Titanium Sponge Trends in OTC Perspective

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Actual results may differ materially, for a wide range of possible reasons, including general industry and market conditions and general international economic conditions.

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Presentation Outline

Part 1: Summary of OTC
   Introduction and Recent Topics

Part 2: Current Situation on World’ Sponge Industry

Part 3: Aerospace Sponge Demand for the Last Several Years
   What factors may have impacted it?

Part 4: Aerospace Sponge Demand for the Next Several Years
   What factors need to be carefully monitored for forecasting sponge demand?
OTC’s Production Sites and Products

Amagasaki Plant
- Ti products
- Ti sponge
- Ti ingot
- High-purity Ti
- Ti powder
- Si products
- Silicon monoxide (SiO)

Kishiwada Plant
- Si products
- Polycrystalline Si
The Bird-eye View of Amagasaki Plant

Titanium sponge facilities expanded to 40,000TPA
Sponge Cake at OTC’s Plant
OTC’s Production History

We have just reached a production of 600,000MT milestone.
OTC’s Sponge Production Capacity since 2003

Annual capacity ('000MT/FY)

Capacity


18K 22K 23K 31K 37K 40K
OTC’s Titanium Powder (TILOP)

* Features of our TILOP

✓ No contamination of impurities
  - IAP (Induction Melting Gas atomization Process) with no crucible

✓ Cost-effective fine spherical powder
  - Using a mass production technology which is unique to our company

SEM Image of Ti64 Powder (-45μm)
We are going forward to develop powder technologies to suit future additive manufacturing requirements.

* Other special alloys
Based on customers request, we have experience to produce;
- Ti-Al alloys  - Ti-6Al-2Sn-4Zr-2Mo etc.

* Customers’ requirements
- Lower Oxygen content (much less than 1,000ppm)
- Reduction of powder cost  etc.
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World’s Titanium Sponge Capacity by Country
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Several Factors Impacted Aerospace Titanium Demands Except for Inventory Adjustment in Supply Chain

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>HOW IMPACTED</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL FLY WEIGHT</td>
<td>VERY POSITIVE</td>
<td>Continued increase of build rate for most of aircraft types</td>
</tr>
<tr>
<td>TOTAL BUY WEIGHT</td>
<td>POSITIVE</td>
<td>May not have been as much as increase of fly weight due to improvement of buy to fly ratio</td>
</tr>
<tr>
<td>TOTAL Melt volume</td>
<td>POSITIVE</td>
<td>The same degree of increase as buy weight, as yield from melt products to mill products are considered to be rather stable</td>
</tr>
</tbody>
</table>
From Aerospace Melt Products to Sponge Demands Biggest

OTC estimates based on USGS data
Sponge-Scrap Ratio/ Impact onto Titanium Sponge Demand

US annual melt Volume 60,000MT – 70,000MT

Sponge/Scrap = 40/60

Sponge 24K – 28K MT
Scrap 36K – 42K MT

Roughly 12,000MT – 14,000MT/Y fluctuation of the US sponge requirement

It must have been a huge impact.
What are the factors impacted sponge/scrap ratio?

1. availability of recyclable scrap

<table>
<thead>
<tr>
<th>OEM strategy of buy back Agreement</th>
<th>More available</th>
<th>More scrap is now being recycled</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM strategy of globalization</td>
<td>Less available</td>
<td>More scrap is being generated in more diverse geographical area, which makes it more difficult to collect and recycle</td>
</tr>
</tbody>
</table>

2. technological reason for more scrap use

<table>
<thead>
<tr>
<th>More introduction of Cold-hearth furnace</th>
<th>More scrap use</th>
<th>Higher scrap ratio is possible in cold–hearth furnace</th>
</tr>
</thead>
</table>
3. Impact from Ferro-titanium market

<table>
<thead>
<tr>
<th>Growth rate</th>
<th>More scrap returning to titanium industry</th>
<th>More pricing pressure on scrap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft &gt; steel industry requiring ferro-titanium</td>
<td>⇒ more competitive price</td>
<td></td>
</tr>
<tr>
<td>More scrap returning to titanium industry</td>
<td>⇒ more incentive to use higher ratio of scrap</td>
<td></td>
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With those factors combined, it is generally considered that growth of titanium sponge demands have been negatively impacted by those factors during the past several years.
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Factors which may impact future aerospace sponge needs

<table>
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<tr>
<th>TOTAL FLY WEIGHT</th>
<th>The more titanium-intensive aircraft to be built, the more fly weight totals to be achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUY TO FLY RATIO</td>
<td>It is a ratio of buy weight required to produce a unit of fly weight. Even a small improvement of buy to fly ratio will have a big impact on buy weight</td>
</tr>
<tr>
<td>TOTAL BUY WEIGHT</td>
<td>The total titanium buy weight required to produce the total titanium fly weight. The question is does an increase in the total fly weight more than offset the buy to fly ratio improvement?</td>
</tr>
<tr>
<td>TOTAL MELT VOLUME</td>
<td>Yield loss will be taken into account to get total melt volume from total buy weight, but yield loss is considered to be stable</td>
</tr>
</tbody>
</table>
Then, in a given melt volume, sponge/scrap ratio is the key factor to determine future sponge needs.

Questions:
1. What factors determine scrap generation?
2. What factors determine recyclable scrap availability?
Since scrap, unlike sponge, is a by-product, recyclable scrap availability is an important factor.
Simplified mechanism of scrap being recycled back to titanium industry is shown on the next page.
When demand for fly weight increases, what happens?
When BTF ratio improves, what happens?
When scrap recycle ratio increases, what happens?

Recycle rate increased

Outside of Titanium industry

Recycled Scrap

Unrecycled Scrap

Mill Products

Scrap

Mill Products

Scrap

Fly weight

OEMs

Sponge

Scrap

Raw Material

Ingot

Ingot

Mill Products

Scrap
Is the assumption on the previous pages feasible?
The answer is no, because in reality, various factors come into play at the same time, so it is very difficult to predict an actual impact. In summary, assuming the same price competitiveness,

- Growth of total buy weight > growth of scrap availability
  ⇒ higher sponge consumption growth than scrap
- Growth of total buy weight < growth of scrap availability
  ⇒ higher scrap consumption growth than sponge
<table>
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<tr>
<th>Factors</th>
<th>Impact on Sponge Demands</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase of fly weight</td>
<td>positive</td>
<td>Will lead to increase of buy weight</td>
</tr>
<tr>
<td>Improvement on buy to fly ratio</td>
<td>negative and positive</td>
<td>Will lead to decrease of buy weight Will lead to lower scrap availability difficult to predict combined impact</td>
</tr>
<tr>
<td>Increase of melt volume</td>
<td>positive</td>
<td>Will lead to more raw materials</td>
</tr>
<tr>
<td>Increase of scrap recycle ratio</td>
<td>negative</td>
<td>Will lead to more scrap availability</td>
</tr>
<tr>
<td>Higher comparative price advantage</td>
<td>positive</td>
<td>More incentive to use sponge</td>
</tr>
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To summarize, key monitoring points to forecast future aerospace titanium sponge needs are:

1. Does growth of fly weight more than offset the buy to fly ratio improvement? And by how much? In other words, what will be the growth rate of the total titanium buy weight?
2. Can scrap availability keep up with anticipated growth of melt volume?
With the current sponge production capability, we believe that titanium will continue to be a material of choice for aerospace industry. OTC will continue its efforts to support increasing demand from aerospace industry.
Thank you