History, Capacity and Innovation

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TOHO TITANIUM CO., LTD.

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Disclaimers

Information in this material includes not only facts that have occurred, but also estimates and projections that represent our assumptions based on available information as of the date this material was prepared. Hence please note that actual figures and results may differ from our estimates and projections described in this material.
Toho’s Vision and Aspiration

To raise the status of titanium metal toward a major from a minor by making it more widely used metal.
Current Plant Sites and Products

- **Wakamatsu Plant**
  - Titanium Sponge

- **Yahata Plant**
  - Titanium Ingot (EB)

- **Kurobe Plant**
  - Catalyst

- **Hitachi Plant**
  - Titanium Ingot (EB)

- **Headquarters**
  - **Chigasaki Plant**
    - Titanium Sponge, Ingot (VAR), Fabricated Products, Catalyst, Ultra Fine Nickel Powder, High Purity Titanium Dioxide and Others
Sales Revenue by product

- Titanium Sponge: 25%
- Titanium Ingot: 40%
- Others: 35%
History

Titanium Sponge

1953 Toho Titanium was established
1954 Ti Sponge production started in Chigasaki
History

Titanium Sponge

Capacity Expansion since 1954

Year


tpy

0 5000 10000 15000 20000 25000 30000
Current Capacity

Titanium Sponge

Wakamatsu Plant: 12,000tpy

Chigasaki Plant: 13,200tpy

Total: 25,200tpy

Dual Production Sites = Less risk of supply interruption
# Productivity Improvement

**Titanium Sponge**

<table>
<thead>
<tr>
<th></th>
<th>Wakamatsu</th>
<th>Chigasaki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>141</td>
<td></td>
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<tr>
<td>Production per Electrolysis cell</td>
<td>188</td>
<td>100 (Index)</td>
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<tr>
<td>Electricity Consumption</td>
<td>102</td>
<td></td>
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<tr>
<td>Product Yield</td>
<td>104</td>
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History

Titanium Ingot

1960 Ti Ingot production started
1985 World Biggest Ti Ingot at the time

15mt
History

Titanium Ingot

1998  EB furnace operation started  **First in Japan**
2008  New EB furnace operation started

**World Biggest Ingot now**

- 9mt
- 25mt
History
Titanium Ingot

Capacity Expansion since 1960

Year

Capacity (tpy)

Table 5.1: Capacity Expansion since 1960

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (tpy)</th>
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<tbody>
<tr>
<td>1960</td>
<td>0</td>
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<tr>
<td>1963</td>
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<td>1966</td>
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<td>2008</td>
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<td>2011</td>
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Current Capacity

Titanium Ingot

Total: 19,000tpy

Yahata EB Plant 10,000tpy

Hitachi EB Plant
2,500tpy

Chigasaki VAR Plant
6,500tpy
Scrap Recycling

2008 Large Size Scrap Recycle started

Toho is the first melter in Japan who melted large size scraps.

Dissolved perfectly in the long hearth of TOHO 4.8MW-EB furnace
Scrap Recycling

Material Flow in Japan in Y2010

Estimated by Toho

Foreign Market

Unit: kt

Mill Product

Fabricated products

End Use

Ingot produced in Japan

17.3

9.2

4.6

0.5

2.4

Scrap generated in and imported to Japan

7~8

Steel Additive

Scrap Recycling

Imported Sponge

Imported Ingot

0.3

2~3

Sponge produced in Japan

1.3

3.5

1~2

Japan
Scrap Recycling

Material Flow in Japan in the future

Estimated by Toho

Foreign Market

Unit: kt

- Imported Ingot
  - $x$
- Ingot produced in Japan
  - $37 - x$
- Mill Product
  - 30
- Fabricated products
- End Use
- Scrap generated in and imported to Japan
  - 14~15
- Scrap utilization ratio in Japan is expected to increase.

Scrap Recycling

Sponge produced in Japan

Imported Sponge

Steel Additive

Scrap

2~3

7

3~4

20

0.5

4

8
Direct Sales Channel

2009 Overseas Sales Offices were established

Toho Titanium Europe
London, UK

Toho Titanium America
Houston, USA

Better service
Closer communication
Quicker response
Next Capacity Expansion
Titanium Sponge

Wakamatsu Plant: 12,000tpy (now)
Under construction for expansion
3,600tpy

Toho’s Sponge Capacity
(by Apr. 2012)

Total 28,800tpy
Chigasaki 13,200tpy
Wakamatsu 15,600tpy
Next Capacity Expansion
Titanium Ingot

Yahata EB Plant  10,000tpy(now)

Building 2nd EB furnace  10,000tpy

Toho’s Ingot Capacity  
(by middle of 2013)

Total  29,000tpy
Chigasaki  6,500tpy
Hitachi  2,500tpy
Yahata  20,000tpy
Innovation

Direct-Cast Titanium Slab, “DC Slab™”

- Jointly developed with Nippon Steel
- Produced through EB melting process
- Control surface properties and internal structure
- High dimensional accuracy
Innovation
Direct-Cast Titanium Slab, “DC Slab™”
Innovation

Direct-Cast Titanium Slab, “DC Slab™”

- No need for ingot breakdown forging
  → Shorten manufacturing time
  → Reduce intermediate inventory
  → Reduce scrap generation
Other Products

1965 Polyolefin Catalyst production started
1986 High Efficiency Catalyst production started

◇ Reduction technology and TiCl$_4$ are used for Catalyst production.
Other Products

1970 High Purity TiO₂ production started
1999 Ultra Fine Nickel Powder production started
Other Products

1971 Ti Fabrication business started

TOHOTEC, an affiliate company
Road to a Major Metal

Why don’t you join us and work together in order to make titanium more widely used metal and raise its status toward a major metal?

Companies involved in the titanium industry such as feedstock suppliers, sponge producers, master alloy producers, mill product producers, forgers, fabricators, scrap processors, Fe-Ti producers and traders are all welcomed.
Thank you for your attention