

The T.I.C. Seventeenth General Assembly

The Seventeenth General Assembly of the T.I.C. was convened on Tuesday, June 8th 1982 in the Williams Plaza Hotel in Tulsa, Oklahoma, U.S.A. The meeting was chaired by Mr. Conrad L. Brown, President of the T.I.C.

As the first order of business, four companies were elected to membership, bringing the total current membership of the T.I.C. to sixty-five.

Further business included: the report of the Executive Committee on the expected relocation of the Brussels office on September 1st to quarters more suitable for conducting the T.I.C. business; the decision not to engage a full-time staff representative at present; and the decision to make the latest T.I.C. study available to the general public at a price of US \$ 600 per copy. Additional items of business were:

- Presentation of the financial report for 1981 and the budget for 1982, both showing that the T.I.C. is comfortably solvent,
- Presentation of statistics covering the production and shipments of tantalum source materials for 1981,
- Discussion of the efforts to begin the collection and distribution of tantalum consumption statistics. The conclusion reached was that the T.I.C. should go direct to member companies for their shipping data and accumulate the information in the same fashion that raw material data is gathered.
- As there were no vacancies on the Executive Committee, no elections of Committee members were necessary. A general proposal to expand the Committee from the present seven members to nine was discussed, but no action was taken at this meeting.
- Plans for succeeding meetings of the General Assembly in the spring were offered. The Nineteenth General Assembly will be held in Penang, Malaysia on May 22nd to 25th 1983 and the theme of this meeting will be "Tin Slags as a source of Tantalum" with sponsors including the tin smelters in both Malaysia and Thailand.
- Tentative plans for future years include the possibility of meeting in Stockholm in 1984, in an African country in 1985 and in Brazil in 1986.
- The Eighteenth General Assembly will be held in Brussels on Tuesday, October 26th 1982. Details will be announced by the Secretariat in the "Bulletin", issue no. 31, in September.

After the completion of the business meeting, other participants, including guests and members of the press, joined the meeting for the presentation of papers (to be published in the next issue of the "Bulletin"):

- Mr. Roy Markon, Commissioner, Federal Property Resources, United States General Services Administration.
A review of the history of the U.S. National Stockpile and the present objectives to "cover the U.S. needs for a period of not less than three years in the event of a national emergency".
- Dr. William A. Owczarski, Manager of Technical Planning, Pratt & Whitney Aircraft Group.
Superalloys, nickel and cobalt based materials, are used to make the heat resistant parts of jet engines, for casting of turbine blades and vanes. Use of tantalum in a nickel based alloy increases its ultimate strength without reducing corrosion resistance or castability.
- Dr. Lloyd O. Brown, L.O. Brown Associates.
Barring future recession, the Gross Free World Product is forecast to grow from 3.5 trillion dollars in 1980 to approximately 4.9 trillion dollars in 1990, a compound annual rate of 3.5 %. During the same period, electronic equipment growth will be from 150 billion dollars in 1980 to over 800 billion dollars in 1990, an annual rate of 18 %

Following these papers, Mr. Tom Barron and Mr. Frank Cook, of Ayers, Whitmore and Company, reviewed the conclusions reached in the update study sponsored by the T.I.C. to determine the factors which have affected the downturn in tantalum demand and the prospect of market recovery through 1985.

T.I.C. SEVENTEENTH GENERAL ASSEMBLY

The Seventeenth General Assembly of the Tantalum Producers International Study Center was held in the Williams Plaza Hotel in Tulsa, Oklahoma, U.S.A. on Tuesday, June 8th 1982, chaired by Mr. Conrad L. Brown, President of the T.I.C. 54 of the 61 member companies were represented in person or by proxy.

The General Assembly conducted the business of the T.I.C. including:

- The election of 4 new members,
- A review of the production statistics for 1981, the accounts for 1981 and the budget for 1982,
- Actions taken with respect to a new office location in Brussels, a full-time staff representative, and other matters of current importance.

Upon completion of the formal business, the meeting was joined by delegates from the newly elected member companies, invited guests, government representatives and trade press journalists, bringing the total attendance to 134 people.

Presentations were made by:

- Mr. Roy Markon, Commissioner, Federal Property Resources, United States General Services Administration,
- Dr. William A. Owczarski, Manager of Technical Planning, Pratt & Whitney Aircraft Group, and
- Dr. Lloyd O. Brown, Economic Consultant, L.O. Brown Associates.

Mr. Tom Barron and Mr. Frank Cook, Ayers, Whitmore & Company, gave a summary of the conclusions of the latest T.I.C. sponsored study, "Explanation of Tantalum Market Behavior: 1980-1985". A panel of T.I.C. delegates then gave their views on the report as a basis for open discussion from the floor.

On Monday evening, participants were the guests of T.I.C. at a Cocktail Party, and on Tuesday evening all were guests of the host company, Fansteel Inc., at a Banquet Dinner featuring entertainment by American Indians.

On Wednesday morning, the delegates and guests visited the Extractive Metallurgy and Metal Consolidation Facility of Fansteel in Muskogee, Oklahoma, and enjoyed a Western-style barbecue afterwards.

The Eighteenth General Assembly will be held in Brussels on Tuesday, October 26th 1982.

A panel of T.I.C. members presented their reactions to the study and its conclusions :

- Mr. Joseph C. Abeles, Samincorp Inc., U.S.A.
- Mr. Robert Franklin, ITT Components Group, U.K.
- Mr. Ernest D. Ganz, Mepco Electra, U.S.A.
- Mr. Ake Janson, Sandvik, Sweden.
- Dr. John B. Lambert, Fansteel Inc., U.S.A.
- Mr. Harold Schwartz, Hudson Bay Mining & Smelting Co., Canada.
- Mr. Hiroshi Tashiro, Showa-KBI, Japan.

Fansteel Metals, the host for the Assembly, entertained all delegates, guests and ladies at an excellent banquet at the Williams Plaza Hotel, featuring a theme of American Indian folklore and dancing.

On Wednesday morning, all the participants travelled to Muskogee, Oklahoma, for the men to visit the Fansteel Metals tantalum and niobium processing plant and for the ladies to tour the areas of interest in the town, including the Indian museums for which Muskogee is famous.

Presidential address

(The following address was made by Mr. Conrad L. Brown, President of the T.I.C., at the Seventeenth General Assembly on June 8th 1982).

It has become traditional for the President of T.I.C. to make a formal address to the membership at the mid-year meeting for the purpose of reviewing developments in the tantalum industry occurring over the past year. However, I believe this group is very familiar with the conditions that have prevailed during more recent times, and my revisiting them with a lot of historical facts and figures would probably serve no useful purpose. Since our excellent speakers are addressing specific areas of interest, we can briefly review the functions of the T.I.C. Please understand that my comments are presented in my T.I.C. capacity.

Soft market conditions commenced late in 1980 and have continued to the present time. The mining segment of our industry made efforts to meet the challenge of assuring adequate supplies of raw materials for the 1980's and the processors and manufacturers made investments to expand capacity and to improve processing in an effort to reduce unit costs so as to serve the markets better. But little did they realize what lay ahead.

- The free world was gripped by recession. Although there was a time when recessions did not occur simultaneously all over the world, times have changed and now we talk about a world economy and rely less and less on the smaller geographic segments of the economic community.
- The improvement of product quality was accelerated to offset the rapidly escalating costs occurring in the late 1970's. As an example, higher and higher capacitance levels in powders have been and are still being developed to levels unthought of a few short years ago. Capacitor manufacturers made great strides in using these powders and implementing techniques which effectively reduced tantalum consumption.
- The higher prices accelerated substitution. When there are insufficient supplies of any commodity at a reasonably balanced price, substitution will occur. Tantalum is no exception, a concern of all of us.

In summary, at the time when raw material supplies and capacities are being expanded to meet forecast demand, a world-wide recession occurs which has lingered too long and even appears to be deepening. Consequently, a drop in tantalum demand has been compounded by technical advances and substitution. Despite lower prices, an oversupply of tantalum raw materials now exists throughout the industry. How long will this condition last?

The relatively small amount of tantalum in the earth's crust and the low concentration in known deposits have caused the price of tantalum to be considered high in relation to other minerals. But this alone does not support the instability of the last five years which has inflicted damage to the growth prospects for tantalum. The members of the tantalum industry must restore the confidence which has been lost by our industry. We must reassure our customers that adequate supplies of tantalum do exist at reasonable prices and, at the same time, we must assure an adequate financial return for our investments. We must somehow get away from the trend of steep mountains and ski slopes before we wind up in an avalanche from which we cannot rescue ourselves.

Historically, we have been an industry that reacts, that follows the tantalum-using industries, that grows and shrinks with the demand for our product. Thus, it is only natural that there are a number of associations whose objectives are supportive of the tantalum market, a prime example of which is the T.I.C.

We will soon be eight years old and we have 65 members. The T.I.C. is a growing organization with an august membership, so it is only fitting to review what we stand for and the challenge we face.

I am sure there are a variety of views held by the members as to how the T.I.C. should function. Our charter states the purposes :

- 1) To promote and further cooperation between members on matters of research,
- 2) To promote common interests and welfare of the tantalum source material industries, and
- 3) To represent the tantalum source materials producing industry to appropriate authorities and other organizations.

And, needless to say, all activities are to be conducted in an entirely proper and lawful manner.

So, with the charter in mind, let me ask this question,

- What was your primary reason for joining the T.I.C. ?

A study performed six years ago found that a large majority of the companies became members because they hoped that the "T.I.C. would aid, either directly or indirectly, price stability in the market. The over-riding concern was for a means to insure the long-term viability for each member company and of the producing industry. If the T.I.C. accomplished little else, it would be considered successful". I now ask "Did we see stability of supply and demand and stability of price in the period from the 1975 recession to the present one ?" I do not have to answer that for you. Yes, there were many factors working against stability, such as cyclical markets, government Stockpile policies, lack of market knowledge which led to the never-fail supply-demand complex.

So, the matter of instability is still with us. Will we ever be able to escape the damaging peaks and valleys ? If so, will the resultant conditions be such that miners can receive a fair market value for their minerals, that processors and manufacturers will receive an acceptable return on their investments ? In the final analysis, they must, if there is to be motivation for capital spending, for identification and development of new raw material sources, for research and development which will expand the use of tantalum and enhance its growth prospects.

Marginal or low profits and dismal forecasts are all our managements need to reduce spending, but doing so will hurt the tantalum industry. On the other hand, abnormally high profits will only accelerate programs by our customers to find ways to use less and less tantalum. When this occurs, the loss in volume will eventually reduce profits to unacceptable levels for the investments and risks involved.

Will there be a middle ground ? This is the real challenge facing the tantalum industry and, therefore, each member of the T.I.C. We can, as an organization, continue to educate and to express what we believe to be in the best interests of the tantalum industry. But the challenge of stability at a level healthy to all segments of the industry is, in reality, in your individual hands. Will stability come ? If it does, how long will it take to restore the lost confidence and to strengthen the future growth prospects for tantalum ? Will there be long-term viability for each member of the T.I.C. and for the producing industry ? These are very important questions which are not necessarily new and for which the tantalum industry is seeking answers. I now leave them with you.

T.I.C. study, "Explanation of tantalum market behavior : 1980-1985"

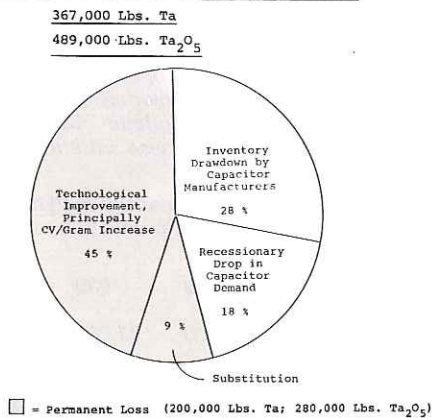
(This new study is an update of that made in 1980 entitled "Worldwide Tantalum Study: Assessment of Availability and Price, 1980-1985". Here is a brief summary of the conclusions, as presented to the meeting in Tulsa).

1981 brought a continuation and a widening of the worldwide recession and extremely high interest rates which had a progressively negative effect on the tantalum market. The price of tantalite fell from a high of almost \$120 per pound in May 1980 to a low of less than \$40 by the end of 1981. Rumors persisted that the demand has been cut in half to less than two million pounds, despite reasonable sustenance of the market for end-use equipment. The study was chartered to find out what happened to tantalum in 1981, why, and what is likely to happen in the period 1982-1985.

CAPACITOR POWDER DEMAND

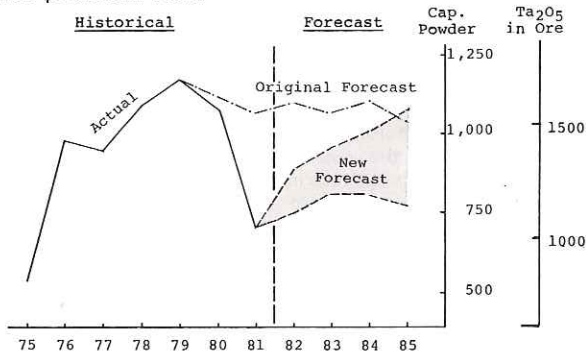
It is estimated that worldwide demand for capacitor powder fell 34 % in 1981 to roughly 1.0 million pounds Ta_2O_5 equivalent. The recession caused a drop in the demand for tantalum capacitors which coupled with the reduction of inventories by capacitor manufacturers explains roughly one-half of the decline. General economic growth should restore this portion. But the other half, about 250,000 pounds, is lost permanently. The continuing shift to higher charge powders has reduced the amount of powder used by 20 % over the last two year period. And substitution of other types of capacitors for tantalums has added to this.

1981 Drop in Worldwide Capacitor Powder Demand



A high and a low forecast have been developed dependent on the expected demand for tantalum capacitors and the continuation of the rate of powder usage in relation to total tantalum capacitor production. The low forecast is based upon the demand for capacitors remaining flat in 1982 followed by an annual growth rate of 5 1/2 %, and capacitor manufacturers sustaining the 1981 rate of increase in powder CV/gram which, for the United States, implies a 12 % compound annual decrease in the amount of powder consumed per capacitor unit. The high forecast is based upon the demand for capacitors growing 11 % in 1982 and at 9 % thereafter; and that the general increase in the capacitance capability of powder falls back to the rate of the 1975-1979 period, about one-half the rate of 1980-1981.

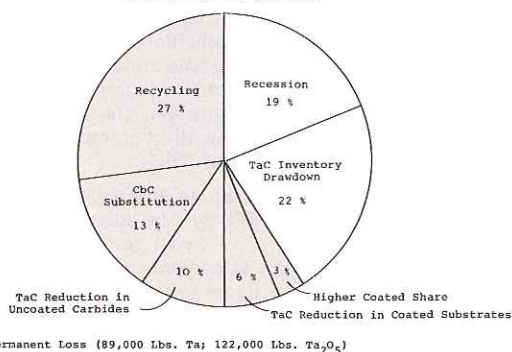
The low forecast suggests that powder demand (in terms of Ta₂O₅ contained in raw materials), will increase by about 7 % in 1982 over 1981 and an additional 17 % in 1983, then levelling off at about 1.2 million pounds, about 25 % below the historic peak in 1979. The high forecast projects a demand growth of 25 % in 1982 followed by a sustained annual growth rate of 9 % thereafter, reaching 1.6 million pounds in 1985.



TANTALUM CARBIDE DEMAND

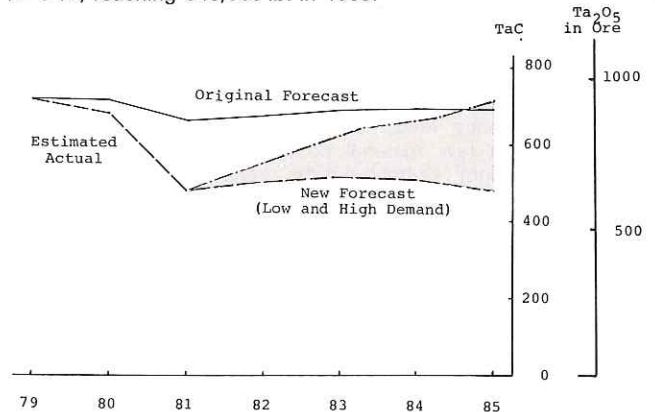
It is estimated that tantalum carbide demand on a worldwide basis fell 33 % in 1981 to 634,000 lb. Ta₂O₅ equivalent. Most of the drop appears to have occurred in the United States. Recession in the automotive, farm machinery, steel, and construction machinery markets decreasing the demand for cemented carbide cutting tools caused about a quarter of the drop in the demand for tantalum carbide. Reduction in inventories of tantalum carbide accounted for another quarter. Both of these will be restored with a general improvement in economic growth. The remaining portion of the loss, about 150,000 lb. Ta₂O₅, is essentially permanent, resulting from increased recycling, redesign of steel cutting tools to reduce the tantalum content, increased use of mixed carbides, and increased market share for coated carbide tools. A small portion of this latter loss may be restored only if TaC prices remain at low levels for a long period.

1980/81 Drop in U.S. TaC Demand (150,000 Lbs. Ta, Estimated)



Future demand for TaC depends principally on the demand for steelcutting grades of cemented carbide cutting tools and producers' level of effort to reduce the tantalum content of those tools. A low forecast is based upon cutting tool demand remaining flat in 1982 followed by a 4 % annual growth during 1983-1985, and TaC prices rising sufficiently to cause the cemented carbide producers to increase their efforts to recycle, redesign and use mixed carbides. A high forecast is based upon an increase of 5 % in tool demand in 1982 followed by a 7 % growth thereafter, and stabilization of TaC prices at a reasonable level causing no further effort by cemented carbide producers to reduce their need for virgin TaC.

The low forecast suggests that TaC demand (in terms of Ta₂O₅ contained in raw materials), will increase by 7 % in 1982, as producers stop reducing inventories, and will peak in 1983 at roughly 700,000 lb. Ta₂O₅, about 26 % lower than the peak attained in 1979. The high forecast envisages a growth of nearly 20 % in demand in 1982 and an annual growth thereafter of 7 %-8 %, reaching 943,000 lb. in 1985.



TOTAL DEMAND ON PROCESSORS

In total, including forecasts for the mill product and additive alloy markets, it is estimated that the demand on processors will grow 10 %-20 % in 1982, from 2.1 million lb. Ta₂O₅ in 1981 to 2.3-2.5 million lb. in 1982. Thereafter, during the period of 1983-1985, demand will grow 6 %-10 % annually, reaching 2.7 million lb. in 1985 in the low forecast, or 3.4 million lb. in the high forecast. The peak historical demand, for comparison, was 3.4 million lb. in 1979.

MATERIAL REQUIREMENTS, SUPPLY, AND PRICE

The effect of the processor inventory situation in 1980-1981 was to dampen progressively the need for virgin tantalum raw material purchases. World processor inventories remain very high relative to processors' current shipments, despite cut-backs in raw material purchases and high inventory carrying costs.

The rate at which processors' inventory-to-shipments ratio (currently about 2.4 to 1) is worked down is first and foremost a function of the United States and European economic outlook. Even assuming that economic recovery begins in the third quarter of 1982, the ratio cannot reach near-normal levels until the fourth quarter of 1983, "normal" being 1.2 to 1.4 years of demand. At best, processors will not begin to increase virgin material purchases until the fourth quarter of 1982 or even the first quarter of 1983.

If the conclusions on inventory change and material requirements in 1982 are reasonably accurate, it is expected that the tantalum price will take about the next six months to stiffen and another six months of slow upward movement.

The more important aspect of tantalum price is the long-run effect of various threshold price levels on future supply. Four scenarios at various price levels are explored.

— At sustained price of \$30- \$40 :

1. Demand will increase to the maximum forecast level of 3.5 million lb. by 1985.
2. Mine and smelter production will be held down reaching about 2.2 million lb. in 1984 and 1985.
3. New resources of tantalum will not be developed.
4. The inventories of low-grade slag will near depletion by 1986.
5. Violent price increases could be expected after 1986.

— At sustained price of \$60 :

1. Demand will also increase to the maximum forecast level of 3.5 million lb. by 1985, but some substitution would progress causing a reduction in demand after 1986.
2. As all current mining operations would be profitable, supply would increase slowly reaching about 2.7 million lb. by 1985 and then increasing further as some new operations come into being.

3. At this price level, it is possible that some of the new reserves could be economically developed, but the lead time being four to five years precludes them as a source of supply prior to 1986.
4. The inventories of low-grade slag will stretch somewhat further but will be essentially depleted by 1987.
5. There is a possibility of price dislocation after 1987 but this depends on both the continuation of demand and the development of new sources of supply to replace those reserves being currently mined which will by then be depleted.

— At a sustained price of \$ 80 :

1. Demand will increase to an intermediate level of 3.0 to 3.2 million lb. and probably begin a decrease after 1985 at the rate of about 0.25 million lb. per year.
2. Mine and smelter production should reach a sustained level of 2.7 to 2.8 million lb. per year by 1985.
3. New reserves will be developed providing supply for the latter half of the decade.
4. Inventory of slags will stretch even further and probably last long enough to effect a smooth transition from the use of the slags to the output from new mines.
5. Price stability is a reasonable prospect.

— At a sustained price of \$110 or above :

At these price levels consumers would experience sharp increases in raw material costs. A return to these prices, however, might not bring out the capital investment needed for new mines. Investors would be cautious of another explosive increase in price like that of 1978-1979. Consumers would renew design efforts and no new tantalum products would emerge. The supply and demand balance would be very unstable and a price collapse could be anticipated again in 1984-1985.

In summary, it appears that a price of \$60-\$80 in the 1983-1985 period would be sufficient to obtain one or two major mines without further damaging consumer demand for tantalum prices.

The tantalum situation in Japan

(This paper was presented at the Seventeenth General Assembly of the T.I.C. by Mr. Hiroshi Tashiro, Executive Vice President of Showa-KBI, as a part of the panel discussion of the T.I.C. Study. It is offered in this issue of the "Bulletin" as it presents a more complete assessment of the Japanese situation than included in the Study).

Starting with a survey of the Japanese market, the actual and estimated production of tantalum products in Japan by category and year follows :

Unit : Kg.	1979	1980	1981	1982
Ta Powder-Cap.				
Grade	101,000	87,000	66,000	(55,000)
Ta Powder-Metal.				
Grade	3,700	5,800	5,000	(—)
Ta Mill Products	37,400	36,900	28,300	(25,100)
Ta Carbide				
(Ta content)	36,400	30,000	28,000	(26,000)
Ta Oxide				
(Ta content)	15,700	12,400	7,300	(5,500)
Total	194,200	172,100	134,600	(111,600)

There has been a downward trend in production for all categories after 1980's peak. 1981 saw the largest annual drop.

Production of tantalum capacitor units also peaked at 1,332 billion units in 1980, began to fall in 1981 and will drop even more this year to 1.1 billion units.

	1979	1980	1981	1982
Tantalum Capacitors (million pieces)	1093	1332	1290	(1100)
Powder ratio (g/unit)	0.096	0.070	0.055	(0.050)

Some analysts have even predicted that shipments will fall as low as 1.0 billion units in 1982. If this is true, the T.I.C. Report forecast should be revised substantially downward by at least 20 %. The same would be true for the powder production forecast above.

However, the trends in Japan will agree basically with the T.I.C. Report analysis of recent developments. As reported by Mr. Okuda of N.E.C. to this meeting last year, in only ten years resin-dipped tantalum capacitors have taken over 85 % of all tantalum capacitor use in the Japanese electronics industry. This remarkable growth can be attributed to the superiority of such capacitors over aluminium electrolytic capacitors in their performance characteristics, in their miniaturization and to the efforts of capacitor manufacturers to reduce production costs.

Areas where tantalum capacitors are used differ in Japan from those in the U.S. Consumer electronics account for 55 % of all sales compared to 45 % in telecommunications, computers and other industrial electronics. In the U.S., on the other hand, estimates are that industrial and military electronics account for 88 % compared to only 12 % for consumer electronics. Since tantalum capacitors are in overwhelming demand in the consumer electronics industry in Japan, production of resin-dipped capacitors has grown to meet that demand.

Coming back to the earlier statement that capacitor shipments may fall as low as one billion units this year, there are two basic reasons for this pessimistic outlook. One is the result of market deterioration, the general recession hurting the consumer electronics industry.

The second reason is directly due to the radical jump in the prices of tantalum ore in 1979 and 1980. Japanese manufacturers want assured and stable supplies, whether it be in raw materials, parts or components. With the threat of a break in supply of tantalum, and even fearing that it may run out, the Japanese electronics industry began to look at aluminium and ceramic capacitors as substitutes. As a result, 20 % of the tantalum market, which comes to 20 million units per month, has been lost to the other types of capacitors and this market share may well be lost for good.

Prior to the radical price hike, Japanese tantalum capacitor manufacturers enjoyed annual production increases of 20 % or more and it was assumed that the same annual growth rate would continue. However, the radical price hike put an end to the growth and started the trend toward substitution. The tantalum capacitor industry believes that the rate of substitution has fallen off and, in fact, virtually stopped by the end of 1981.

Today, however, the industry faces an entirely different challenge from the aluminium capacitor industry. The substitution which took place until late 1981 was by 5 × 7 mm or 4 × 7 mm aluminium capacitors. Now, however, the aluminium capacitor manufacturers have introduced miniature 4 × 5 mm and even 3.5 × 5 mm capacitors. This has intensified competition. The size of these new aluminiums is similar to the size of the resin-dipped tantalums and



Mr. Thomas C. Barron.



Mr. Frank Cook.

the new technology is claimed to provide most of the characteristics that have been peculiar to the tantalums in meeting the requirements of the consumer electronic industry. With the former advantages of tantalums lost, price has become the deciding factor in use.

Therefore, substitution is still going on and will continue until the tantalum capacitor manufacturers are producing chip capacitors in large quantities. Although chips have distinct advantages, price is still the key factor. If the price of tantalum chips can be cut in half, the price differential over aluminiums will be offset and tantalum chip capacitors will meet and overcome the challenge from the aluminium capacitor industry.

Another challenge is coming from the ceramic capacitors in the very low capacitance range. At the present time, however, there is little direct challenge. If technological improvements in ceramics accelerate, however, they may become formidable competition.

The production and unit price of tantalum, aluminium and ceramic capacitors in Japan last year is compared as follows :

	<i>Production (million pcs.)</i>	<i>Unit Price (Yen/pc.)</i>
Tantalum	1,290	29.7
Aluminium	10,955	11.2
Ceramic	21,475	3.8

The Japanese tantalum industry has not been sitting still. Specifically, we have

- Developed and increased production of chip capacitors. But, to date, chips account for less than 10 % of the total production although future production will increase rapidly.
- Improved the CV/g value of the powder in miniaturized capacitors. In 1979, the average CV/g value of powder in Japan was 8,600. In 1980, it was 8,800, an increase of 2 %. In 1981, it rose to 10,000, a 14 % increase, and it is estimated that it will reach 11,000, an additional 10 %, in 1982. Mr. Okuda suggested last year that we should aim for 30,000 CV/g powder. Powder manufacturers are currently responding with products in the range of 15,000 to 20,000 CV value. While values higher than 20,000 may be possible, such powder cannot be used in existing types of products within the next two to three years without lowering performance. In order to put such powder into practical use in the future, both powder and capacitor manufacturers will have to make dramatic improvements in manufacturing technologies. Closer cooperation will be essential.

Referring back to the first table, some comments about other tantalum products are :

1. Demand for mill products for chemical use in Japan is relatively small. Mill products also include wire and foil for capacitors and since production of capacitors has fallen, demand for such mill products has also decreased.
2. Demand for tantalum carbide is also falling. According to cemented carbide tool manufacturers, demand hit a peak in 1979 and has been falling sharply since then. 1982 will see the demand fall by at least 7 %, there being a large shift to niobium carbide as a reaction to the price increases of 1979 and 1980.

	<i>1979</i>	<i>1980</i>	<i>1981</i>	<i>1982</i>
CC Cutting Tools (mt)	749	857	817	(830)
Tantalum content (%)	4.85	3.50	3.43	(3.13)

The future role of tantalum carbide in the cutting tool industry is uncertain.

3. Demand is also down for high-purity tantalum oxide which has been widely used for single lens reflex cameras, a Japanese speciality. But there has been a switch to less expensive automatic cameras and the demand for tantalum oxide for high-quality lenses is gone for good except for a small market for high-quality lenses.
4. At one time it was expected that the high-purity oxide would be used in compounds for electronics, but that development has not come about because of severe competition, particularly with regard to cost.

A reference should be made to the trend in ore prices and the effect of such on the tantalum business as noted in the T.I.C. Report, which suggests that ore prices ranging from \$ 60 to \$ 80 per pound would provide a good supply and demand balance. The suggested range does not have much to commend itself to tantalum consumers. If ore prices are projected as if the drastic jump had not taken place in 1979 and 1980, even allowing for inflation and other factors, the current price would be in the \$ 40 to \$ 45 range. Even \$ 60 per pound, the Report's second scenario, is higher than the natural price would have been. Ore priced at \$ 60 may well drive away more of the tantalum business. Ore priced at \$ 80 will affect survival.

In order to have the industry prosper, an assured supply of tantalum at a reasonable price is needed. If that can be achieved, not only will the lost market share be regained but part of the established market of the aluminium capacitor industry can be taken on.

The tantalum industry has a real challenge. How that challenge is faced is the task of all of us, miners, processors and manufacturers. Price is the key to the challenge.

T.I.C. tantalum production and shipments

The T.I.C. data for the production and shipment of tantalum-bearing tin-slugs and concentrates for 1981 are as follows, including the total production and shipments for 1979 and 1980 for comparison (in lbs. Ta₂O₅ contained) :

	<i>Slags</i>	<i>Concentrates</i>	<i>Total</i>
1979			
Production	1,204,945	893,157	2,098,102
Shipments	1,182,163	938,723	2,120,886
1980			
Production	1,383,704	792,528	2,176,232
Shipments	1,589,729	726,480	2,316,209
1981			
Production	1,228,246	926,241	2,154,487
Shipments	1,020,598	738,628	1,759,226

In the first half of 1981, 22 producing members were asked to provide data and all 22 responded; in the second half, 24 out of 26 companies responded.

The total production in 1981 represents a small decrease, 1 %, from the production of 1980. But the shipments in 1981 are 24 % lower than in 1980. It appears that producers built their inventory by approximately 395,000 in 1981, about 18 % of total production.

It is estimated that the T.I.C. producing members account for 90 to 95 % of the total free world production of tantalum source material. This is particularly true at the present time as the reduced price level of tantalum source materials has diminished, if not eliminated, the recovery of old tin slags produced many years ago.

T.I.C. study available to non-members

Although a brief summary of the conclusions reached in the new T.I.C. Study, "Explanation of Tantalum Market Behavior: 1980-1985" is offered in this edition of the T.I.C. "Bulletin", it has been recognized by the Executive Committee that some non-members of the T.I.C. may wish to have a full copy of the report. Thus, with membership approval, it will be available at a subscription price of US \$ 600. Copies may be ordered either from Mrs. J.A. Wickens, Secretary, Tantalum Producers International Study Center, 1 rue aux Laines, 1000 Brussels, Belgium, or from Mr. Tom Barron, Ayers, Whitmore & Company, 950 Third Avenue, New York, N.Y. 10022, U.S.A. Please remit the full price with the order in order to assure prompt delivery.

This voluminous report covers an in-depth analysis of the tantalum market during 1980 and 1981 analyzing the factors that have led to the decline of tantalum usage. The factors which are of a temporary nature resulting from efforts of consumers to respond to economic conditions and those which are of a more permanent nature as a reaction to the price cycles of tantalum are separately identified and analysed as a basis for forecasting the recovery of tantalum demand. Further analysis of the effect of future raw material price levels on both the market and the supply of new materials establishes the scenario most suitable to sustained health in the future of the tantalum business.

T.I.C. telex service

The Secretariat of the Tantalum Producers International Study Center has subscribed to a telex service organised by a commercial agency in Brussels. Messages sent to the agency will be promptly communicated to the T.I.C. office. The telex number is

61344 Contac B

Please begin messages by addressing them clearly for the attention of the T.I.C. or Mrs Wickens, or preface them "Ext. 181".

T.I.C. Seventeenth General Assembly



The President, Mr. Conrad L. Brown, addresses the general session of the meeting.



Mr. Brown opening the panel discussion.

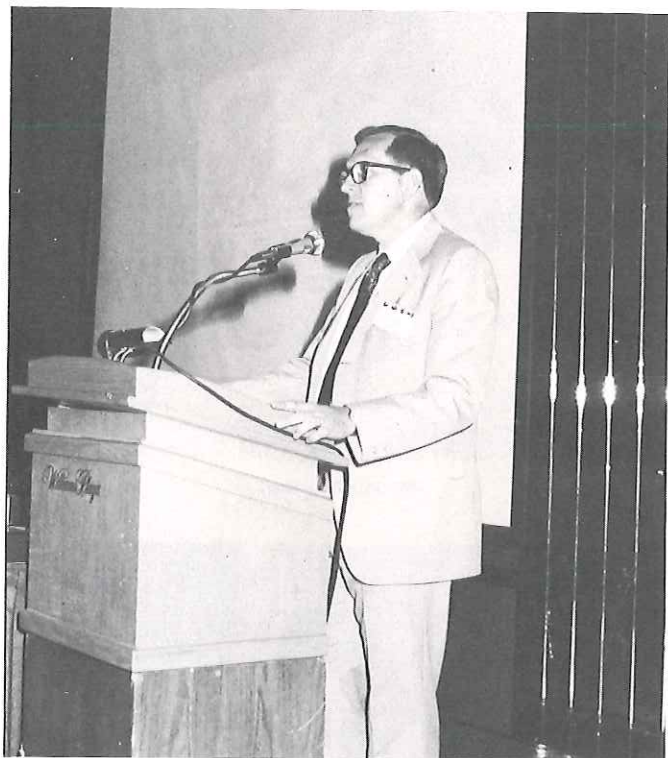


Mr. Tom Carlile, Fansteel.



Mr. Herman Becker-Fluegel becomes "Big Chief T.I.C." during the barbeque luncheon.

**Speakers presenting
their papers
to the meeting**



Dr. William A. Owczarski.

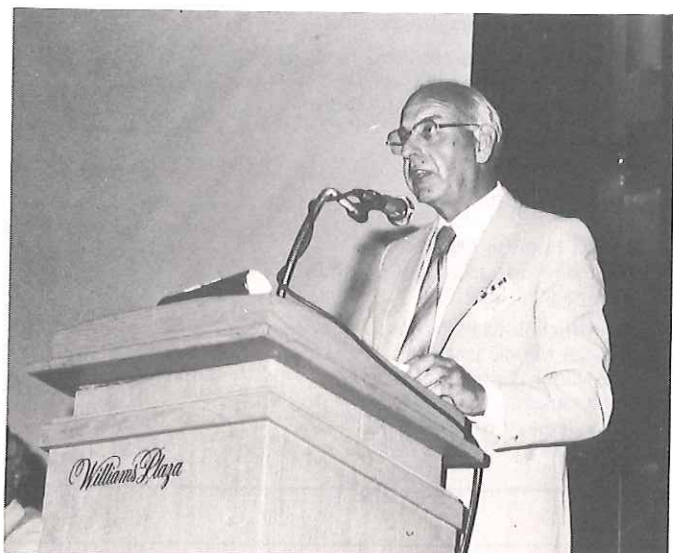


Mr. Roy Markon.



Dr. Lloyd O. Brown.

Delegates taking part in the panel discussion



Mr. Robert W. Franklin.



Mr. Hiroshi Tashiro.



Mr. Joseph C. Abeles.



Dr. John B. Lambert.



Mr. Ake Janson.



Mr. Ernest D. Ganz.



Mr. Harold Schwartz.

NEW MEMBERSHIP

The following companies were elected to membership by the Seventeenth General Assembly :

Intersteel Comercio Exterior Ltda.,
Rua Miguel Lemos, 41 - C/04,
22.071 Copacabana - RJ - Brazil.

Mallinckrodt, Inc.,
P.O. Box 5439,
St Louis,
Missouri 63147, U.S.A.

Angel Luengo Martinez,
Avenida Portugal, no. 106 - 5º B,
Salamanca, Spain.

Northbrook Metals Inc.,
Special Metals Division,
1551 John Tipton Boulevard,
Pennsauken,
New Jersey 08110, U.S.A.
(Delegate in London).