Titanium Scrap Trends

Impacts of a Dynamic Market
Topics of discussion:

I. Introduction to the ELG Utica Alloys Group
II. Impact of using scrap
III. Scrap Trends
IV. Impact of OEM’s controlling their Revert
V. Role of Scrap Processors in today’s market
VI. What happens when scrap flows change?
VII. Revert Melting outside of the US (Europe, Japan)
Topic I:  
Introduction to the ELG Utica Alloys Group
ELG Utica is a world leader in state of the art certified processing of Titanium and Superalloys turnings and solids

Full analysis of all elements and trace elements with in-house labs

Controlled and certified mutilation of life limited parts and in-house recovery of precious metals

Global Revert Management Programs.

11 locations in six countries dedicated to processing of Titanium and Superalloys and On-Site-Service. Another 34 facilities of the ELG Group in the US; Europe and Asia are utilized for service and logistics solutions
“Combining ELG Utica Alloys processing facilities with ELG Group sites and offices ensures local presence, global collection and worldwide service – for a better recycling loop”
Mission

Providing processing and trading of Titanium and Superalloys as well as scrap related services

Service Approach

Global Reach
Global Scrap collection and processing network

Technology
Cost & Quality Leadership through constant development of processing Technology and experienced commercial Team
Topic II:
Impact of using Scrap
Energy Savings and minimalizing the environmental impact

Using solely Scrap as the primary source of raw materials for the production of Titanium ingots will reduce the energy consumption and the related CO² emissions by 95.4%
Types of Scrap and their Impact

- Bulk-Weldable
- Feedstock
- Turnings
Topic III:
Scrap Trends
Raw Material Value Trends

Sources:
1. Ti64 BW, Ti64 Chip, CP2 Clip – metalprices.com
2. Sponge, Fe-Ti Scrap - USGS
Major Factors in Scrap Availability

- Buy-To-Fly of parts to scrap.
- Scrap Consumption Ratio (incorporation rate)
- Fe-Ti or Steel Grade Percentage of Scrap Generated

Assuming 8:1 By-To-Fly, 40% Fe-Ti Rate, and 56% Scrap Consumption

<table>
<thead>
<tr>
<th>Ingot</th>
<th>Buy to Fly</th>
<th>Scrap</th>
<th>Fe-Ti Ratio</th>
<th>Vacuum Ratio</th>
<th>Incorporation</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>61,800</td>
<td>0.875</td>
<td>54,075</td>
<td>21,630</td>
<td>32,445</td>
<td>34,608</td>
<td>(2,163)</td>
</tr>
</tbody>
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Assuming 8:1 By-To-Fly, 40% Fe-Ti Rate, and 50% Scrap Consumption

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Topic IV:
Impact of OEM’s controlling their Revert
Topic V:
Role of scrap processors in today’s market
Most of the melting capacity for Titanium scrap is concentrated in the North America (largest capacity worldwide) with new projects in Europe, Japan and China.....

Scrap has to sourced globally but supplied locally – Sophisticated logistic solutions are needed to secure scrap volumes generated emerging manufacturing clusters.

Nicholas D. Corby, Titanium Product Manager

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Topic VI:
What happens when scrap flows change?
Scrap consumption and the use of sponge behave contrary.
Scrap Flows

Scrap Exports to the USA

- United Kingdom
- Japan
- Germany
- France
- Korea, Republic of

2002-2015

Avg 2011-15
Topic VII:
Revert melting out of the US (Europe, Japan)
• France – a joint venture between Aubert & Duval, UKAD, ADEME (Energy), CACF (Finance) will begin qualification in 2017, with Industrial Production beginning in 2018.

• Japan – a joint venture between Nippon Steel and Sumitomo Metal Corporation (NSSMC) recently signed supply agreement with SAFRAN.

• Russia – increasing scrap generation due to partnerships with OEM’s delivering finished and semi-finished parts. Utilization of Skull Furnaces will enable VSMPO to recycle domestic scrap that was previously available.
Summary:

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Thank you for your attention!