Feedstock pressure on the titanium sponge market
About TZMI

TZMI is a global, independent consulting and publishing company with offices in Australia, the US, Europe, Africa and China. The strength of TZMI's consulting services stems from extensive practical experience in the mineral sands, titanium dioxide and coatings industries and from a comprehensive database, which has been built up over many years.

TZMI has proven expertise gained from our consultants having many years of direct operating experience in the industry in chief executive, senior operational, analytical and marketing roles.

TZMI's publications and data services support the consulting activities and ensure up-to-date, high quality and comprehensive data, analysis and information across the mineral sands, zircon and TiO₂ pigment industries.

### Associated Companies

**Allied Mineral Laboratories**

Resource assessment and flowsheet development for mineral sands, iron or other heavy mineral deposits.

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**TZMI provides operational and technical expert advice on many areas including:**

- Mergers and acquisitions
- Market assessments and industry analysis
- Due diligence
- Pre-feasibility studies incl. preliminary capital and operating cost estimation
- Competitive cost analysis and benchmarking
- Technical reviews and audits
- Resource assessments
- Physical separation test work
- Flowsheet development
- Customised data analysis and reporting
World’s known TiO₂ resources
New feedstock project activity

Reversal in industry activity from 2011

'000 TiO₂ units & '000 tonnes zircon

Number of companies

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Production of mineral by type in 2012

High TiO₂ content mineral is generally used to make titanium sponge.

- Sulfate ilmenite: 35%
- Chloride ilmenite/leucoxene: 9%
- Sulfate slag: 11%
- Chloride fines: 2%
- Chloride slag: 19%
- Synthetic rutile: 8%
- UGS: 5%
- Rutile: 11%
Forecast supply 2013

- Cristal
- Sierra Rutile
- Tronox
- CRL
- Ostchem
- Rio Tinto
- China various
- IRE
- Iluka

Sierra Rutile dredge

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Rutile supply by country

- Sierra Leone: 90, 111, 152 '000 tonnes
- South Africa: 131, 75, 111 '000 tonnes
- China: 29, 27, 27 '000 tonnes
- India: 29, 39, 39 '000 tonnes
- Ukraine: 48, 46, 43 '000 tonnes
- Australia: 380, 273, 314 '000 tonnes
- Others: 10, 25, 86 '000 tonnes

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Global titanium feedstock supply/demand balance

Short-term market surplus anticipated

Timing for new (un-approved) project starts

'000 TiO₂ units


- 10,000  9,000  8,000  7,000  6,000  5,000  4,000  3,000  2,000  1,000

New projects
Supply
Demand - base case
Demand - upside

Short term surplus

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Total titanium feedstock demand

- Static demand for feedstocks in 2013 compared to 2012
- TZMI is forecasting a significant step up in offtake in 2014
Sponge production in 2012

- US: 5%
- Russia: 20%
- Japan: 25%
- Kazakhstan: 10%
- Ukraine: 4%
- China: 36%

Does not include a small pilot plant in India
TiCl₄ production costs

[Bar chart showing production costs for CIS, US, China, Japan, and average, with categories: Other, Utilities, Labour, Chlorine, CPC, and Feedstock.]

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TiCl₄ prices in China
Take home messages

- TiCl₄ is the largest cost in the manufacture of sponge and feedstock is the large contributor to TiCl₄ cost.

- The weighted average cost of feedstock per tonne of TiCl₄ increased by 13% in 2012. But some sponge producers may have been caught by new contracts kicking in.

- The cash cost of producing TiCl₄ varies widely between producers.

- TZMI believes we have seen a 20 year peak in rutile costs to sponge producers.
If you squeeze hard enough ......
Have you got your reference material yet?

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