
Titanium sponge supply

past, present and future

Philip Dewhurst

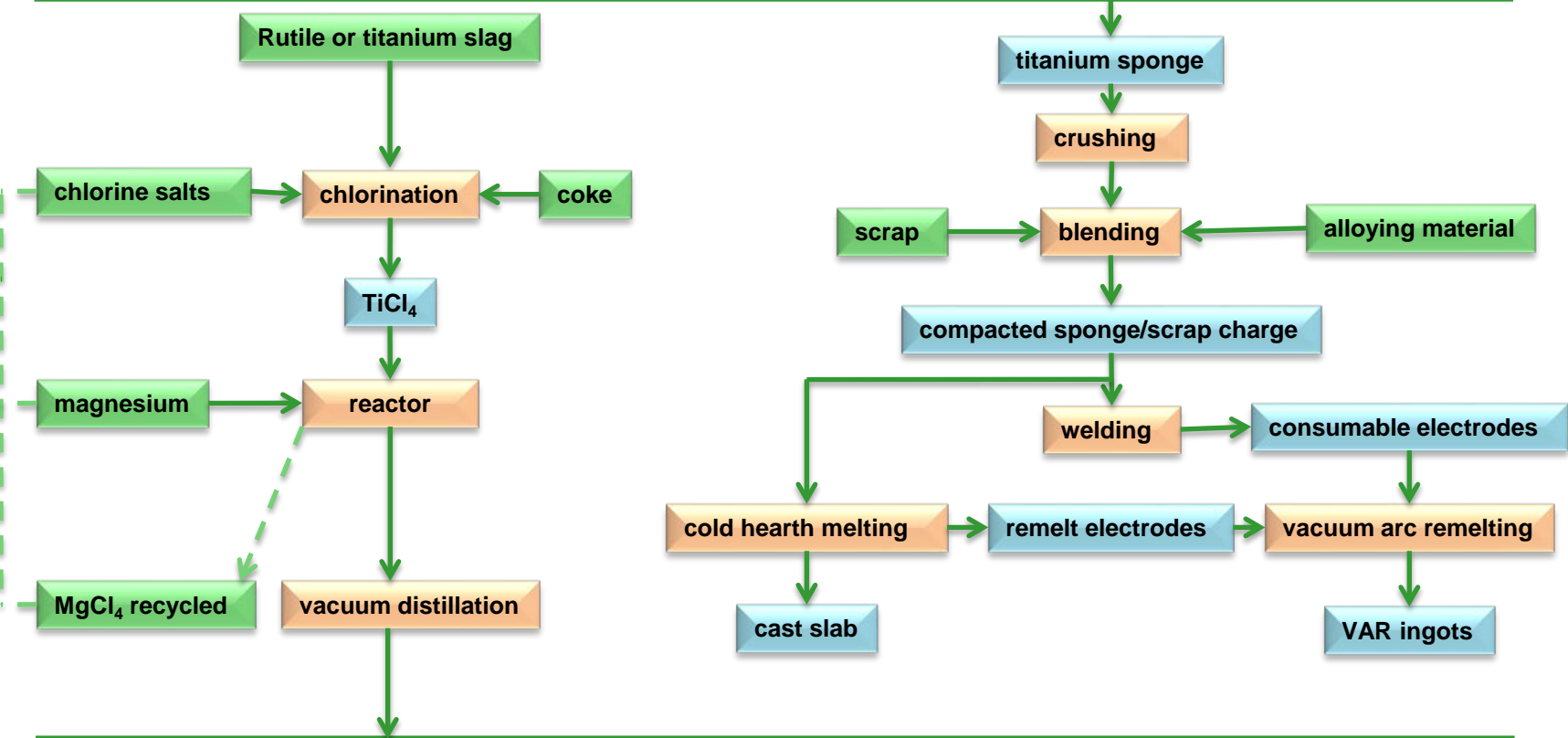
Roskill Consulting Group Ltd.

9th October 2013

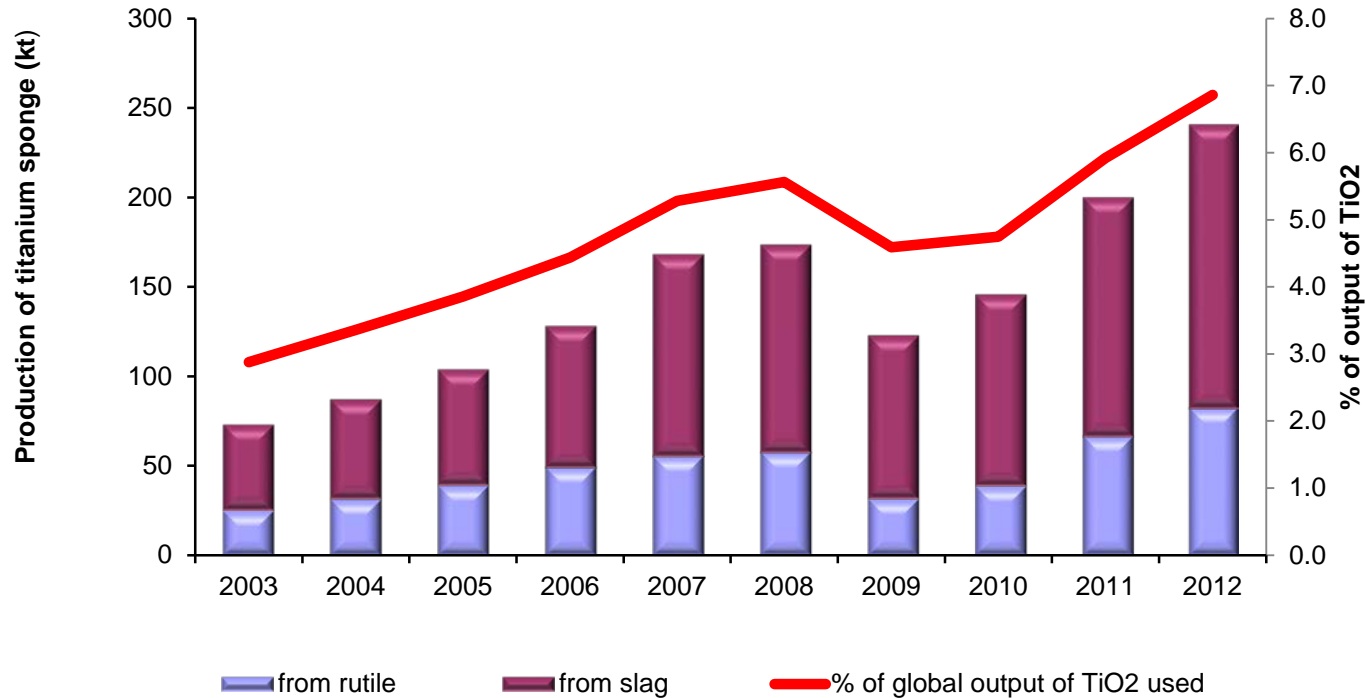
□ Overview of global titanium sponge supply

- Recent and historical supply trends
- Current producers
- Expansions and new developments
- Outlook to 2018

How titanium sponge is made and processed



Little of the world supply of TiO_2 is used to make titanium sponge

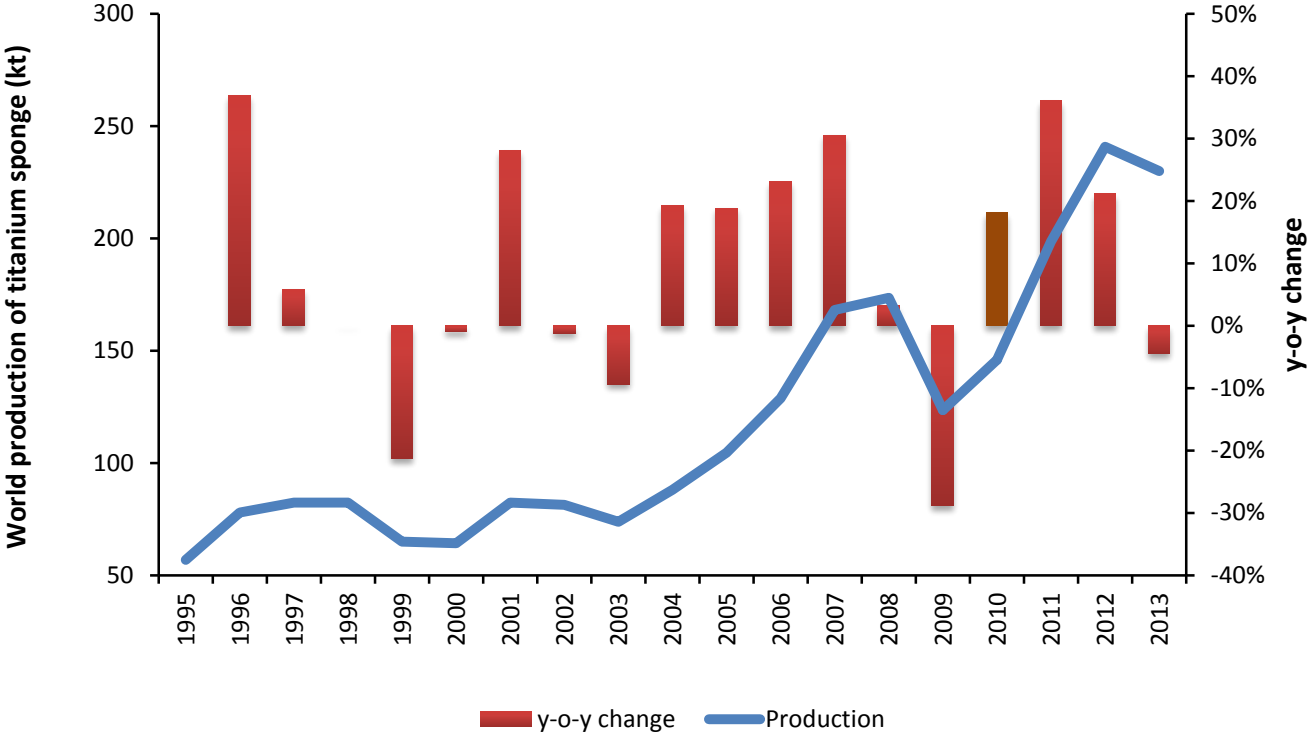


Supply

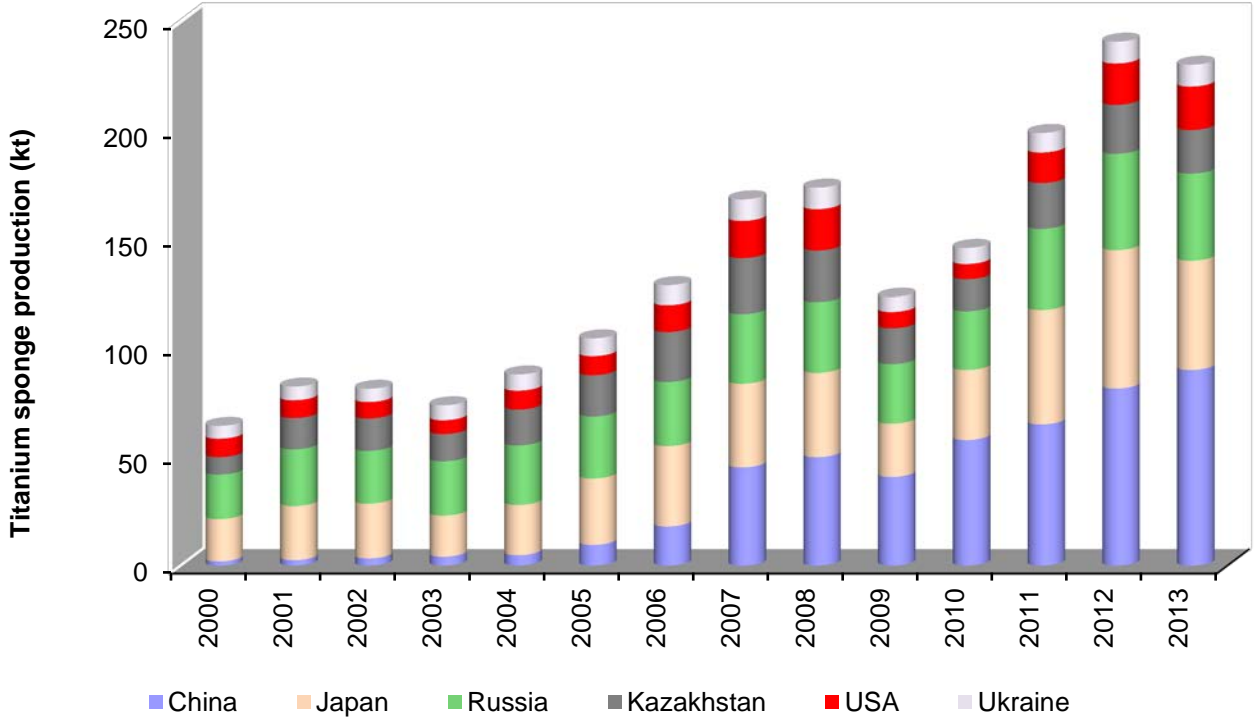
Review of recent trends

- ❑ After falling to 123.5kt in 2009, annual global supply of titanium sponge rose by an average of 26.5%py from 2010 to 2012 reaching 241kt
- ❑ There was a global sponge surplus of some 20kt in 2012 consisting mainly of industrial (standard) material produced in China
- ❑ Output is expected to fall to about 230kt in 2013 because of growing inventories and slowing demand growth

Rapid growth 2010-2012 for aerospace and industrial demand

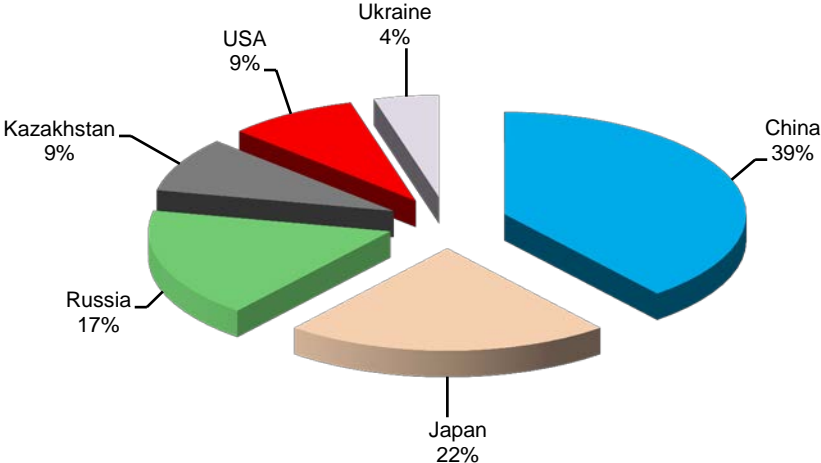


Growth was mainly in China - of industrial grade - and in Japan



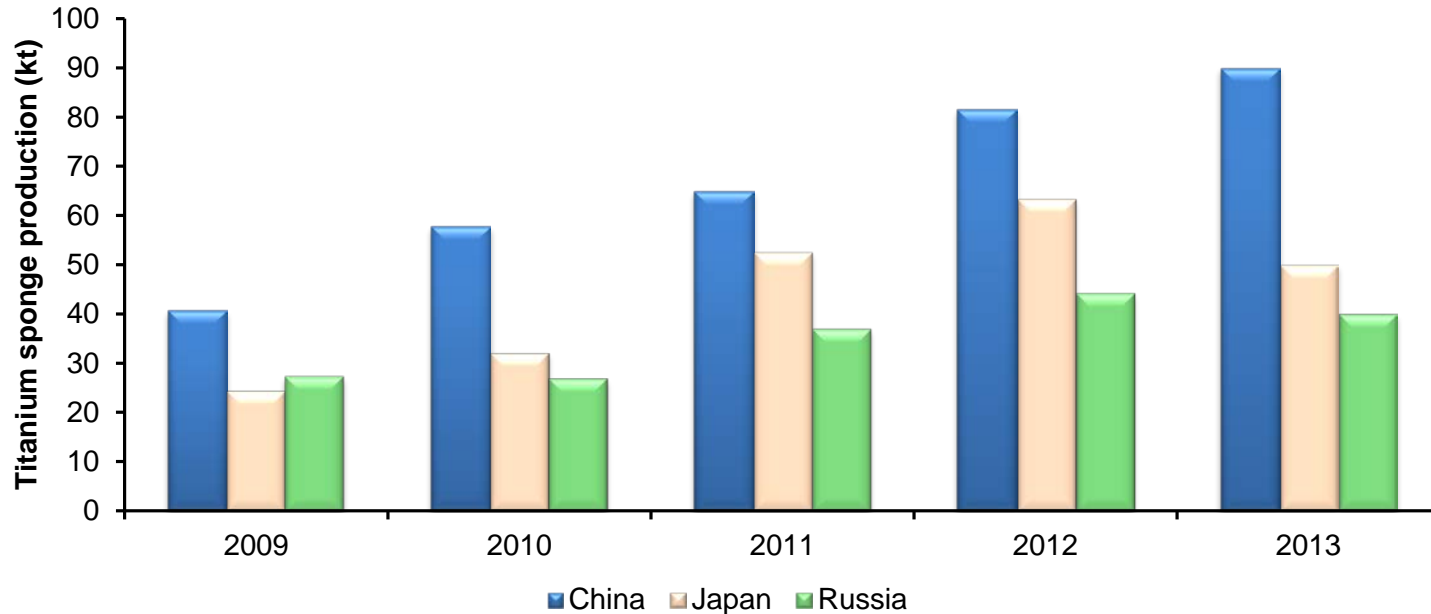
Forecast division of global output of sponge in 2013

World output forecast: 230kt



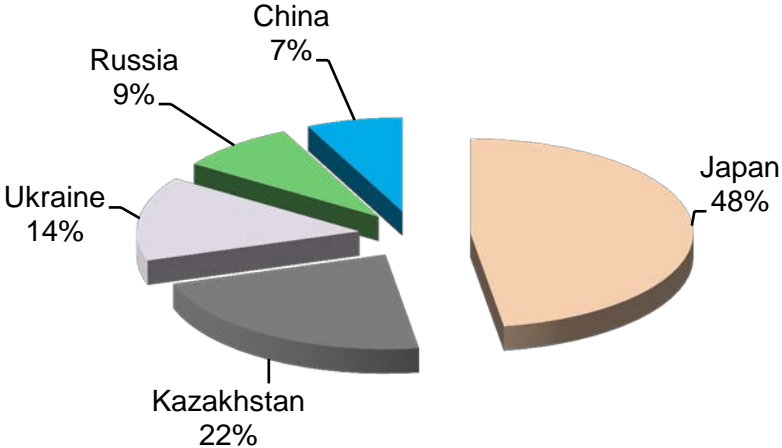
China, Japan and Russia account for almost 80% of world supply

Output in China continues to grow in 2013; unlike that in Japan and Russia



Exports of sponge – 65kt in 2012 – 40% to the USA

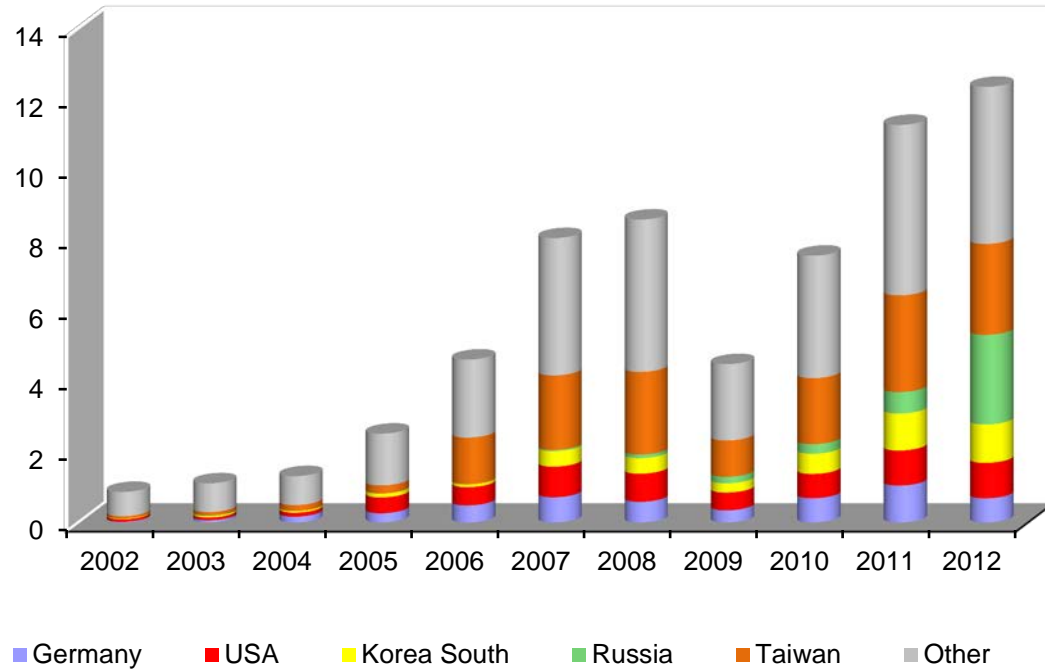
Japan overtook Kazakhstan as the largest exporter of sponge in 2010; melting started in Kazakhstan in 2010



There are important differences in the grades of sponge produced

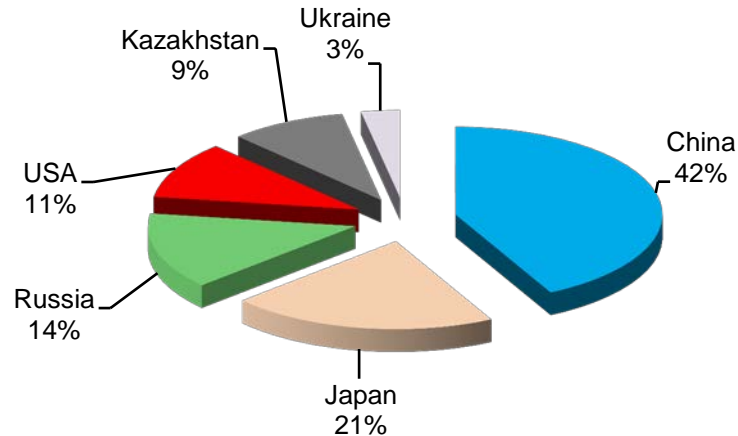
- ❑ Most of China's output is of industrial or standard grade sponge for the domestic market; in Japan, Russia and Kazakhstan it is largely aerospace grade ultimately for export.
- ❑ There is far greater use of titanium in chemical and petrochemical plant in China than elsewhere – looking at the long term?
- ❑ Exports of sponge from China are small, but a growing amount is being converted to mill products for export: to 70 countries in 2012.
 - Taiwan, Russia, South Korea and the USA were the main destinations for Chinese exports of titanium mill products
 - Unit value is relatively low indicating industrial and consumer grade products

Chinese exports of titanium mill products (kt)



Global capacity for titanium sponge production

- Capacity of 330ktpy is greatly surplus to demand – more than 40% is for industrial grades in China
- Capacity of ≈ 130 ktpy for aerospace grade sponge, mainly in Japan, Russia, the USA and Kazakhstan, is more than adequate to meet current demand.



Companies producing titanium sponge

Locations of sponge producers:

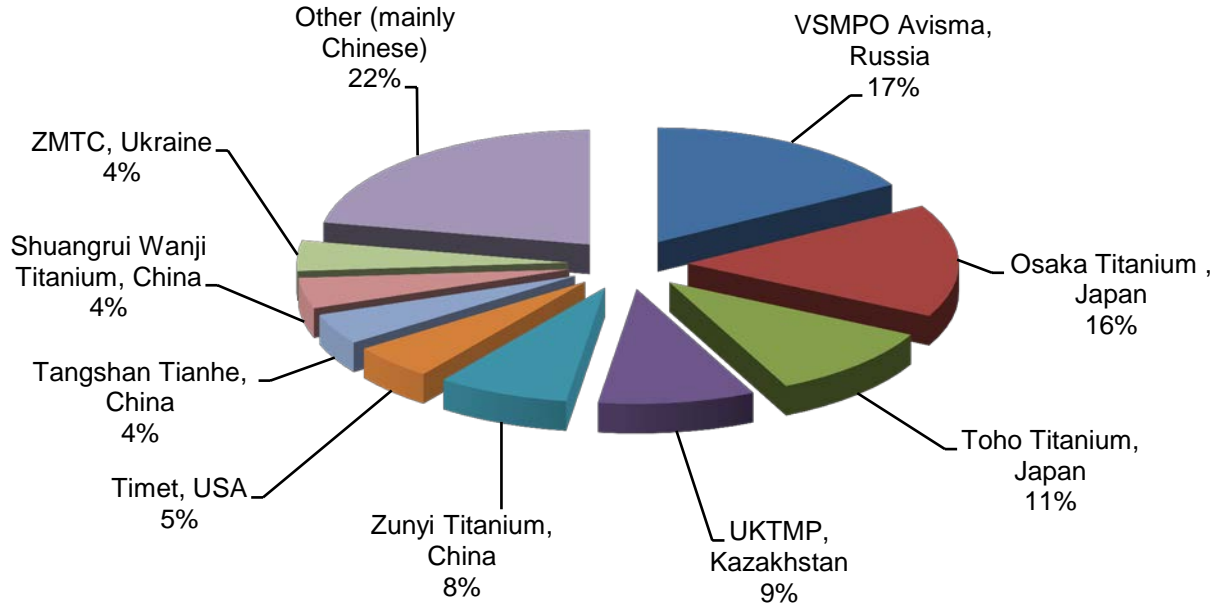


23 companies with capacity to produce titanium sponge:

- 3 in the USA
- 14 in China
- 2 in Japan
- 2 in Russia
- 1 in Kazakhstan
- 1 in Ukraine

9 of these companies melt some or all of the sponge they produce – the remainder are merchant suppliers, mainly in China

Production of titanium sponge by company in 2012



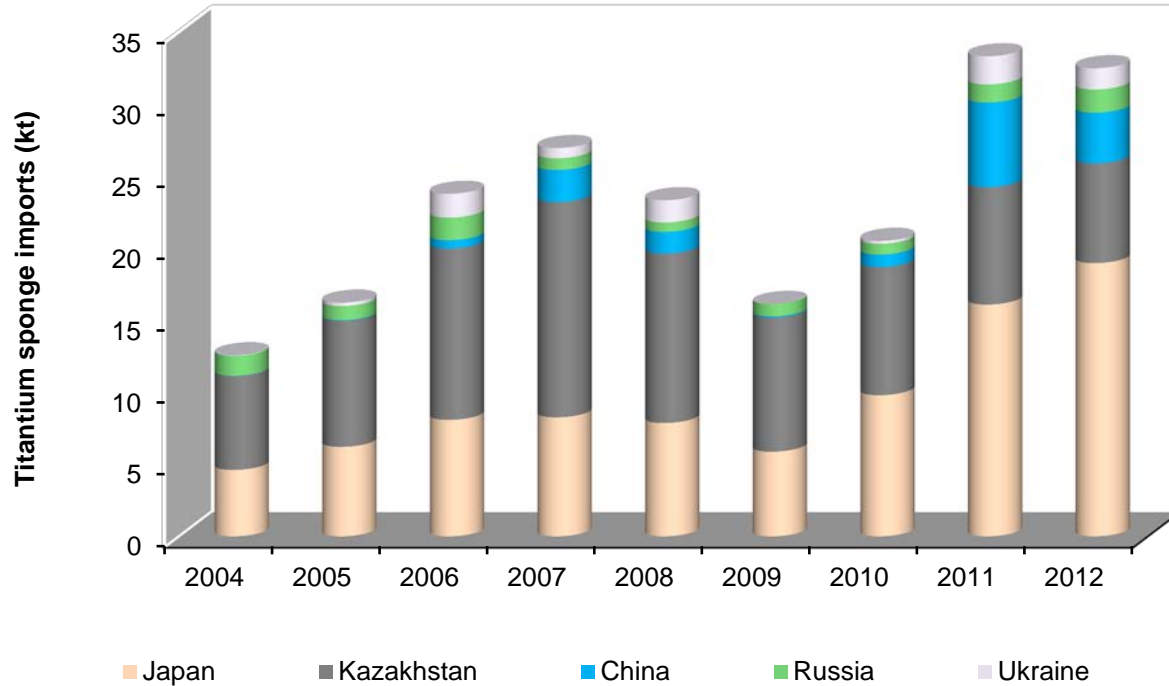
USA: mainly aerospace grade for domestic market

- ❑ Titanium Metals Corporation (Timet):
 - 12.6ktpy at Henderson, Nevada; aerospace grade
 - estimated 2012 output at capacity for own use

- ❑ Allegheny Technologies (ATI):
 - 10ktpy at Albany, Oregon; standard grade
 - 11ktpy at Rowley, Utah; aerospace licensing in 2014?
 - 2012 output about 7kt for own use

- ❑ Honeywell Electronic Materials:
 - 300tpy at Salt Lake City, Utah; high purity electronic grade

USA: 34ktpy capacity but most requirements are imported



China: 147ktpy capacity – most used domestically in industry

- ❑ Zunyi Titanium:
 - 24ktpy at Zunyi City, Guizhou; to increase to 34ktpy by 2015; 18.9kt in 2012 largely for domestic market; some aerospace grade (Grade #0)
- ❑ Tangshan Tianhe Titanium :
 - 15ktpy at Tangshan, Xingang ; 10.5kt produced in 2012; for export and domestic markets
- ❑ Shuangrui Wanji Titanium:
 - 11ktpy in Henan Province; 10.4kt produced in 2012 for domestic market
- ❑ Pangang and Jinchuan Groups
 - 15ktpy of new capacity each in 2012; includes aerospace grade
- ❑ Other Chinese producers
 - 67ktpy at nine companies

Japan: 68ktpy capacity – aerospace and industrial– half for export

❑ Osaka Titanium technologies:

- 40ktpy at Amagasaki; 8ktpy added in 2011
- ≈30% exported mainly for aerospace applications; remainder melted in-house or by Kobe Steel
- ≈ 38kt produced in 2012; output rate cut in early 2013

❑ Toho Titanium:

- 16ktpy at Chigasaki
- 12ktpy opened at Wakamatsu, Kitakyushu in April 2010
- for domestic industrial markets and for export
- ≈ 25kt produced in 2012; output rate cut in 2013

Russia: Aerospace grades - local processing and export

□ VSMPO Avisma:

- 44ktpy at Berezniki, Perm Krai; 6ktpy added in 2011
- 80%-90% melted in-house to aerospace and industrial products mainly for export
- estimated 42kt produced in 2012

□ Solikamsk Magnesium:

- 2.5ktpy at Solikamsk, Perm Krai; opened 2009
- ultimate design capacity is 5ktpy
- 1.9kt produced in 2012; 44% for export

Kazakhstan: Domestic melting will reduce sponge exports

□ Ust-Kamenogorsk Titanium and Magnesium Plant

- 45% owned by Specialty Metals of Belgium
- practical capacity of 30ktpy at Ust-Kamenogorsk City; production 22kt in 2012
- melting started in 2010; export of ingot mainly to South Korea
- remainder exported to USA, EU & Japan
- plans to melt up to 16ktpy locally
- JV with Posco of South Korea started producing slab at Ust-Kamenogorsk in 2013 (6ktpy)
- JV with Aubert & Duval producing mill products in France

Ukraine: Standard sponge being produced mainly for export

□ Zaporozhye Titanium & Magnesium Combine

- 12ktpy standard grade at Zaporozhye City
- acquired by Group DF
- 10.3kt produced in 2012 – exported mainly to Russia, USA and EU
- small volume of local melting
- new 20ktpy plant in two phases planned by Group DF

Expansions and new developments

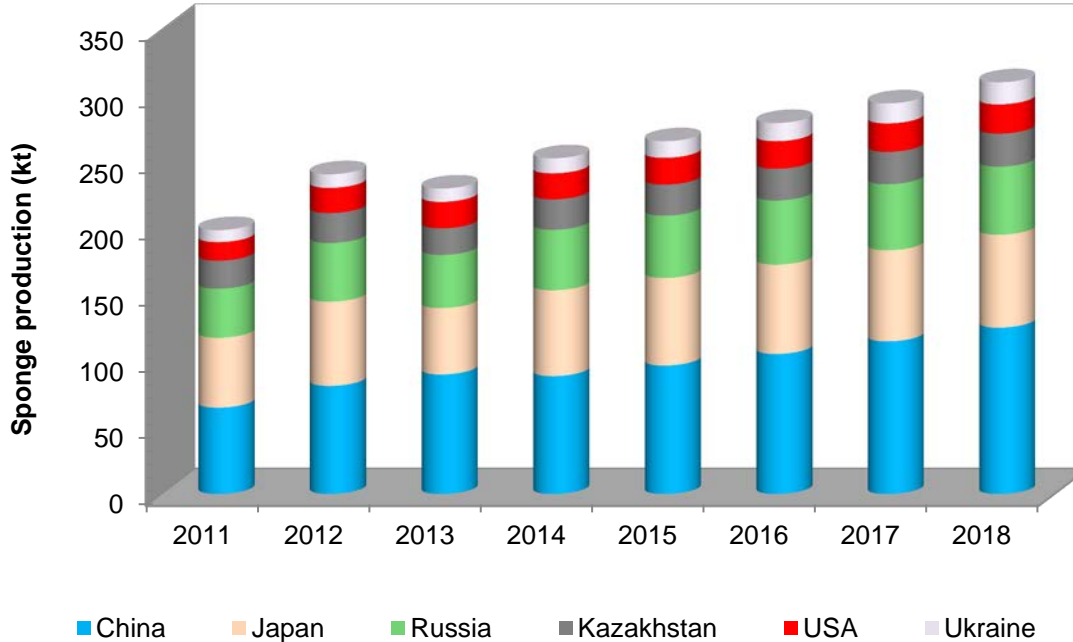
Global output forecast to reach 310kt by 2018

- ❑ Despite a global surplus, capacity continues to grow in China
 - Pangang, Jinchuan, Gansu Lixing Titanium and Yunnan Xinli together commissioned some 50ktpy of new capacity in 2012 and 2013; including some aerospace grade
 - Plans by Chaoyang Jinda Titanium, Chalco Fushun Aluminium, Shuangrui Wanji, Yunnan Copper Group and Zunyi Titanium amount to a further 50ktpy by 2015
- ❑ In Ukraine, Group DF plans 20ktpy including aerospace grade – no timetable announced
- ❑ In India, Kerala State Industrial Development Corp plans 10ktpy

Outlook to 2018

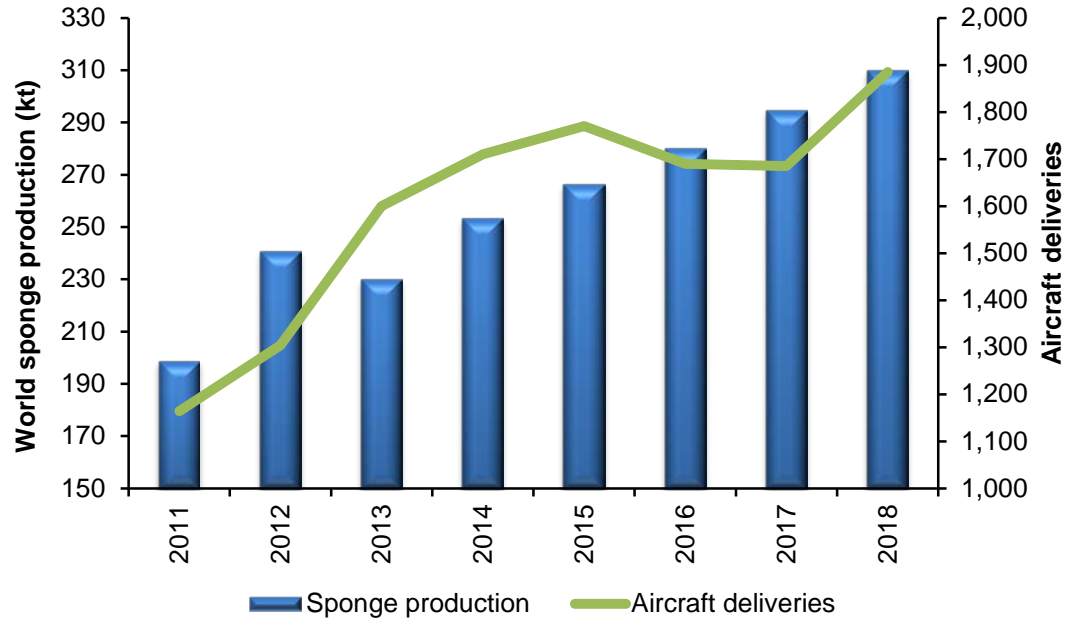
Global output to reach 310kt by 2018; aerospace grade \approx 100kt

Less volatility than in the past? Growth rate of 4-5%py



Comparison of forecasts: sponge production/aircraft deliveries

With growth of industrial markets the link has become tenuous



New Roskill Report now out:

Titanium Metal: Market Outlook to 2018

Roskill Information Services Ltd.

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Thank you for your attention!