we can't under peacetime conditions.

MR. PARKER: May I supplement you on that? I think specifically what the gentleman means is actually the procedure that must be gone through. I believe I am correct in saying that if it is a thing that flies or shoots there must be a prototype built of the alloying or substitute steel, and that prototype must pass through rigid operating tests before the steels can be qualified.

QUESTION: Sir, I think in the past 2 or 3 years there has been a marked increase of interest in the rare-earth metals. I understand there has been some usage by the steel industries, in working on different types of steel, of purified rare earths, or "mish metal," a combination of several. I wonder if you have experimented with rare earths, and what success you have had.

MR. LOSE: All the steel companies, I think, have been working on that particular phase of steelmaking, and I am glad again to turn to Mr. Parker--he knows what all the steel companies are doing--to report on this.

MR. PARKER: This is a very difficult question. The first use of rare earths was in the production of stainless steel, to increase rollability. It very definitely does increase rollability by two grades. We are positive of that. We can lay down substantial data. I use the word "substantial" advisedly. The percentage of increase is something of the order of 10 or 12 percent. But it is not in the field of stainless steel that we are most interested, or in which the major theory is being put forth. It is in the field of plain carbon steels.

I don't know of any steel company that has experimented with rare earths in the past two years that has been able to achieve better than about a 1-1/2 to 2 percent increase in properties, or increase in rollability. And, when that 1-1/2 to 2 percent is pitted against the economics, not only of the cost of the rare earths themselves, but the procedures and inspections necessary to make them work within the 1-1/2 to 2 percent, it is not worth it. It is a long way from being worth it, because we can't produce steel that precisely.

In other words, take a plate specification which has a normal tensile strength range of, let's say, 15 thousand pounds and let's say, 60 to 75 thousand pounds per square inch, with all other mechanical characteristics homogeneous to the tensile strength. Now, an addition of rare earths to the heated steel might give you 61 thousand on the minimum, or 76 thousand on the maximum; and, obviously, to get a thousand pounds within a 15-thousand pound range and have to pay money for it is utter folly.

That is the present condition. Hope is not yet gone. There is a great deal of work being done, but, right at the moment, that's it.

MR. HENKEL: Mr. Lose, in spite of your experience last night you have given us some excellent information. I want to thank both you and Mr. Parker in behalf of the College.

Thank you.

(20 Mar 1956--450)O/en