TITANIUM EUROPE 2016

Keynote Speaker
OUR JOURNEY

SAFRAN AT A GLANCE

OUTLOOK

MARKET

SUPPLIERS

STRATEGY
SAFRAN AT A GLANCE
KEY FIGURES

Revenue breakdown, as of December 31, 2015

Revenue:
17.4 billion euros

Over 70,000 employees in more than 60 countries

Recurring operating income:
2.4 billion euros

Net income - Group share:
1.5 billion euros

Revenue: 17.4 billion euros

Over 70,000 employees in more than 60 countries

Recurring operating income: 2.4 billion euros

Net income - Group share: 1.5 billion euros

Aircraft Equipment 28%
Aerospace Propulsion 54%
Defense 7%
Security 11%

Public 70.9%
French State 15.4%
Treasury shares 0.1%
Employees 13.6%
PROPULSION: THE BROADEST POWER RANGE

(1) PowerJet is a 50/50 joint company of Snecma and NPO Saturn (Russia)
(2) CFM International is a 50/50 joint company of Snecma and GE (USA)
(3) EPI is a consortium with Snecma, Rolls-Royce, ITP, MTU Aero Engines
(4) In collaboration with GE (USA)
(5) Collaboration through the Engine Alliance (Snecma 10%, Techspace Aero 7.5%)
(6) In collaboration with GE (Snecma 23.7%)
(7) Europropulsion is a 50/50 joint company of Safran and Avio (Italy)
TITANIUM OUTLOOK
MAIN APPLICATIONS

Aircraft Engines

B737

Superjet 100

A320

C919

A400M

Rafale

Thierry Viguier, Purchasing Director of Materials

April 18-20, 2016 • Paris Marriott Rive Gauche Hotel & Conf. Center • Paris, France
MAIN APPLICATIONS

S A F R A N
AEROSPACE • DEFENCE • SECURITY

Nacelles

A320

C919

A380

Falcon 5X

B777X

Superjet 100
MAIN APPLICATIONS

Landing Systems

A350

B737

A380

B787

A400M

Rafale
MAIN APPLICATIONS

Helicopter Engines

Airbus H145
Airbus H160
NH90
Bell 505 Jet Ranger X
HAL Dhruv
Tiger
COMPREHENSIVE OUTLOOK

VOLUME PER APPLICATION
(tons)

- Nacelles & Helicopter Engines
- Landing Systems
- Aero Booster
- Aircraft Engines

Casting and Additive Manufacturing
- Disk Quality
- Premium Quality
- Standard

Thierry Viguier, Purchasing Director of Materials

April 18-20, 2016 • Paris Marriott Rive Gauche Hotel & Conf. Center • Paris, France
TITANIUM'S OUTLOOK KEY ELEMENTS

Rank one of materials spending

CAGR 2015-2020: 14%

6,600 t in 2015
TITANIUM MARKET
ORE TiO₂ - VALUE CHAIN -

Historically supply increased by ~ 3% and current ore reserves are abundant

Production by country of ilmenite and rutile

<table>
<thead>
<tr>
<th>Country</th>
<th>Kt TiO₂</th>
<th>Years after 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Countries</td>
<td>74 400</td>
<td>175</td>
</tr>
<tr>
<td>Madagascar</td>
<td>40 000</td>
<td>140</td>
</tr>
<tr>
<td>USA</td>
<td>2 000</td>
<td>60</td>
</tr>
<tr>
<td>Norway</td>
<td>37 000</td>
<td>140</td>
</tr>
<tr>
<td>Ukraine</td>
<td>8 400</td>
<td>90</td>
</tr>
<tr>
<td>Mozambique</td>
<td>14 510</td>
<td>100</td>
</tr>
<tr>
<td>Vietnam*</td>
<td>1 600</td>
<td>36</td>
</tr>
<tr>
<td>China</td>
<td>29%</td>
<td>200 000</td>
</tr>
<tr>
<td>India</td>
<td>13%</td>
<td>92 400</td>
</tr>
<tr>
<td>Canada</td>
<td>4%</td>
<td>31 000</td>
</tr>
<tr>
<td>South Africa</td>
<td>10%</td>
<td>71 300</td>
</tr>
<tr>
<td>Australia</td>
<td>17%</td>
<td>187 000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>~700 000</td>
<td>~140</td>
</tr>
</tbody>
</table>

Thierry Viguier, Purchasing Director of Materials

April 18-20, 2016 • Paris Marriott Rive Gauche Hotel & Conf. Center • Paris, France
ORE TiO₂ - PRICE FORECASTS -

Prices are expected to remain stable in the future and find equivalent levels of 2010-2011 (before inflation spectacular that was known in 2012)
SPONGE - VALUE CHAIN -

In 2020, aeronautical qualified sponge capacity will be just enough to cover the demand.

It is necessary that new aeronautical capabilities are developed.

Sponge request at 2025

<table>
<thead>
<tr>
<th>Year</th>
<th>Other Qualified Sponge</th>
<th>Aeronautical Qualified Sponge</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>215 Kt</td>
<td>67%</td>
</tr>
<tr>
<td>2020</td>
<td>288 Kt</td>
<td>60%</td>
</tr>
<tr>
<td>2025</td>
<td>354 Kt</td>
<td>60%</td>
</tr>
</tbody>
</table>

2020 usage rates: 75-80%

Necessary production capacity at 2025

<table>
<thead>
<tr>
<th>Year</th>
<th>Needed Additional Capacity</th>
<th>Required Production Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td></td>
<td>350-400 Kt</td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td>430-490 Kt</td>
</tr>
<tr>
<td>2025</td>
<td>47%</td>
<td>560-620 Kt</td>
</tr>
</tbody>
</table>

Thierry Viguier, Purchasing Director of Materials

April 18-20, 2016 • Paris Marriott Rive Gauche Hotel & Conf. Center • Paris, France
SPONGE - PRICE FORECASTS -

Only the rising costs of energy and labor could explain a small variation in price of sponge in the medium term.
VANADIUM - VALUE CHAIN -

The vanadium market could overtake the offer in 2021 ... the offer is not following.

- **Growth of the steel industry and intensity of the vanadium in steel**: 4.8% CAGR
- **Aerospace**: 10-15% of global vanadium demand in 2016
- **Automotive**: Increased use of High-strength Steels and Advanced High-strength
- **Batteries**: Lithium-vanadium-phosphate solution; 70% growth between 2009 and 2014

---

**Future vanadium use (Kt)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Batteries</th>
<th>Catalyst</th>
<th>Titanium</th>
<th>Steel Alloy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>5%</td>
<td>4%</td>
<td>1%</td>
<td>90%</td>
</tr>
<tr>
<td>2025</td>
<td>75%</td>
<td></td>
<td></td>
<td>152%</td>
</tr>
</tbody>
</table>

Thierry Viguier, Purchasing Director of Materials

April 18-20, 2016 • Paris Marriott Rive Gauche Hotel & Conf. Center • Paris, France
TITANIUM SCRAP SUPPLY
A long-term market with overcapacity

Scrap supply vs needs
Kt of scrap

maximum load of scrap in a furnace
Minimum load of scrap in a furnace

<table>
<thead>
<tr>
<th>Technology</th>
<th>2013</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAR</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>EB/PAM/Skull</td>
<td>30-40%</td>
<td>50-70%</td>
<td>60-80%</td>
</tr>
<tr>
<td>Ferrotitane</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Thierry Viguier, Purchasing Director of Materials
April 18-20, 2016 • Paris Marriott Rive Gauche Hotel & Conf. Center • Paris, France
MELTING CAPACITY

Production capacity should increase by more than 80 kt between 2013 - 2020

Development of capacity 2013-2020

kt/year

+2%

~530

~450

Skull

PAM

EB

Unused VAR²

VAR

2013

2020

capacity installed | Actual 2014 | Future 2020

VAR | 141 | 167

EB | 14 | 18

PAM | 6 | 8

SKULL | 3 | 5

Thierry Viguier, Purchasing Director of Materials
TITANIUM DEMAND GROWTH

The titanium demand is expected to grow by 4.5% / year, representing an additional need of 85 kt of bars & billets, driven mainly by the civil aviation of the aeronautical business.
**TITANIUM'S MARKET KEY ELEMENTS**

**Panel**
A large panel of worldwide suppliers - US, EU & Asia - with different levels of capability

**Costs**
Projected change in production costs:
- essentially driven by the increase of input costs.
- largely compensated by management of scrap and load

**Market**
An unbalanced market, with overcapacity until 2025 ...
Programs to increase capacity if necessary and this at all stages of the value chain.

**Growth**
A projected demand growth of around 4 to 5% per year between 2013 - 2025 driven by Aerospace with the ramp up of A350 and B787 programs.
TITANIUM SUPPLIERS
GLOBAL DEMAND: FORGING, CASTING & MACHINING

More than 150 potential Safran subcontractors worldwide for titanium alloys
SCORE CARDS

General Criteria

Best in Class only

OTD

ppm

Quality system

Services

Technical Criteria

Raw material management

Means & automation

Quality capability (Std, PQ, DQ, …)

Innovation

Competitiveness

Investment

Cost Structure

Pricing Policy

Price competitiveness

Supply Chain

Capacity installed

Reactivity to changes

Worldwide supply

Scrap management
SAFRAN PANEL

**What should the Supplier bring to Safran?**

Best in class on general criteria
- OTD
- ppm

Accept Long Term Agreement

Continuous cost improvement

Optimizes use of scraps

Price competitiveness

Delivers all over the world
- Good relationship with all forgers

Secures its supply chain
- Sponge
- Vanadium
- Scrap

**What does Safran bring to Suppliers?**

Standardizes demands
- Specification,
- Format,
- Size, …

Globalizes Safran demands
- Safran Aircraft engines
- Safran Helicopter engines
- Safran Landing Systems
- Safran Nacelles

Provides reliable forecast
- 4 years of backlog
- More than 13,000 CFM56/LEAP engines total orders & commitments

Opening to challengers
/05/ TITANIUM STRATEGY
SAFRAN PROCUREMENT STRATEGY

**Safran outlook**
- CAGR 2015-2020: 14%
- 13,000 t in 2020
- Several qualities & type of format

**Market**
- market with overcapacity,
  low and stable raw material costs,
  driven by aerospace - Safran 13% -

**Target Suppliers**
- Best in class & Competitive,
  able to provide several qualities
  with secured supply chain

**Current situation**
- 2015 volume was 6,600 t,
  Several LTA’s with Safran Affiliates,
  Non centralized scrap management

**Safran strategy on going**
- Standardize and globalize demands,
- Selection from Best in Class suppliers ,
- Competitive bidding and opening to challengers,
- Globalization and centralization of scrap management,
- Safran LTA from “Right to Buy” to “Directed Buy”

Thierry Viguier, Purchasing Director of Materials
April 18-20, 2016 • Paris Marriott Rive Gauche Hotel & Conf. Center • Paris, France
Q & A