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PROBLEMS AND TRENDS OF T'L IRON AND STEEL INDUSTRY

by

Dr. Walter S. Tower
Executive Secretary
American Iron and Steel Institute

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I have asked that you be given in advance of our discussion a set of pages on which you will find perhaps a somewhat appalling array of figures. It always seems to me, however, that to have the figures on paper rather than in the air is very helpful, because there is not much of anything that is more depressing than an atmosphere laden with statistics. I have put them down on paper for you so that you may have them for your own reference at your own convenience or if you prefer you can ignore them entirely.

The subject of which I am asked to talk to you this morning, "Problems and Trends of the Iron and Steel Industry" is rather large in its scope, if one would undertake all that might be said on either of those two categories. Perhaps I made a mistake in not suggesting to Colonel Miles, who I understand is prevented by illness this morning from being here, that he could relieve me of boring you this morning by assigning you to attendance at the hearings a couple of weeks ago by the Temporary National Economic Committee in respect to the Steel Industry. If you had sat through those hearings you would have learned much more than I can possibly undertake to tell you this morning, and you would have learned particularly that one of the principal problems of the Steel Industry is to throw light into some rather foggily shrouded minds. I was tempted at one stage in listening to those hearings to paraphrase or supplement the well-known saying that "A little knowledge is a dangerous thing" by adding that "no knowledge is fatal".

It is always a little difficult to know exactly where to start in discussing problems and trends in the Steel Industry. Last year, when I had the pleasure of being here before what was then said to be the best of the classes, but I understand that it has now been superseded by the class before me, I was able to say that the principal problem then before the Steel Industry was to find orders. Well, it is only twelve months since then and the principal problem of the Steel Industry now is to fill orders, and I don't know of any better way to characterize the problems of the Steel Industry than to note the ups and downs experienced in the last three years. In 1937 the industry established a high level of activity gaged in terms of actual tons produced. In 1938 it dropped down in scale of operations to a level almost ruinously low, and now, in the current week, more steel is being made than has ever been made any other week, either in peace of wartime in the United States. Manifestly, with variations of that sort in the run of activity in the industry there are bound to be many kinds of problems of operations and production.

Most of those, however, are internal to the industry and are felt only a little, if at all, by the people outside the industry who are using its products. Perhaps that statement ought to be qualified in part to take care of the present situation of pressure for delivery of material from consumers who are, in a good many instances according to reports, not able to get as prompt delivery of assembled material as they would like to have. I am sure that that statement will suggest to some of you the desire to ask a question later as to where are the bottlenecks in the Steel Industry and so I shall not answer that question now.

In the statistical tables that I have given you I want you to note the various kinds of statistics there which I have selected in order to set before you in accurate measure some of the fundamentals of the industry, notably, capital figures and production figures in different representative years over a space of approximately three decades, to trace the effects of different conditions at different times on the progress and activity of the industry. I want particularly to have you compare the figures on blast furnace statistics which appear in the second table on page 1 with the figures in the first and second tables on page 2 which show first, the steelmaking figures and secondly, the relationship between the pig iron and steel ingot figures. Those comparisons will lead you immediately to the first and one of the most fundamental problems of the industry with respect to raw materials.

The basic raw materials of the Steel Industry - ore, fuel, stone - are available in the United States in adequate and, for current requirements, unlimited quantities. The quantities and qualities of those basic materials available domestically leave little if anything to be desired. The product of those, as far as the steel industry is concerned, is pig iron and as soon as you have produced pig iron by smelting of iron ore, you immediately find yourself requiring certain other auxiliary materials, like manganese, for example, to help in the purification of pig iron for the production of steel, and like iron and steel scrap for use in open hearth steel making furnaces, in order to facilitate certain processes of production and get the best results and practices, under present day conditions.

What you have then are three basic materials for the production of pig iron, and add two more, manganese and scrap for the production of steel - plain steel, simple steel. As soon as you go into the more specialized quality of steel, the so-called alloy steels, then immediately comes the subject of alloying materials. Prominent among those are to be noted nickel, chromium, molybednum, tungsten, and vanadium. Unfortunately, the majority of those are not available in the United States in adequate quantities for our requirements and when we find that fact with reference to alloying metals we should turn back and note also that we are not now able to produce

domestically enough manganese for our own requirements. On that subject I am sure there are some questions in your minds and I shall not deprive you of the chance to ask them.

Those alloying metals for which we are dependent on the outside world are among the most essential strategic materials which we need from overseas or foreign sources. Molybdenum we have in abundance in this country, more than in other known deposits in the world and as our knowledge of the usefulness of molybdenum in steel making increases, it appears that molybdenum will make steel have the things or impart to steel many of the qualities heretofore deemed to be available only by the use of other materials.

Then there are three more materials essential for certain parts of the steel industry - coating materials, tin, zinc, and lead - tin for making tin plate, zinc for making galvanized products, lead to be used in conjunction with tin in the manufacture of certain other coated products. Zinc and lead are of domestic origin in adequate amounts - tin, not. We must draw tin from overseas sources and at the present time, among the consumers of tin in the Steel Industry, there is a considerable uncertainty as to the adequacy of tin supplies at reasonable prices. Without tin there could be no tin plate, without tin plate, no canned foods for the military arm of the Government.

There you have the larger problems with reference to raw materials and in conjunction with those problems of supplies of raw materials there are one or two trends which I would like to mention.

There is an increasing use of alloying metals because of the growing recognition of the possibilities of special qualities imparted to steel by the addition of specified percentages of other materials in conjunction with iron.

The so-called specification steels which are becoming constantly more important in the industry are related in large part to the use of alloying metals.

The growing importance of trend toward the use of scrap is revealed in a general way by the second table on page 2 in which is shown the relationship between the production of steel making pig iron and the output of steel ingots. You will note that in the early years shown in the table the production of steel making pig iron exceeded seventy per cent of the total tonnage of steel turned out in a year but more recently only about sixty per cent. That is an indirect way of measuring the increasing importance of scrap.

Scrap is becoming increasingly important and if you don't ask me some questions about it I shall be disappointed. I should say this further concerning scrap, that a great deal of scrap is produced in the process of manufacturing steel, as indicated by the right hand column of figures in the first table on page 2, showing the percentage of yield from steel to finished product. The first figure in that right hand column is wrong, instead of 94.9 per cent it should be approximately 81 per cent. Even with that correction you see that yield has been a diminishing percentage. The difference between ingot and finished product is home made scrap, and that goes back into the furnace.

Two other important sources of scrap - one, generated in the process of manufacturing articles out of steel, as in the automotive industry where approximately twenty-five or thirty per cent of all the steel products fabricated become scrap in the process of fabrication. The percentage varies in other industries. And then as a second important source of scrap, the scrapping of industrial equipment, tearing up of old rails, junking of automobiles and railroad cars, tearing down steel frame buildings, junking of many different kinds of agricultural and industrial equipment, all contribute in varying amounts to the annual output of scrap. It might be interesting to note in this connection that a fairly accurate estimate indicates that at the present time we have in use in the United States upwards of a billion tons of steel performing some function or other. Now, somebody has taken that figure and deal with it in a rather liberal way by calling it "potential scrap". I want to disavow any responsibility for that idea. How great the potential supply of scrap is in the United States can be determined only in the light of certain variable factors of which price is an important one. Place and time are other important factors. There you have to compute your equation with three variables, price, time and place, all unknown, and while my mathematical studies are behind me, I was never able to solve an equation with three unknowns in it.

That brings up the question of the export of scrap about which you hear much. That is another one of the problems of the Steel Industry.

So much for the question of the raw materials of making steel. Now let's look at steel itself, the capacity to produce steel as a raw metal in the form of ingots and its use in making finished products, the various ways in which it goes into consumption. Last year when I was here I was able to discuss that old point about excess capacity in the steel industry. We have a fraternity in this country which has always amused itself by talking about excess capacity particularly in the Steel Industry. At the moment there is neither excess nor idle capacity. Capacity in the Steel Industry is gaged approximately by what we might call "peak demand". If you look

at those capacity figures that I have set forth for you in the first table on page 2 there may be in your minds some question as to whether, if at this moment when ordinary commercial requirements are taking all the steel that can be turned out, there would be enough steel for everybody who wanted it if sudden additional demands for military purposes were to be put on top. I am not saying there would be a shortage of steel making capacity to meet combined civilian and military requirements because I don't know, probably nobody knows exactly what the situation would be, as a result of the demands for military requirements on industrial plants now producing for civilian purposes, if we had to put in effect Colonel Hinton's steel plan. Specifically, let's take a case which may illustrate the point.

Take the case of a company like Marion Steam Shovel - which with a great deal of difficulty, I am told, could be turned over to the manufacture of tanks for military purposes, because that company is in the business of making heavy excavating machinery in which the caterpillar type of locomotion is fundamental. Assume that at present the plant is working full time on production for civilian purposes and requires steel for those purposes, but, however, it should be called upon to turn its facilities to the manufacture of tanks for the Army, then the steel requirements would be chargeable against Colonel Hinton's steel plan and would not represent additional demands upon the capacity of the steel mills to produce. Considerable parts of the requirements of war would represent industries diverted to produce items for military program, and the needs for steel would be substitution rather than additional requirements. I wanted to dwell on that point because if civilian needs were at top-notch level, and wartime needs were added, I don't exactly know the answer as to what capacity would be. Colonel Hinton may because he has so much of those facts of available capacity and military requirements on hand.

Steel furnaces in the United States are capable of making seventy-two million tons of steel in a year. There is probably not much chance for the industry to make at any higher rate than seventy-two million tons in a year. In other words, the capacity is rated high enough. That tonnage of steel can be finished into a variety of forms, there are some forty or fifty standard classes of products. Enough of those products are listed in the first table at the top of page 3 to be a good indication of how the tonnage of those products is divided. However, the ability to finish steel is more flexible than the ability to make steel. As an illustration, you have all probably heard about the continuous strip sheet mills that the Steel Industry has been putting in during the last ten or fifteen years. They are enormous affairs, requiring plants half a mile long capable of taking steel as it comes in the form of ingots and turning it into a highly finished product, at a speed of more than a thousand feet a minute. If you have never seem one of those

finishing mills you ought to go to the nearest one and have a look at it. It is really a grand spectacle of industrial achievement. In the aggregate those mills are rated as capable of finishing fifteen million tons of steel, rolled in the hot form, in the course of a year. It probably is true that if they could be given all the steel they can handle, operating at maximum capacity, as many turns per week as there could be run on desirable sizes of products they could double that figure. In other words if some emergency requirements in the United States called for twenty or twenty-five million tons of the kind of product that can come off those mills, they could probably do the job provided the necessary steel were diverted from other uses. Much the same thing is true of others - the bar mills, for example. Undoubtedly, if the steel were diverted to them, operating at maximum capacity, many more tons than are talked about as bar mill capacity could be produced in the United States.

The reason for these conditions is that the demand for steel is the composite demand of thousands of individual users. It is the people who use steel who determine the demand, and there are probably between twenty and twenty-five thousand manufacturing consumers of steel, probably a total of forty-five to fifty users of steel who are buying steel directly from steel mills. There are probably an equal number of users who buy indirectly from the mills, through jobbers and distributors and warehouses. The composite product of all of their demands for steel tells the Steel Industry what to make. At one time they will want more of one kind of steel and the weight of production is thrown on one side of the industry. At another time more of another type of steel is wanted, and production is on another side. The diffrernces are reflected in the fluctuating balances between the different clas es of products as shown in the table on page 3. Note, for example the declining importance of railroad track materials as compared with the upward tendencies of sheet and strip steel. The necessity for maintaining elasticity of facilities to meet fluctuating demands is obvious in the shifting balance between heavy and light products. As a result of those trends of demands, there are many problems presented to the Industry.

The problem of satisfying the purchasers' requirements in the varieties and grades of steel they want is one of the chief problems of the industry. There are really scores of thousands of different grades and varieties of steel which have to be made to satisfy purchasers' demands. The tendency of the buyer is to want specification steels, products for which they set close tolerance as to size, narrow specifications as to chemical analysis, high requirements as to physical quality As an illustration, the first time you get a chance, look at one of the current new automobile models and contemplate the front fenders. From the side of the hood, one

piece of steel may be required to make everything there is in the fender, in the headlight shell, in the entire works. Now when you look at that fender consider the fact that the metal was required yo take that shape when it was cold, not when it was hot. It had to flow in the cold state under pressure, had to preserve uniformity of thickness and to preserve the finish. That is what I mean when I speak of physical quality.

Another important point in connection with specifications is that control of chemical analysis is required by users to a closeness of specifications that is almost unbelievable. In the matter of carbon content, for example, it is not uncommon for a purchaser of steel to require that the carbon shall fall within ten or fifteen hundredths of one per cent in the finished product, or a range from .15 to .25 per cent. That means that there can be a maximum variation of one tenth of one per cent of carbon in the finished product, and if you translate that into terms of formula for providing the ingredients in the furnace where the steel is melted you get down about to the proportion that you would be in if you were to tell your respective wives when they are putting sugar in a batter for a cake that they must measure the sugar by individual grains.

The demand is for material that is made with a degree of accuracy much like a medical prescription, and the steel maker shows extraordinary ability to perform with accuracy. That trend is becoming even more marked than less marked. Every year there are new requirements and closeness of specifications demanded by the purchaser. Thus one big problem of the Steel Industry is how to satisfy the exacting demands of purchasers of steel and still make any money.

I realize that the idea of making a profit in industry is somewhat frowned upon in certain quarters these days. In the first table on page 1, however, you will see some figures that will convince you that the Steel Industry ought occasionally to make some money, that it ought to pay a wage to the capital which is working in industry, in order to be in a position when it needs additional dollars for keeping abreast of technological progress, to know where to go or how to attract them. Unfortunately, the Steel Industry has been too generally an unprofitable industry in terms of dividends to stockholders or return on investment. That may be a natural corollary of those points I have been making about specifications, exacting requirements of customers, and increasing demands for skilled labor in the Industry.

A generation or more ago, for instance, the typical steel labor was the square-head or bonunk; today, the unskilled labor is quite in the minority. It is probably true that not more than seven to ten per cent at present employed in the Industry truly can be called "unskilled" The demand for skilled labor is at a maximum and, in that

fact may be one of the problems in the Steel Industry of serious importance if added demands are put upon it.

I referred a minute ago to the question of profit in the Steel Industry. I want to say one more word on that subject. Profit is largely dependent on the price in relation to the cost of the product. There has been a lot of discussion about the price of steel being too inflexible or too high. It doesn't seem to me that there is any inherent merit in constantly changing prices. If I were a manufacturer using raw material of any description, the first thing I'd want to know would be that the price I had paid for my raw material would remain at that level until at least my competitors had bought their materials. I wouldn't like to be gambling that after my raw materials had been bought my competitors could get their materials at a lower price. Relative stability of price is a desirable thing from the standpoint of economic progress. The real test of prices can be found in the answer to two questions. First, has the price of the product limited its use? Second, has the price restricted the growth of other industries which use that product? In the case of steel, the answer to both of those questions is in the negative. I believe that is an adequate test of the fairness and soundness of the price of steel products from the consumers' viewpoint. And the maintenance of fair prices is one of the basic problems in any industry.

DISCUSSION FOLLOWING LECTURE
By Dr. Walter S. Tower
November 21, 1939.

Q. I'd like to find out about this business of trend in industry towards skilled labor, why and how are we going to handle that, particularly in regard to excluding skilled labor from the drafts?

A. I would be more or less of the opinion that you'd have to go pretty far in the event of drafts for military purposes in exempting employees in steel mills because such an overwhelming majority of these employees are indispensable for the conduct of operations and not readily replaceable. I think it is true that in the last war more than 65% of the employees in steel plants were exempt. Today, the figure would have to be higher than this because of the progressive tightening up of skilled employees over the years that have elapsed. As high as possibly even 90% would have to be considered exempt.

Q. I like to ask this about that question. How many of these skilled people you'd have to have are unmarried men under 30 years of age? Isn't it true that the majority are well beyond the draft age?

A. I'm sorry I don't know the division of employees with reference to age groups. There is a surprisingly large percentage, however, of employees in the industry not only beyond 30 but beyond 40 years of age. To hazard a guess, I would say that a minority and a very definite minority are under 30. 35 or 40% might be under 40 years of age. How many of them are unmarried I don't think anybody has any figures on that. Mostly I expect them to be married.

Q. In connection with the subject of profits. I think I recall a certain industry where millions of dollars were handed out in the form of bonuses and $1,600,000 was a bonus for the president above his salary, which was comparatively small. I believe that bonus comes out of the profits.

A. That was in lieu of salary. That is an individual condition known to the stockholders, they were responsible. If they were dissatisfied they had the remedy within their control.

Q. These continuous mills. You perhaps know the one at Sparrow's Point of the Republic Steel Corporation. Can you tell us the number of people actually necessary to run one of those new mills?

A. I am glad you asked that question. I will answer it in a broader way, I don't know the answer. The mill at Sparrow's Point, which is 54 inches in width, is not wide. The mill in Cleveland, 97 or 98 inches wide, is the widest in the world. We don't have yet complete information relative to the effect of the installation of those mills on employment in the industry. We hope in due course to get from the various companies who have installed those mills an accurate and detailed analysis of the effect of that installation on their employment. Four of the companies, I believe, have already completed that study, tracing from the time before they had such mills down to the present, progress of employment of that company as related to the production of the product coming off those mills. In every instance there was an actual increase in the number of men required to produce, to finish, on the continous type of mill. Our impression

is, impression only - we don't have the details from other companies yet - that these are representative circumstances. In other words, we expect to find that what has been experience of those four companies will be the experience of industry as a whole and the number of men actually employed on sheet and strip process, more men than prior to installation of those big mills. Why? The installation of those mills has made it possible to produce a product of quality at a price which previously could not be produced and thereby has given a material suitable for the consumer and therefore the demand has been stimulated by technological advances.

Q. A steel corporation operated two roll mills at Joliet two years ago; those plants were put into operation and men were obtained who were not initiated without a shutdown for six months. If that is true perhaps in an emergency we could train new men, apparently it is not an impossible job.

A. I didn't mean to imply that men couldn't be trained, but the length of time required to develop a skilled worker for various operations ranges all the way from several months to several years so that if you were to put out of the mill suddenly a considerable number of skilled operators the industry would be heavily penalized for perhaps a critical period of time while they were trying to develop skilled workers in replacement. The development has to be by the apprentice type.

Q. It seems to me that there is too much confusion between specialized labor and skilled labor. If you are talking about specialized labor the men are more readily trained.

A. I think you brought out a very fundamental point there. Specialized type of labor can be created in a matter of months, whereas the highest skilled type of labor, competent machinists, may call for several years, and it is in the particular category, high grade machinists, where most difficulties are encountered. In other operations - rollers, who actually determine the operation of the rolling mills, or melters, who determine when the molten metal should be poured from the furnances - it takes years to develop a good roller or skilled melters.

Q. You spoke of manganese in this country not being of such quantity. We read of low grade ore present in our western states. We'd like to know what the attitude of industry is in regard to this low grade ore.

A. Probably the attitude of industry is that it is perfectly willing and ready to use manganese from any source, domestic or otherwise at the same price. It is true, as you say, that there are extensive deposits of low grade manganese ore in this country, not only in the West but in the southern states, Virginia and Georgia. There has been a lot of discussion, particularly in recent years, as to the feasibility of various processes of beneficiation of those low grade ores and then their manufacture in the finished manganese by various processes. At one time not long ago it was announced that the Bureau of Mines had perfected a process that would make the low grade domestic deposits of manganese ore commercially available in a quality that probably would come close to meeting the requirements of the Steel Industry, but it doesn't appear to have been made applicable

successfully on a large commerical scale yet. Now at the same time there are not quite such low grade ores as there are being exploited in Cuba and Cuban product is coming into this country in increasing quantities. It can very well be the beginning of a development for new prospect of utilizing low grade ore in this country - it is still in the experimental and development stage. It is also true that the total actual amount of available manganese reserves even in the lower grade deposits is not as much as we'd like to have for long run use and therefore so long as we can get manganese in a satisfactory quality and supply from overseas sources it is just as well to have our domestic sources for the future when the material is not available.

Q. Would you mind telling us about the accumulation of manganese stock - what is the normal stock that the steel industry has on hand?

A. I have asked that question of different people in the industry and their replies have been that under ordinary conditions the manganese stock in the steel industry would be about an eight months supply and that last summer there may have been ten or twelve months supply of manganese in the United States, either in the hands of consumers or in bonded warehouses. That is merely heresay.

Q. Is that on seven million tons production?

A. No, the answer would have been made in the light of the scale of activity current, around August or September, say 65%.

Q. I would like Dr. Tower to talk more about strategic materials - tin What is the prospect of some substitute in the tin plate industry? Is the supply jeopardized?

A. I would be disposed personally to question the likelihood or possibility of the development of any satisfactory and complete substitute of tin for coating material. We have had reports at one time or another to the effect that tin plate would be superseded but it has never come to pass yet. The fact that the reports have always been premature or untrue leads one to have a considerable feeling of scepticism as to the imminence of any such development. As to the supply of tin, it doesn't seem to me there ought to be any acute shortage of tin for us in this country if the Tin Control Authority, represented by the International Tin Committee, would give its approval to unrestricted production. If production is restricted and the demand continues - c. Unrestricted production of tin from the Dutch East Indies and the Straits Settlements, I don't believe there should be any shortage of tin at a reasonable price.

Q. Will you discuss the problem of further bottlenecks?

A. That seems to be a point on which almost everybody is interested and I don't know the answer to the question. There are all kinds of answers given, amusingly enough. I heard not long ago, for example, one man say that he had private information direct from Washington to the effect that the Army itself had been making an accurate study of the various plants and steel mills to determine what their facilities would proof capable of doing in the event of a war emergency and they were particularly concerned with the

question of bottlenecks and as a result had come to the conclusion that the real bottlenecks in event of an emergency would be the shortage of electrical energy. The plants would break down in the event of an emergency of a sort for major activities in general and the steel industry in particular.

Then I went to a friend of mine in Public Utilities and told him the story and I wanted to know what he thought of it. The answer was the it was all rubbish, there was plenty of electrical energy available if you allow for interchanging of lines. If you can't find it in one place you can find it somewhere over a connecting line. The story was all bunk.

Then shortly after that another man said the bottleneck in the steel industry was really the matter of the blooming mill, the first process of rolling the ingot form in which the raw steel is poured goes through power mill preparatory to going on to more finishing. He said the first stage was the bottleneck.

It wasn't very many days before I was talking to another man. He said the blooming mill can take care of it; the bottleneck was in the coke oven.

A couple of weeks ago I spoke to still another man and reported all this and he said that it was all wrong. We can take care of all those situations; the real bottleneck is skilled labor.

The last contribution to the story - I talked with some men long experienced and recited to them the whole story - they said there was nothing to any of those at all. The real bottleneck would be created if we were asked to do something which we couldn't foresee. If the military asked us to make all the steel in plates for shipbuild-

ing, we couldn't do it. The real bottleneck, if there is any at all, will come from what the military establishments ask us to do. I give you all of those, you can take your choice.

Q. Colonel Minton tells me that there is a bottleneck of insufficient capacity of alloy steels, corrosion resisting and heat resisting steels.

A. That belongs under the last category. The industry hasn't expected to do it, therefore isn't equipped to do it. If you are going to require in a war program a lot of stainless steel, more than civilian requirements, that is something that industry hasn't foreseen. I think in making alloy steels it is more a matter of technique, skilled labor, than furnaces equipment.

Q. Has there been any tendency to concentrate on any one district in the production of alloy steel? Do you visualize a time when the only type of steel produced will be alloy steel?

A. On the concentration of alloy steels-I think we are in a better position today than any other time with the entrance of one of the important centers, Chicago, in definitely alloy steel production. Prior to that there was an unfortunate concentration of alloy steel production in the East along the Atlantic Seaboard - from Eastern Ohio to the ~~Atlantic~~ Atlantic Seaboard - and only a few localities within those limits. That has very definitely broadened within the last few years. Actually there are some on the Pacific Coast.

On the other point of preponderance of alloy steels against carbon steels my opinion is very much of a lay opinion; I am not a metallurgist, engineer, economist, as to the matter of what I am, I'd have to throw myself on the mercy of the court. I doubt

very much whether alloy steels are going to be preponderant in the industry and I include under that even the so-called low-alloy high tensile steel. One reason why I feel that way - from my conversation with high powered technical spirits in the industry when I can get them to talk my language as that I can understand them, I get the impression that the art of treating steel by annealing and heat treating methods is opening up rather broad new vistas as to what quality and what adaptability can be brought into plain carbon steel of different analysis without the necessary presence of such quantities of alloying materials as are commonly designated in alloy steels. Whether that vista will prove to be a bona fide landscape or a mirage is to be demonstrated. There is nothing at the moment to lead us to the conclusion that alloy steel is going to be perponderant.

Q. I have a few comments in connection with making all manpower available to possible military service, not enough to industry. Equality is important. In time of war industry produces at a maximum. In the last war we got the effect of a shortage whether it was real or not. In time of war we should everything we can to bolster production. How much of the steel buying is artificial today?

A. I can readily understand why my original friend Colonel Harris is now General Harris. I'd like to have General Harris talk a little longer on that subject. That is particularly gratifying to listen to in these surroundings because one doesn't have to wander far afield to get an entirely different attitude. I do feel, however, that what General Harris said would be echoed most heartily by the people in the steel industry, who feel their responsibility in

respect to the problem about which he was talking. To harrass industry would be like asking your troops to go into an engagement walking backwards. As to the other question.

I don't know the answer, I don't know that anybody knows the answer, but I honestly feel from all that I can hear and I have asked everybody I have seen during the last two months the same question. I honestly believe that the bulk of steel now made and shipped is being made and shipped because the people who are buying it are promptly using it, they are turning it into fabricated xxx or manufactured articles. Whether they are immediately moving out into immediate consumption is another stage of inquiry about which I don't know the answer. I will repeat to you what the National Industrial Conference Board, one of the most highly regarded bodies, said to the effect that industrial inventories at the end of September were less than they had been in preceeding months. We are seven weeks on from the end of September and a lot has been made in the intervening seven weeks. On the outside, not more than 12 % of the present production of steel has been for accumulating inventories. How much of that is warranted and how much is not has largely to be judged in the light of statistics of inventories prior to September and what is justifiable inventory at the present state of the industry. There is no such thing as a normal inventory because an inventory at a certain amount at one scale of operations may be far too much and the same inventory at a different scale of operations may be wholly inadequate. The question of investory in my own personal belief has been grossly overdone because we do know that prior to September all consumers of steel products were buying little, maybe in the next three months you will get a definite and final answer to that question.