## The Plating Industry in World War II Part 2: After Pearl Harbor and Beyond

by

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## Introduction

Last month, in light of the extraordinary economic challenges to the surface finishing industry in the last few years, we looked at another period of unprecedented challenge in the years leading up to World War II. Long before Pearl Harbor, Britain stood alone in Europe and despite the isolationist hangover in America, the handwriting was on the wall. At the 1940 AES Annual Convention ("SUR/FIN 1940") in Dayton, Ohio, the technical sessions still discussed engineering and science, and the winds of war amounted to nothing more than a light zephyr. By the time of the 1941 AES Annual Convention in Boston, Massachusetts, American industry was on a war footing, gearing up at that point to supply what was left of the Allied cause. The viability of the plating industry was at grave risk, owing to metal shortages in the civilian sector, and the nature of the talks at the 1941 AES technical program had drastically shifted. The speakers pulled no punches in laying out the challenges of the coming years.

We all know by now that those challenges were just the beginning, as on December 7, 1941, the nation was inexorably drawn into active participation in a two-front war. In one year's time, at the 1942 AES Annual Convention in Grand Rapids, Michigan, America had been attacked at Pearl Harbor and the American involvement in all-out war was underway. As will be seen, the priority in the defense sector was paramount, which had even stronger consequences for the long-term survival of the electroplating industry.

Fortunately, we have the records of those times, including the records of the Annual Conventions of the American Electroplaters' Society. In this second article, you will read what was on the minds of the players in the industry and government in the months following the attack on Pearl Harbor, and how one year made a difference in the war outlook and that of the plating industry. Although today's situation is far from the best of times, it is by no means the worst of times.



Accompanying this article are photos of plating installations of that era, gleaned from the pages of the AES Proceedings of the day. Although originally part of other papers in the proceedings, they are used here to capture the flavor of the plating industry of the day.

## Six Months after Pearl Harbor - The 1942 AES Convention in Grand Rapids, Michigan

Looking back from today, it is a wonder that an AES Convention was held at all in 1942, but it is clear that such a forum was absolutely critical to the future of the plating industry. What could be more important than providing a venue for the industry members to meet, discuss and learn of the crucial issues of those times? The unprecedented mobilization of the entire nation required nothing less.

The flavor of the papers at the 1942 Annual Convention contrasted sharply with those given one or two years earlier. Growing scarcities of critical materials that were diverted to the war effort encouraged the development of substitutes for civilian decorative and functional products. Indium and indium alloy plating was used as a substitute for nickel, brass and copper in a wide variety of decorative and engineering applications. Iron plating was used as a substitute for nickel and copper in printing plates. The other side of the coin saw development of new processes for defense needs on metals that were now critically important, but less used in peacetime. Magnesium was one of those metals. Most of the talks were prefaced by the importance of the work described in the context of the national emergency at hand.

Indeed, the sudden change in the tenor of the times was quite evident with the renaming of the traditional Opening Session of the Convention to the "Victory Session." That session featured representatives from the federal government, with whom the industry had been working quite closely over those early months, a number of whom had come to Washington from private industry to contribute to the war effort. In this article, the focus is on one Mr. William W. McCord, the member of the War Production Board who dealt with issues germane to the surface finishing industry.

William McCord had been very active in the AES for years and was technical advisor with the McCord Radiator Manufacturing Company in Detroit for 30 years. In the emergency, he was appointed as Chief of the Electroplating Durable Goods Branch of the War Production Board. His 1942 talk dealt with "The Present Situation in the Electroplating Industry as Regards Government Restrictions and Government Business."

It is perhaps somewhat surprising that anyone needed to be convinced of the dire emergency that the country faced by the Summer of 1942, and yet Mr. McCord's opening remarks indicated otherwise: "It may strike you as entirely unnecessary and even redundant to have a speaker start an address with the statement that this country is at war, but if you had handled the quantities of interviews and correspondence which I have since Pearl Harbor in which it was evident that this fact was making no particular impression, you would understand why I start in this manner.

"I reiterate, this country is at war. It is not merely at war; it is at war to prevent you from becoming a slave. There has been altogether too much disposition to take the attitude, "Oh yes, we are at war and oh yes, we must win the war but that has nothing to do with me, personally." The hell it hasn't! Maybe you are willing to spend the rest of your life with a Gestapo agent showing you where to dig, but I certainly am not.

"We must win this war, and we must win it, regardless of what it may cost any individual either in money, life or property. That is a serious statement and its implications are not pleasant. However, it is a fact which we must all face squarely. Our choice is between winning, no matter what the cost may be to us individually, or virtual slavery.

"The trouble is that too many individuals have refused to recognize that there is no alternative choice. They want to win the war, but at the same time they do not want the winning to cost them anything in any way. It can't be done. We are all going to take it in the solar plexus. The severity of the blow may not be equal in all cases, and probably will not, but if anybody thinks he personally is going to entirely escape it, he is the world's greatest optimist."

Before Pearl Harbor, materials shortages were critical issues when the primary concern was providing resources to what remained of free Europe through Lend-Lease and other programs. With America now active in the war, on two separate fronts, Mr. McCord painted a bleak picture.



Connecting rod assembly for airplane engine.



Fully automatic machine, Conn Ltd., Elkhart, Indiana.

"In order to produce the vast quantities needed for modern warfare, it requires raw materials, and particularly metals, in previously unheard of quantities. Some of the astronomical figures which I have heard casually mentioned by representatives of our armed forces have made me fairly dizzy. When anyone begins to count in billions, my mind refuses to grasp it and I think that would be the case with most laymen.

"We have always had a more or less smug self-complacency that this country was the one most blessed with natural resources, and that we could always get anything we wanted.

"It is difficult for anyone to change his viewpoint in that respect. However, we are in for a rude awakening. The plain facts are that we haven't enough copper, we haven't enough aluminum, we haven't enough nickel, we haven't enough chrome, we haven't enough cadmium, we haven't enough tin, we haven't enough rubber; we haven't enough wool, we haven't enough steel, and a lot of other materials. About the only things in which we really have any great surplus are gold, silver, cotton and wheat. So far we have enough lead and zinc.

"We are by no means the land of abundance that most of us thought we were. Even where we have the ores, such as in the cases of aluminum, copper and steel, we lack sufficient facilities for converting them into form in which they can be used. But in some very important cases we haven't the raw materials, such as tin, rubber and chrome. There is no use disguising the fact that those deficiencies are going to hurt.

"When we are faced with the fact that there is not sufficient material of any given kind to meet all needs, there is no option left but to use what materials are needed for war purposes, and then if there is any left over to use that to the best possible advantage in other ways.

"I don't suppose there is a single soul in this room that would take issue with that general statement.

"The trouble is that when the application of the general principle hits anyone personally, that too many of us forget it, and think only of the personal angle. I can understand the feeling to some extent, and there is an element of justification. I am perfectly ready to admit that I think a lot of people have material in their possession which they should not have. It is a little difficult in some cases to understand how they have so much. However, those stocks are being frozen as fast as located, and they will be taken away from them."

That last sentence conveys the utter seriousness of the situation faced by our nation in the Summer of 1942. The shortages were very real. McCord reviewed the basics:

Aluminum:	Not enough for a long time to
	come.
Rubber:	Not enough and with poor
	chance that synthetic will arrive
	in time.
Copper:	Not enough and with little or
	practically no chance there ever
	will be.
Tin:	Not enough and with little
	or practically no chance of
	betterment.
Chromium:	Very tight, however, the Montana
	ores may provide sufficient
	chromic acid by the end of this
	vear although this does not help
	ferrochrome materially.
Cadmium:	Not nearly enough to take care
	of war demands and many
	specifications have had to be
	changed.
Nickel:	Not nearly enough and with
	practically no hope that there
	ever will be

"That does not leave very much for any plater except war work. He would still have gold, silver, lead and zinc; with which to plate for civilian usage. So far, we still have plenty of gold, silver and lead. We also have been able to meet all demands in zinc." "In other words, you may continue to do a little plating in special fields for civilian consumption, but it will not be of any great magnitude. Gold, silver, zinc and lead plating may even become more popular than in the past. However, nobody will get rich on the amount that will be done for civilian purposes. That leaves war work."

He then outlined the overall picture for the plating industry as he saw it at that moment:

"In the first place, the plating trade is lucky. As soon as I sit down, about a hundred men will jump to their individual feet and say, 'What do you mean lucky, when my plant is shut down?' The statement still stands. Individually, you may be unfortunate, and that may continue without much hope for you, but the fact remains that the plating trade as a whole is lucky. They have lots of work to do, and will continue to have it for the duration.

"I can point out plenty of industries to you that were told to stop entirely their former system of manufacture and to go out and find something to do for war purposes. Nobody has told you to stop plating. They have told you that you cannot plate with certain metals for certain purposes, but so long as you stay away from those prohibited areas, you can continue to plate. Also there is a very large volume of war plating to be done, and if you are able to get enough of it, you can continue your previous type of manufacturing without essential change, as was necessary with so many industries.

"Now that distinctly does not mean that every individual plater is going to be able to go along just as he always did and have plenty of work. There simply is not enough work to go around and when there isn't enough for everybody, someone is bound to get hurt. "I have been trying for months to get an accurate picture into my own mind, as to just what percentage will remain in the plating business and what will have to go out of it, and I am frank to confess that I still do not know.

"In order to arrive at that percentage two facts have to be known that as far as I can discover are known only to God. The first one is just how much war plating is there going to be. I have already told you that today's figures mean nothing tomorrow as far as totals to be produced are concerned. Added to that is the difficulty that articles which are specified for a plated finish today may not be so specified tomorrow. They are coated with a given metal, and the supply of that metal becomes inadequate or progressively tighter, and it becomes necessary to find places where it can be eliminated. Specifications are changed and something else is substituted. Vice versa, some material becomes scarce and another material is substituted but the latter material has to be protected against corrosion, so a plate is added. The steel cartridge case is a good illustration of this.

"The picture changes rapidly. All I can say has to be in very general terms and subject to change without notice. However, I think I am safe in the following generalizations:

- 1. There will be a very considerable volume of war plating that will continue to be done.
- 2. The total volume of this has increased rather than diminished as time went on due to both increase of amounts required of specific articles, and also to the addition of plating to articles not previously so coated.
- 3. Our belief is that this tendency toward increase rather than decrease is apt to continue although this can by no means be any surety.





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"However, we do not know just how much war plating there is to be and in the very nature of things, never can know. Neither do we know just how much plating capacity there is in this country. Neither do you and neither does anyone else. We probably have as good information on the subject as exists, but it is a long way from accurate.

"Not knowing either the demand or the capacity for meeting it makes it a trifle difficult to give in percentage the amount of plating capacity that will be used for war work. However, I am going to give you a guess figure.

"My best guess is that there will be about 50% as much plating as prior to the war, but if anybody tries to make me substantiate it I will immediately retire from the field because I do not know how I arrived at the figure, anymore than I know why an article when first seen costs about \$5. I probably would not be far wrong, but I have no knowledge of the mental process by which I arrived at the figure. It can only be a guess, but it is probably a pretty good guess.

"However, that does not mean that everybody is going to do 50% as much business. It is not as simple as that. Some platers will have 100% and others will have none. There are all kinds of factors involved. Some plating plants are set up with equipment that is not readily adaptable to anything but the plating of the particular article for which it was designed. The chances of finding a war article to which it can be converted are pretty slim. In addition, most plating will be done by sub-contractors working for some manufacturer who holds a prime contract for some article which requires plating. Naturally if you happen to be located in a territory in which there are not prime contracts placed which require plating your chances of securing any plating business would not be very good. On the other hand, you might be located where the number of contracts placed are in excess of the capacity to plate. There will be no uniformity about it.

"The third factor is that most jobs are going to be volume. That would seem to indicate that small platers would probably find it pretty difficult to secure any of this business. I still think that the cards are stacked against them, but I have been rather surprised to find individual cases of rather small platers who are actually running 30% to 50% of former capacity on war orders. In fact, I have known some of them to be so enthusiastic that they wanted to increase capacity.

"Another factor in the situation is that a considerable part of the 50% will be made up of plating in a form that could not be handled in an ordinary plating plant with ordinary equipment. For instance, there are 24 tin-plating plants going in for electro-tinning instead of hot tin-dipping commercial tin plate. My best judgment is that there will be a great deal more pre-plated sheet used than formerly. This is a specialized game that cannot be handled with ordinary equipment. In addition, there is bound to be a certain amount of equipment go in where it did not exist before to



Racking for hard chromium plating of plug gages.

take care of special requirements on production lines, or where adequate facilities are not available in the district.

"When all this is deducted from 50%, our best judgment is that not more than 35%, to 40% of the equipment used will be actually employed.

"That may be considered as not particularly alluring but I remind you that even if only 35% of former equipment finds employment that this is infinity times zero, which is the amount allotted to many industries. Again I say, you are lucky."

But the situation regarding individual metals in common civilian use in the 1930s was not so lucky:

"This covers what you might do. Let's see what you cannot do. We will run over the present restrictions on the plating of various metals individually. Gold, silver, lead and zinc have no restrictions as to usage, provided you can secure the materials. The same is true of cadmium but as the supply of cadmium is inadequate even for war alone, the chances of securing it for any other purposes are practically negligible. Tin falls into a similar category. There are no direct prohibitions against its use by plating, and as a matter of fact due to the ability to control thickness more closely by plating than by hot tin dipping it is probable that its usage by plating will actually increase in total rather than decrease. However, due to its extreme scarcity, it would be practically impossible to secure raw materials except for extremely essential purposes.

"Likewise, the plating of chrome is unrestricted so far as we know, except for vending machines. In other words, if you can procure chromic acid, you can apply it directly to any base metal provided the part is not going into a vending machine. While the supply of the basic chromite is exceedingly limited in a general sense, due to the ability to secure low-grade ores, and the lessening of demand for chromic acid for composite coatings, it is our judgment while this cannot be entirely final that there will be adequate supplies for all who want to apply chrome directly to the base metal. But as soon as an under-coating is desired for the chrome, the condition changes.

"I do not need to tell anybody in this audience that anyone who is plating nickel is breaking the law, and I am putting it badly that way, because it should be. He is not only a slacker from a patriotic standpoint but he is sticking out his neck in addition. You cannot use nickel as an undercoating for chrome, or for any other purposes, except virtually by special permission. We have about two-thirds enough nickel for this year's demands and it is not going to be wasted, just because somebody wants to. It is known that there is bootlegging but they will catch up with it.

"The situation in copper is more complex. The M-9-c Order prohibited plating with copper where the purpose was primarily decorative. Most plates where copper was employed had two purposes. One was corrosion resistance and the other was decoration. Which was the primary purpose? You and I know that in most cases it was decoration, or you would have used zinc which would have given you a far better corrosion resistance. However, a lot of platers virtually ignored the order on the ground that they were doing it primarily for corrosion resistance. They were not very honest about it. However, I want to correct any misconception that may exist about the future. We haven't anywhere near enough copper for purely military needs and under those circumstances the usage of copper for plating except for really essential purposes will not be permitted. Do not make plans on that basis.

There are other metals such as rhodium and indium. It is entirely possible that such metals may come into more general use, limited of course by amounts available. An acute general metal shortage exists and under those circumstances, it is likely that usage will be made of any metal that is available." Mr. McCord then summed up, ending in the mood that he began his talk:

In conclusion, let's sum up a little. Plating for civilian usage will be curtailed, but there is and will probably continue to be a considerable volume of war plating. Prospects for individual platers vary exceedingly. Some will prosper while others will go bankrupt. There is nothing fair about that but it is an unavoidable condition of war. There is nothing fair about war. It is not fair that just because I happen to be 54 years old and have already lived most of my life in a condition of luxury that would have made the old Roman *Emperors* green with envy, should stay home while young chaps with all their lives before them are sent out to toil and sweat in foreign jungles and perhaps lose their precious lives. War just isn't fair in any way, and if you happen to be one of the unfortunates, you will simply have to chalk vourself up as one of the casualties. We recognize that this is cold comfort. Nobody is going to award you any posthumous medals or send any gold stars to your mothers, but you are a casualty of war just as surely as the boy that gets in the way of a [Japanese] shrapnel.

This industry depends upon metals, and there isn't enough metals for war purposes, so there are bound to be casualties, and the fact that there is going to be casualties cannot be allowed to interfere with the winning of the war.

We are not going to let McArthur down. We are not going to let the Chinese down. We are not going to let the Russians down, but above all, we are not going to send out our kids to be slaughtered because somebody did not want to change his occupation or was trying to hold onto money that he never would have had, except for the system of freedom which we are all fighting to preserve.

We have a job to do. We are all equally responsible. It is my job and it is your job. Our individual welfare does not



Racking cylinders for I.D. chromium plating.



Placing a load of cylinders to be I.D. plated in the chromium tank.

count until the job is done. Let's forget personal fortunes for the time being and stop petty bickering. If we all put our shoulders to the wheel, with the one idea paramount of keeping the wagon rolling, we will get this thing over in a hurry. Nothing can stop us. And then I would like to talk to this society again. I can be just as optimistic, as I have been pessimistic today and the picture I have in my mind of the eventual future of the plating business can only be expressed in superlatives.

## One Year Later - The 1943 AES Convention in Buffalo, New York

With the passage of another year, the war effort was in full swing and the tide was starting to turn. The shock of Pearl Harbor had given way to steely determination as the entire nation mobilized and got down to business toward eventual victory in 1945. The intervening year between the Grand Rapids confab and the 1943 AES Convention in Buffalo, New York had seen the country transform itself to a total war footing. One of the most visible outcomes was the cessation of civilian automobile manufacture. The 1943-45 model years never came to pass; your father's (or grandfather's) souped-up 1944 Chevy was a myth. The entire automotive industry, as part of the "arsenal of democracy," was given over to the manufacture of tanks, bombers at Willow Run, Michigan and yes, Jeeps, from Willys-Overland in Toledo, Ohio.

With rhetoric giving way to determination, the opening session of the 1943 AES Convention was once again called the "First Educational Session," in contrast to the "Victory Session" of 1942. William McCord of the War Production Board continued to keep the metal finishing industry well informed in the first presentation, "The Plating Situation in General." One year later, there was a more optimistic tone:

"Istood before you a year ago at Grand Rapids and made the prediction that about 35% of the existing plating equipment would come into actual usage although undoubtedly a considerable amount of additional new equipment would necessarily have to be employed for various reasons. I do not suppose that anyone ever made a poorer prediction.

"The situation is in a constant state of flux and it would be impossible to give an accurate figure without a complete survey but spot checks plus general knowledge lead us to believe that the figure actually now in production is certainly 60% to 70% of previous capacity and may be even higher than that. In addition the equipment makers cannot keep up with the demand for new equipment.

"There are various reasons why it will never reach 100%. Some equipment is entirely inappropriate for any war usage. Practically all jobs are now large volume and some people have such a limited amount of equipment that it would be extremely difficult for them to secure business with the volume which they could handle. Others have equipment which they are reluctant to convert to war usage or otherwise put into service, or have not been able for one reason or another to secure contracts which would make use of them. The percentage figure will probably increase a little over the present but probably cannot go a great deal further.

"The reason I missed my guess so far cannot be attributed to any one factor. It is made up of a great many. I was very careful to hedge my prediction with the statement that there was a constant change in both specifications and volume, and that is one statement in which I was correct.

"The increase in the amount of plating came about in many ways. The outstanding reason is simply that we built more war goods of all characters than seemed probable a year ago. We have sent goods all over the world for the use of others. We are actively in the war ourselves and war means a constant consumption of goods. We are rapidly expanding our armed forces, and war goods for our own use have kept pace with the expansion in manpower. It is extremely difficult for anyone who is more or less closely in touch to appreciate the tremendous increases in production of war goods that has actually been accomplished and we do not believe that anyone who is not in that position has any chance of comprehending it. They see small segments but it is the overall picture that is so astounding.

"Of these goods a large part had to be plated for one reason or another. As the total amount of goods produced increased, so did the total amount of plating. However, all types of goods did not affect plating in equal proportions. The constantly increasing spiral of airplane production has probably been the greatest factor. When one stops and considers, the present airplane is practically either plated or anodized from stem to stern. That is a slight exaggeration, but not much. As the total of airplanes produced went up, so did the amount of plating. That will continue as the new



Plating Floor

airplane factories go into production. Our best guess is that about 75% of all plating being done today is for airplane consumption.

"Ordnance takes the next largest block. They speak casually of numbers that are utterly beyond my mind to comprehend. They always required a good deal of plating in many applications, but changes in specifications in the past year have greatly increased their demand for plating."

The nature of the war effort had made the use of plating essential to victory - more than anticipated at the outset. Further, as time went on, there was a greater appreciation for what plated coatings could offer in terms of functional properties. It wasn't just the bright decorative hardware on the 1937 LaSalle. It was the wear and corrosion resistant properties that could be realized on cheaper steel substrates. Beyond that, the sheer volume of manufactured items for the war effort affected the metals plated and equipment used:

"The general character of the plating has entirely changed. Before the war appearance was generally the governing factor. Resistance to corrosion was important but eye appeal was usually the cause of the choice of the particular plating used. Appearance is still important in a small minority of applications such as instruments, ships goods, etc., but in the great majority of cases, appearance plays little part, and resistance to corrosion or resistance to abrasion, coupled with the availability of the various metals, is the deciding factor.

"There are very few small jobs now. If they buy anything, it is in such large quantities that even though split up in a number of contracts the quantities in each run into large figures with the practical elimination of the small lot runs. These large quantities lead to the use of automatic plating. There is a great deal of still-tank capacity being used for want of other facilities but the tendency is decidedly toward automatic with its saving in manpower. There is a very distinct surplus of still-tank capacity in the country.

"Another peculiar angle is that there seems to be a larger proportion of small articles to be plated in war work in comparison with large articles than is true with civilian goods. Why this should be true is a little difficult to understand but it seems to be the fact. The result is that there appears to be more barrel plating being done than ever before.

"Of course the metals employed are entirely different in relative quantities used. There is a great deal more silver being plated than is probably generally realized, although some of the applications are entirely new. There is a considerable amount of copper being plated although not to compare with what was previously done. There is a small amount of nickel although practically negligible as compared to prewar days. All the cadmium that can be produced will be plated. "The great increase has come in the use of zinc. That is going up by leaps and bounds. There is some additional use of lead but it is not very material as yet. There are some new applications for indium but rhodium remains about as it was a year ago.

"Chromium presents a peculiar picture. The decorative uses of chromium have practically disappeared. However, the usage of chromium for protection against abrasion has increased greatly. There is an increase in applications where it was formerly used to a comparatively small extent and there are a considerable number of entirely new applications. Its use seems on the upgrade.

"Tin plating on finished articles has been reduced to a low figure although there is still some, but tin plating to replace hot-tin dipping on sheet has received a tremendous impetus.

"Incidentally the use of preplated sheet generally is decidedly on the increase, as witness the new [1943 steel] pennies.

"Iron plating has been adopted to a considerable extent by electrotypers and there is some iron plating being done for other applications. In addition there is a marked tendency to use iron for electroforming. It is a peculiar fact that every time we have a war, sudden interest is developed in electroforming.



Aluminum propellers After deburring and buffing operations.

There were other changes in outlook that Mr. McCord noted:

"Plating has become national in scope instead of localized. Prior to the war, the great bulk of the plating was done north of the Ohio River and east of the Mississippi. There was a little plating here and there in the rest of the country, but in the sum aggregate it did not amount to very much as compared with that done in the territory mentioned. It is going to be far different in the near future. When the Army and Navy place contracts, they do not limit themselves to that territory. They place them everywhere. Many of the articles have to be plated and facilities have to be provided at those particular points. The result is that plating is spreading over the country at large like wildfire.

"Another angle is that many concerns with no previous experience with plating have been forced to start doing it. Today there are probably hundreds of men who never before had anything to do with plating who are in active charge of plating plants and the number is increasing daily.

"If the society is to remain truly representative of the industry, it means that it will need a great many branches at points where they now have none, and that these newcomers will have to be brought into the fold."

Finally, with a great deal of candor, Mr. McCord gave his thoughts on the business outlook for the rest of the war:

"That is the present plating situation in a nutshell. What of the future? It takes a good deal of nerve for anyone who made as bum a guess as I did last year to venture to predict again but I am a glutton for punishment. The upward trend certainly cannot continue indefinitely, but we can see no evidence of any slackening as yet. New plants and newly converted plants are constantly coming into production, and part, at least, mean more plating. That cannot continue forever because there is a definite limit to the amount of raw materials which can be made available. However, we can see no prospect of the upward trend tending to level off before the end of this year. Understand that we are talking about the total amount of plating to be done in the country at large and not of any component or localized part of it. It is entirely possible that individually you may have already hit your peak and that you may even suffer either a decrease or entire elimination. Do not apply our generalities to your own case.

"There is a very spotty condition in the industry. Many people are completely overloaded at the same time that others are just existing or even shut down. However, on the general average the plating industry is doing a lot better than we expected them to do and on the whole seem to be getting along in very fair shape. We certainly think they have no particular cause for complaint. Furthermore I think they can point with more or less just pride to the amount of the war load which they are carrying. They have been adjudged an essential industry and it seems entirely merited. If you could sit alongside of me for just a few hours some day and hear all the things that are going to happen to the war unless the ABC Company gets delivery of plating equipment sooner than it is promised, you would inevitably come to the conclusion that plating is either extremely important or somebody is badly fooled. There is no question that many people are now plating conscious who never were before and we believe that the industry does not need to be ashamed at all of any opinion they may gather regarding its ability to absorb the load.

"There is just one criticism that comes with such frequency that there probably is some basis for it and that is adherence to specifications. I recognize that experienced help is nonexistent and that turnover is extremely bad and that the pressure for delivery is often so great that the problem of just getting out the work overshadows everything else, but I want to warn you that not only must the work be done, but the specifications must be met or you probably will not continue to hold the business.

"Last year I indulged in a burst of oratory because I thought you needed waking up to the fact that there was a war on. I do not think that is necessary now. Most of us have close relatives or close friends in uniform. The war is beginning to come home to us. Unfortunately it will probably come closer yet as the casualty lists come in.

"I think most of us realize now that we are not working for ourselves but to accomplish an object and there is every indication that the industry as a whole is assuming their burden in an entirely creditable manner. When I go out in the plant of one of the larger producers of equipment for the industry and find the daughter of the president of the company doing a man's work at a machine for 56 hours a week, I want to cheer. I think the industry will do all right, no matter what may be asked."

It can be seen from Mr. McCord's two talks, one year apart, the beginning of the war was filled with uncertainty in terms of approaches taken to win the war. Yet in just one year's time, miraculous progress was made on the home front. One wonders what might have been if the efforts prior to Pearl Harbor, including the Lend-Lease programs, etc., had not already have been underway. We also find that electroplating had vastly increased in importance as war planners became more aware what could be accomplished with the technology - that remains a lesson for today.

Next month, the third and final installment of this series will consider the massive growth of plating technology and engineering design which arose as a result of the war, and which spawned the successful industry of the post-war years. All of this was discussed during the AES Conventions of the latter years of World War II.