Tantalum: Trends & Opportunities

February 2020

Argus Metals Week
Tantalum
The past 12 months have seen significant changes in the market

These changes have impacted the demand for Tantalum

With specific regards to Ta capacitor demand, last year I stated:

- Trends favor Tantalum
- The Tide has Turned
- Supply Chain Stability is Critical to Longevity

Let’s take a fresh look at the overall market, market trends and demand
Despite these considerations, most predictions foresee positive global growth in the 2% - 3+% range for 2020.
Global GDP Projections*

Global growth has been declining...
but there are tentative signs of stabilization

Global Economy
- 2019: 2.9%
- 2020: 3.3%
- 2021: 3.4%

Advanced Economies
- 2019: 1.7%
- 2020: 1.6%
- 2021: 1.6%

Emerging Markets & Developing Economies
- 2019: 3.7%
- 2020: 4.4%
- 2021: 4.6%

*Global growth declined 2017 - 2019

Source: IMF, January 2020
Global PMI

Source: Bloomberg, Jan 2020
Let’s Talk Tantalum
Where is all the Tantalum?*

Source: Richard Burt - "Much ado about Tantalum – Again" 2016
Where is all the Tantalum?*

- South America: 130,000
- Australia: 66,000
- Central Africa: 29,000
- Other Africa: 21,000
- China/SE Asia: 33,000
- Russia/Middle East: 31,000
- North America: 5,500
- Europe: 2,300

* Estimated “likely” resources in metric tonnes Ta₂O₅

Source: Richard Burt - "Much ado about Tantalum – Again" 2016
Where Tantalum is Sourced - Today

Source: T.I.C. 2019
Where Tantalum is Sourced - Today

- Africa: 65% - 70%
- South America: ~10%
- China: ~10%
- Australia: 5% - 10%
- Other: ~5%

Source: T.I.C. 2019
Tantalum Usage

- On average, receipts and shipments have not wavered much since 2010 with the average of each, over this period, being remarkably close...within 1%...and the average usage not changing/growing over that period also

- Only the applications have shifted over this period

Source: T.I.C. 2019
Where Tantalum is Used - Today

- Capacitors: 32%
- Superalloys: 23%
- Sputtering Targets: 17%
- Chemicals: 11%
- Carbides: 7%

Source: Roskill 2017
Ta End-Use Applications

- Capacitors: Electronic Devices
- Superalloys: Aerospace/Ballistics
- Targets: Semiconductors/Displays
- Chemicals: Optical Glass/SAW Filters/CVD
- Semi-Finished: Chemical Processing/Surgical Implants
- Carbides: Industrial Cutting Tools
Ta Commercial Product Trends

• Capacitors: Market correction after 2018 surge
• Superalloys: Steady w/aerospace
• Targets: Slow down w/semi market
• Chemicals: Decline w/SAW market demand
• Semi-Finished: Steady with industrial output
• Carbides: Slow down w/automotive
Tantalum in Electronics
Market Forecast

Growth Drivers

2.4%

YoY Growth ($)

Sources: Priskmark, Statista, IHS Markit, IDC, Digitimes
After no growth in 2019, the electronics systems market ($) YoY growth forecast for 2020 is projected at 2.4%.

**Growth Drivers:**

- 5G Infrastructure & Devices
- Servers & Storage
- Defense/Military/Space
- Automotive Electronics

Sources: Prismark, Statista, IHS Markit, IDC, Digitimes
Semiconductors & Capacitors – The World

Semiconductors & Ta Capacitors – The World

T.I.C. - Social & Environmental Responsibility

• OECD due diligence and responsible minerals
  – T.I.C. has worked closely with the OECD for over a decade to develop due diligence guidance

• ITSCI Programme
  – T.I.C. was instrumental in establishing ITSCI over 10 years ago
  – Over 2,000 conflict-free mines provide safe work environments to over 80,000 miners in central Africa

• Women’s Rights and Mining (WRM)
  – T.I.C. is signatory to the Stakeholder Statement on Implementing Gender-Responsive Due Diligence and ensuring the human rights of women in Mineral Supply Chains

• Communities where we source are conflict-free
  – RMI’s Responsible Minerals Assurance Process independently audits all Ta smelters

• NORM (Normally Occuring Radioactive Materials)
  – T.I.C. Transport Policy
  – Publish detailed guidance on NORM transport in eight languages.
  – Hold observer status at IAEA’s Transport Safety Standards Committee (TRANSSC)
  – Member of the EAN-NORM group
  – Member of the Transport Facilitation Working Group (TFWG)
  – NORM and DOS (Denial of Shipments) is a global supply issue

• Supply Chain
  – Represents tantalum on the OECD Multi-Stakeholder Group (MSG)
  – Represents tantalum on the Governance Committee of the ITSCI Programme
  – Co-leads the RMI-TIC Technical Working Group
  – Member of the European Partnership for Responsible Minerals (EPRM)
  – Member of the Critical Raw Materials Alliance
  – Strong relationships with the European Commission and British government for minerals legislation
T.I.C. – Information, promotion and awareness

• General Assembly
  – Each October we host a technical conference and members’ annual general meeting
  – Field trips have included: the Airbus factory, Hong Kong container port, a Rwandan mine & CERN*

• Quarterly “Bulletin”
  – News, information and updates from our industry and the Association’s outreach efforts
  – Annual version also in English, French, Chinese and (starting 2020) Japanese

• The Anders Gustaf Ekeberg Tantalum Prize
  – International award recognizing “Excellence in Tantalum Research & Innovation”

• Statistics
  – Tantalum and niobium statistics published on a quarterly basis
  – Data is compiled from members and augmented with international trade data
Anders Gustaf Ekeberg Prize
Annually Awarded by the T.I.C. for
Excellence in Tantalum Research and Innovation
T.I.C. – Global Members/Stakeholders

• Miners & Associations
• Traders
• Processors
• Smelters
• Capacitor Manufacturers
• Trade Associations

• Secondary Processors
• Recyclers
• NGOs
• Compliance Associations
• Chemicals Manufacturers
• Media
Tantalum was there.

Tantalum has powered many technological milestones.

- 1930s
- 1946
- 1959
- 1962
- 1981
- 1987
- 2007
- 1998
A Day with Tantalum
Tantalum is in in hundreds of products that you use everyday.