OVERVIEW OF TITANIUM SPONGE SUPPLY

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• REVIEW OF TITANIUM SPONGE PRODUCTION BY COUNTRY

• CONSOLIDATED WORLD SPONGE PRODUCTION

• CONSEQUENCE OF 2012 SPONGE OVER PRODUCTION

• OUTLOOK OF 2013 DEMAND

• CONCLUSION
Growth has been steady since 2010.

ZTMC has operated at full capacity in 2011 and 2012.

ZTMC has gone through a restructuration, it will open the door to investments which should:
- strengthen ZTMC upstream integration
- double ZTMC sponge production in the future.
Kazakhstan Ti Sponge Production

Upstream and downstream integration strategy to continue

A large proportion of Ti sponge production has been used internally to feed UKTMP melting plant.
Russia Ti Sponge Production

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>29,380</td>
</tr>
<tr>
<td>2006</td>
<td>32,140</td>
</tr>
<tr>
<td>2007</td>
<td>34,080</td>
</tr>
<tr>
<td>2008</td>
<td>34,950</td>
</tr>
<tr>
<td>2009</td>
<td>27,440</td>
</tr>
<tr>
<td>2010</td>
<td>27,000</td>
</tr>
<tr>
<td>2011</td>
<td>37,700</td>
</tr>
<tr>
<td>2012</td>
<td>44,200</td>
</tr>
</tbody>
</table>
• Ti sponge capacity at Avisma has been increased
• Operating presently at almost capacity
• Most of Avisma sponge is used internally at VSMPO
• Solikamsk producing less than 2,000 t per year
Japan Ti Sponge Production

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>30,800</td>
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<tr>
<td>2006</td>
<td>37,800</td>
</tr>
<tr>
<td>2007</td>
<td>38,865</td>
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<tr>
<td>2008</td>
<td>40,946</td>
</tr>
<tr>
<td>2009</td>
<td>24,500</td>
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<tr>
<td>2010</td>
<td>32,200</td>
</tr>
<tr>
<td>2011</td>
<td>52,600</td>
</tr>
<tr>
<td>2012</td>
<td>63,400</td>
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</tbody>
</table>
Japan Ti Sponge Production

- Largest increase of titanium sponge capacity and production over the last two years
- Sponge production exceeds demand of Japanese domestic market
- Will need to increase export of sponge
- Melting capacity has also increased but will only require a fraction of the sponge production increase.
USA Ti Sponge Production

2005 2006 2007 2008 2009 2010 2011 2012 (e)

8,600 12,000 19,900 22,600 7,500 8,000 14,000 19,000
USA Ti Sponge Production

- Two Ti sponge plants operating in the US presently
- Only one of them is certified for rotating parts which explains the high volume of Ti sponge import
- Within a few years it is expected that both sponge plants will be producing premium quality sponge but total volume produced may not cover full requirement
US IMPORTS OF TITANIUM SPONGE
FROM KAZAKHSTAN, JAPAN, CHINA, RUSSIA AND UKRAINE

<table>
<thead>
<tr>
<th>Year</th>
<th>Kazakhstan</th>
<th>Japan</th>
<th>Ukraine</th>
<th>China</th>
<th>Russia</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>24,372</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2007</td>
<td>26,382</td>
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<td></td>
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<td>2008</td>
<td></td>
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<td>2009</td>
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<td>2010</td>
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<td></td>
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<tr>
<td>2011</td>
<td>33,751</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>33,628</td>
<td></td>
<td></td>
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</tbody>
</table>
• Years 2011 and 2012 have seen the largest imports of sponge in the USA ever

• In 2011 and 2012 the US sponge imports were almost twice as much as the US sponge production

• US titanium industry is fully dependent on sponge imports
US IMPORTS OF TITANIUM SPONGE FROM KAZAKHSTAN, JAPAN, CHINA, RUSSIA AND UKRAINE
Since 2010 Japan has had the biggest share of export of sponge into the USA with about 48% of all exports in 2011 and 56% for 2012 with Kazakhstan as the second supplier and China the third supplier.
China Ti Sponge Production

• Since 2010 Chinese sponge production is continuing to increase every year.
• With Chinese sponge capacity estimated at 103,500 mt further increase of sponge production can be expected in the future.
• Export of sponge from China remains low compared to the total production: in 2011 about 12.5 %, in 2012 5.6 % of Chinese sponge production were exported.
• Majority of sponge produced remains in China to fulfill the strong demand of the industrial sector.
World Ti Sponge Production

- CHINA
- JAPAN
- RUSSIA
- KAZAKHSTAN
- NORTH AMERICA
- UKRAINE
World Ti Sponge Overall Production

- 2005: 106,090
- 2006: 132,161
- 2007: 173,181
- 2008: 181,401
- 2009: 120,575
- 2010: 145,670
- 2011: 197,421
- 2012 (e): 232,100
• World Titanium sponge production almost doubled between 2009 and 2012.
CONSEQUENCE OF 2012 SPONGE OVER PRODUCTION

• Large volume of sponge purchase in 2012 is partly due to the fear of shortage of Ti feedstock and slag.

• Increase of raw material prices due to the very large demand from the pigment industry has lifted sponge price in 2012.

• Melters have taken advantage of low scrap prices and have switched from sponge to scrap resulting in expensive sponge still in stock at the end of 2012.
OUTLOOK FOR DEMAND IN 2013

Aerospace

• Aerospace structure market remains flat due to delay of ramp up at Boeing and Airbus

• Boeing still has large inventory
OUTLOOK FOR DEMAND IN 2013

Industrial market

• Demand for Titanium tubes for desalination plants in 2012 was postponed.
• Demand for titanium for power plants and shipbuilding has decreased.
• Large inventory intended for these markets will be carried over from 2012 to 2013 resulting in reduced demand for sponge in 2013.
World Ti Sponge Production (2013 estimate)
• Taking into account inventory carried over from 2012 most of sponge producers have to adjust production level.
• Largest drop of sponge production is expected in Japan.
• Chinese and Russian sponge productions to remain stable.
World Ti Sponge Overall Production (2013 estimate)

YEAR | Production (units)
---|---
2005 | 106,090
2006 | 132,161
2007 | 173,181
2008 | 181,401
2009 | 124,675
2010 | 146,870
2011 | 201,421
2012 (e) | 235,600
2013 (e) | 213,700
• Decrease of Ti sponge world production between 2012 and 2013 is estimated to be 21,900 mt.

• With an estimated world sponge production of 213,700 mt in 2013 it will be still higher than sponge production in 2011 of 201,421 mt.

• Titanium scrap prices will determine the level of sponge inventory in 2013 and possibly the volume of sponge production in 2014.