

HSS-Forum -Smart Solutions for the Future of Metal Cutting- Aachen January 20th-21th, 2009



Titanium Market Trends

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Essen

ThyssenKrupp Corporate Structure

ThyssenKrupp AG

Sales **€53.4 bn** • EBT **€3.13 bn** • EBITDA **€5.0 bn** • Employees **199,374**
 all figures 2007/2008 (consolidated)

Steel

Sales **€14.4 bn**
 EBT **€1,540 m**
 Employees **41,311**



**ThyssenKrupp
 Steel AG**
 Duisburg

Stainless

Sales **€7.4 bn**
 EBT **€126 m**
 Employees **12,212**



**ThyssenKrupp
 Stainless AG**
 Duisburg

Technologies

Sales **€12.4 bn**
 EBT **€741 m**
 Employees **54,043**



**ThyssenKrupp
 Technologies AG**
 Essen

Elevator

Sales **€4.9 bn**
 EBT **€434 m**
 Employees **42,992**



**ThyssenKrupp
 Elevator AG**
 Düsseldorf

Services

Sales **€17.3 bn**
 EBT **€750 m**
 Employees **46,486**



**ThyssenKrupp
 Services AG**
 Düsseldorf

Steel

Industrial Goods

Services

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ThyssenKrupp Titanium



ThyssenKrupp

Business Fields of ThyssenKrupp Stainless Group

ThyssenKrupp Stainless

Sales €7.4 billion • EBT €126 million • Free cash flow €195 million • Employees 12,212

| Business Field | Stainless Steel | Stainless Steel Titanium Processing | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel | Nickel Alloys |
|--|-----------------------------------|---|-------------------------------------|----------------------------------|--|---|--|
| Company | ThyssenKrupp Nirosta (Germany) | ThyssenKrupp Acciai Speciali Terni (Italy) | ThyssenKrupp Stainless USA (USA) | ThyssenKrupp Mexinox (Mexico) | Shanghai Krupp Stainless (VR China) | ThyssenKrupp Stainless International (Germany) | ThyssenKrupp VDM (Germany) ThyssenKrupp VDM USA (USA) |
| Sales <small>not consolidated</small> | €3,234 m | €2,689 m | project phase | €591 m | €284 m | €1,187 m | €1,177 m |
| Employees | 4,682 | 3,180 | 154 | 1,361 | 522 | 453 | 1,801 |

FY 2007/08

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ThyssenKrupp Titanium



Locations of ThyssenKrupp Titanium (1)

Essen, Germany



Production and Distribution Sites



ThyssenKrupp Titanium GmbH
 Westendstr. 15, 45143 Essen
 Germany
www.thyssenkrupp-titanium.com

| Employees | Products | Facilities |
|-------------------------------------|--|---|
| <p>161 by 30.09.2008</p> | <p>Titanium Blooms, long products and alloyed plates within TK production facilities In Germany</p> | <p>VAR Melting shop, capacity ≈ 5000 t/y EB Melting shop, capacity ≈ 5000 t/y</p> |



Locations of ThyssenKrupp Titanium (2)

Terni, Italy



ThyssenKrupp Titanium S.p.A.
 Viale B. Brin 218, 05100 Terni
 Italy
www.thyssenkrupp-titanium.com

Production and Distribution Sites



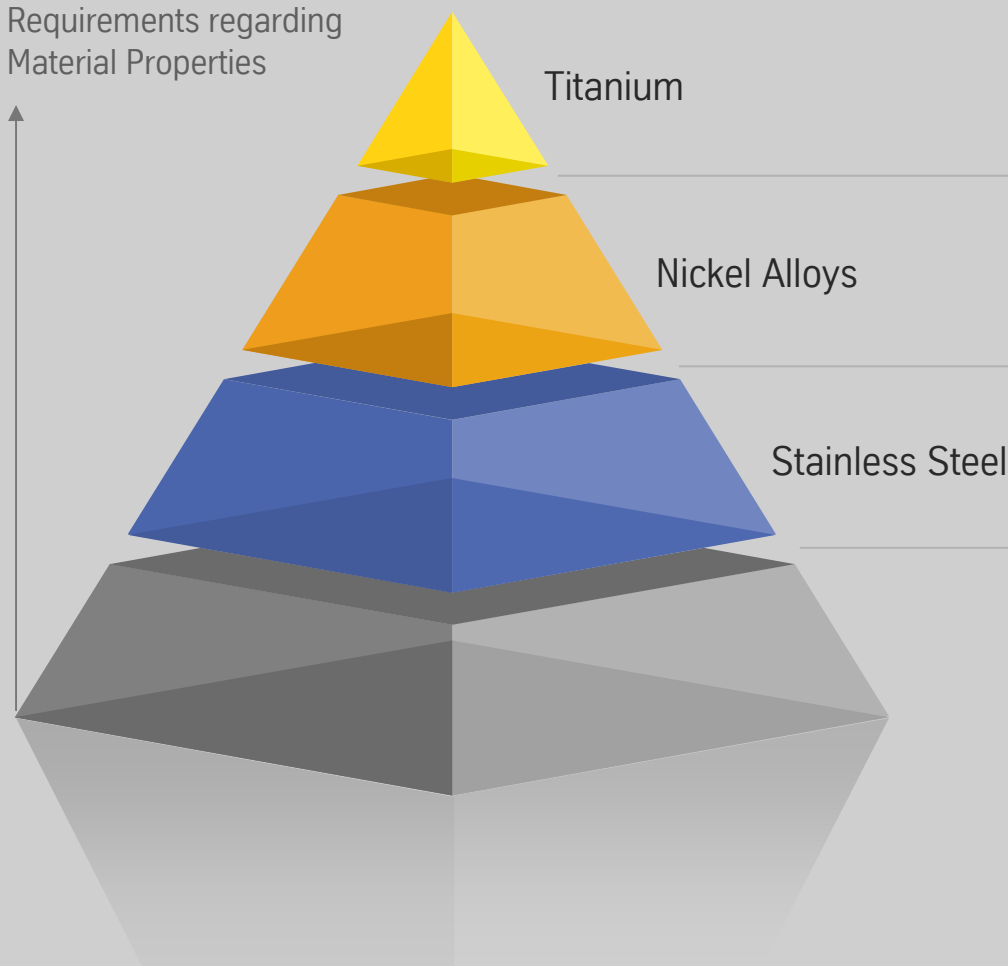
| Employees | Products | Facilities |
|--|---|---|
| <p>125</p> <p>by 30.09.2008</p> | <p>Titanium Slabs, coils, sheet within TK AST-Stainless production facilities</p> | <p>Plate mill for CP plates, capacity ≈ 5000 t/y Tube mill, capacity ≈ 1.000 t/y Skull melting plant: direct casting of ingots + slabs, capacity ≈ 1.000 t/y</p> |



Market Environment

ThyssenKrupp Stainless covers the Top of the High-Demanding Material Pyramid

Requirements regarding
Material Properties

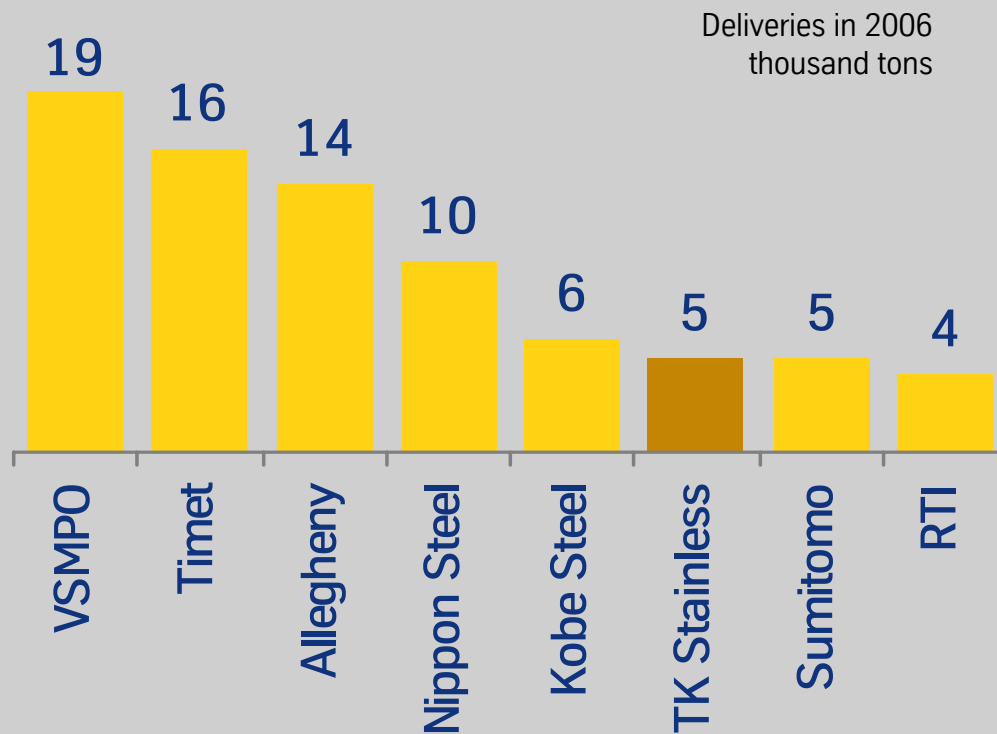


| Demand | Deliveries | Market Share | Market Price |
|---------|------------|--------------|--------------|
| 1,000 t | 1,000 t | | EUR / ton |
| 85 | 5 | 6% | ~50,000 |
| 245 | 33 | 14% | ~30,000 |
| 15,399 | 1,786 | 12% | ~4,000 |

Calendar Year 2007
Source: CRU November 2008; TKL



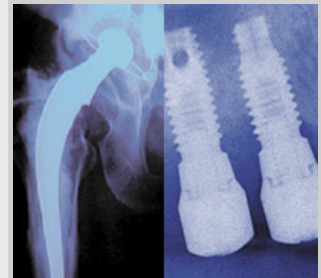
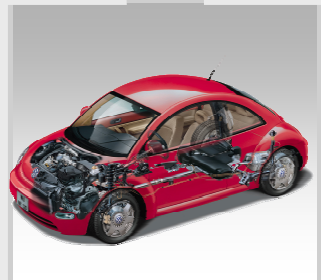
Titanium Semis



The 5 largest producers stand for 67% of all worldwide shipments

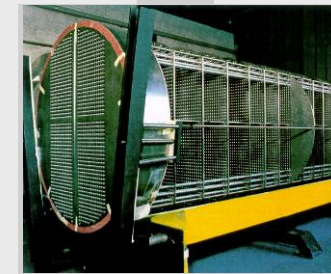
TKL is the only integrated Titanium Producer in Western Europe

Why Titanium?



Titanium and Titanium alloys are materials with exceptional properties:

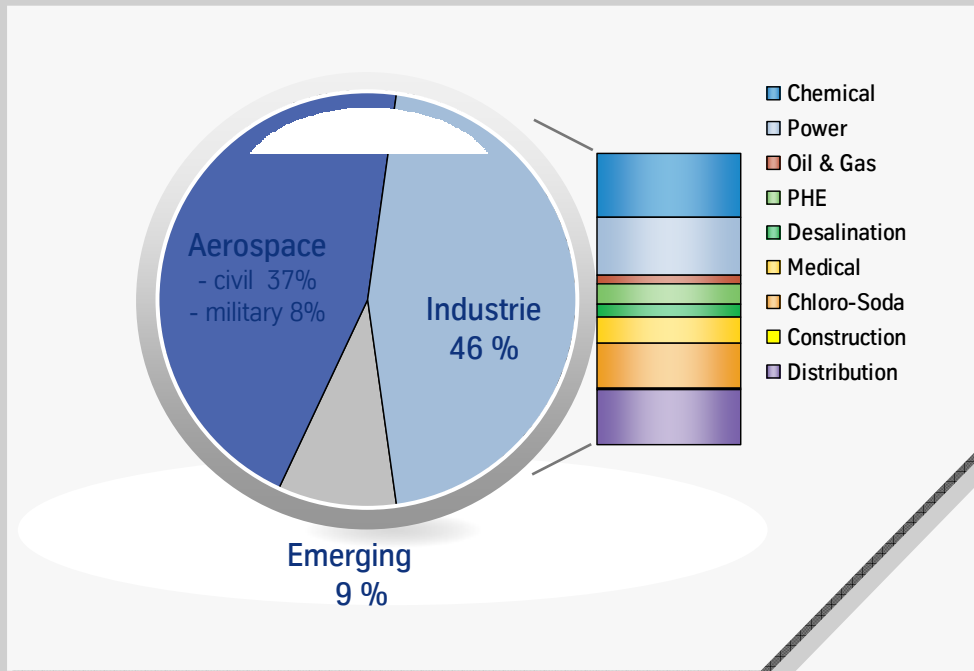
- High strength (500-1500 N/mm²)
- Low density (~4,5 g/mm³)
- Biocompatibility
- High corrosion resistance
- Low modules of elasticity
- Good processing characteristics
- Good decorative properties
- Good image
- High availability



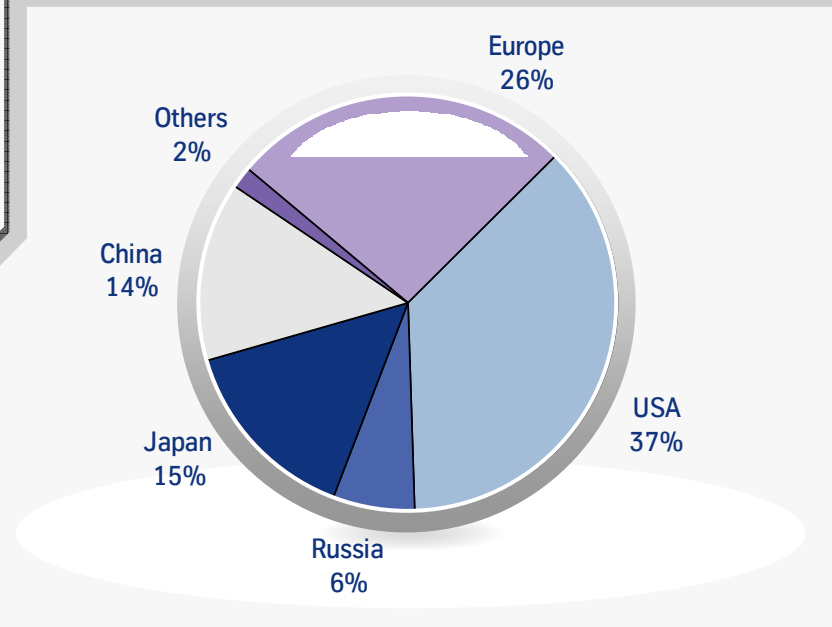
Titanium Market 2007

Total Market is 85.000 t

By Application



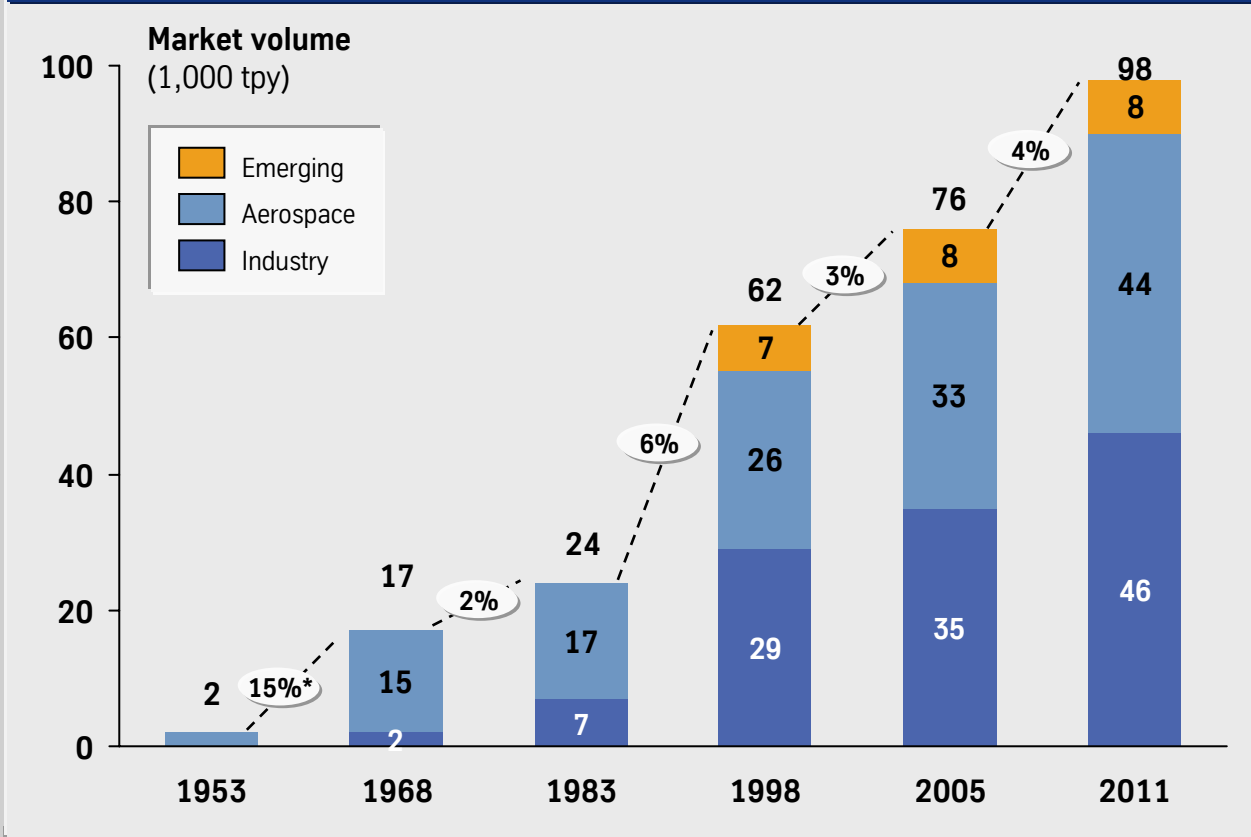
By Regions



Global Titanium Mill Product Market is growing steadily by 3-6% per year

Increasing use in various (new) Applications; for the period 2005-2011 growth is expected to be 4%

Titanium mill products: Market development and forecast (1953 - 2011)



* CAGR – compound average growth rate

Source: own-research/-interviews/-calculations

Remarks

Period 1953 - 1968

Use of titanium for military aerospace in the beginning, later on for commercial jets (Boeing)

Period 1968 - 1983

Titanium use for non-aerospace becomes the major driver for increasing demand

Period 1983 - 1998/2005

Non-aerospace becomes the major market, despite further growth of aerospace

Period 2005 - 2011

Growth of commercial aerospace above average due to structural changes (trend towards wide body aircrafts with high titanium content)

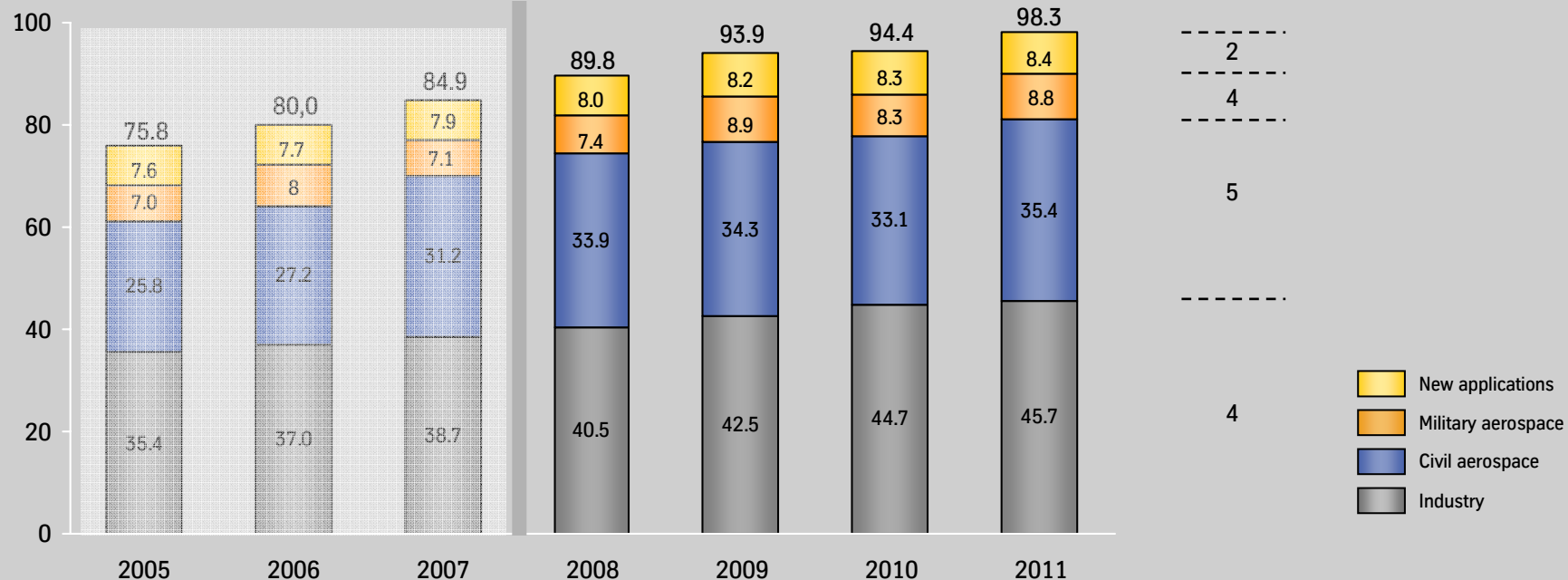


The market for titanium mill products will grow by 4% from 2008 – 2011.

Titanium mill products: Market volume 2005-2007, forecast 2008 – 2011 (world)

Civil aerospace is a major sales market with 5% per year.

Market volume
(1,000 tpy)



* CAGR – compound average growth rate

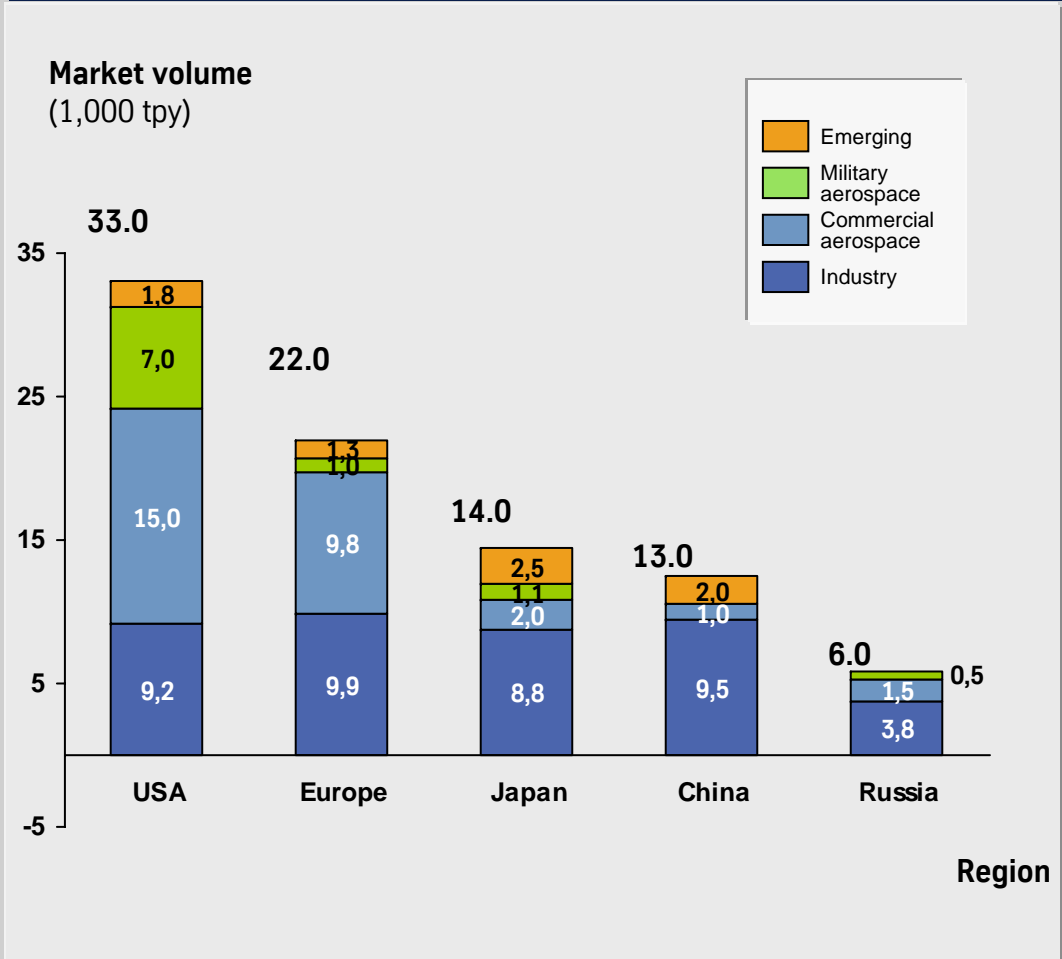
Source: own research/interviews/calculations



USA and Europe are the major titanium markets for commercial aerospace.

Industry markets are Europe, Japan, China and the USA.

Titanium mill products market by regions and applications (2007)



Remarks

USA
 Major market for commercial and military aerospace
 Higher titanium content of commercial jets from Boeing (compared with Airbus in Europe)
 Higher military budgets for fighters (with high titanium content)
 Emerging = military applications (tanks etc.)

Europe
 Second largest commercial aerospace market (= Airbus)
 Top-market for industry (strong engineering industry in Europe)
 Emerging = mainly military applications (tanks, vehicles etc.)

Japan
 Strong industry market (engineering industry)
 Emerging = largest market for automotive and golf club heads

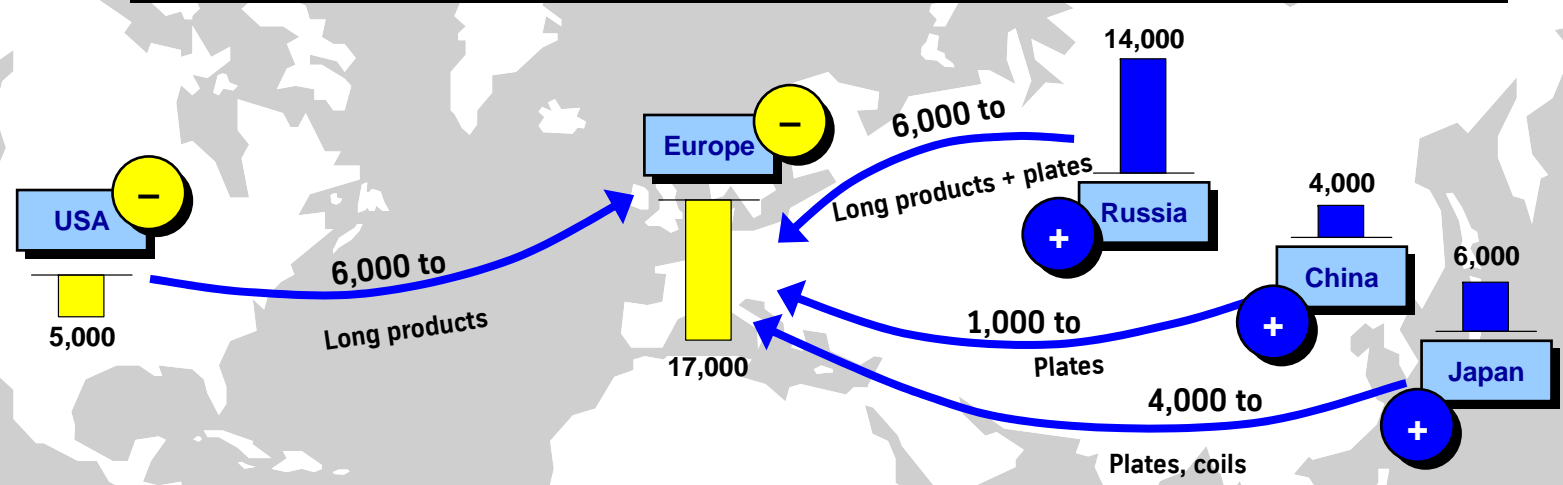
China
 Mainly industry market
 Emerging = golf club heads mainly

Source: own research/-interviews/-calculations

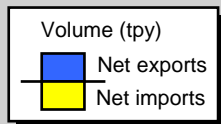


Import Statistics

Titanium mill products: Trade balance by regions (2007, estimate)



- ⇒ Russia: Exports to USA, Europe (Boeing, Airbus)
- ⇒ China: From a net importer to a net exporter, exports to Airbus
- ⇒ Japan: Exports to Europe (industry)



European Civil Aerospace

Airbus Situation

Airbus Order Portfolio as of 09/01/08

| | No. of aircrafts |
|--|------------------|
| A318, A319, A320, A321: | 2725 |
| A330, A340, A350: | 935 |
| A380: | <u>186</u> |
| Order backlog aircraft: More than 5 years | 3846 |



Total titanium demand: ~ 100,000 to

Source: THE AIRLINE MONITOR

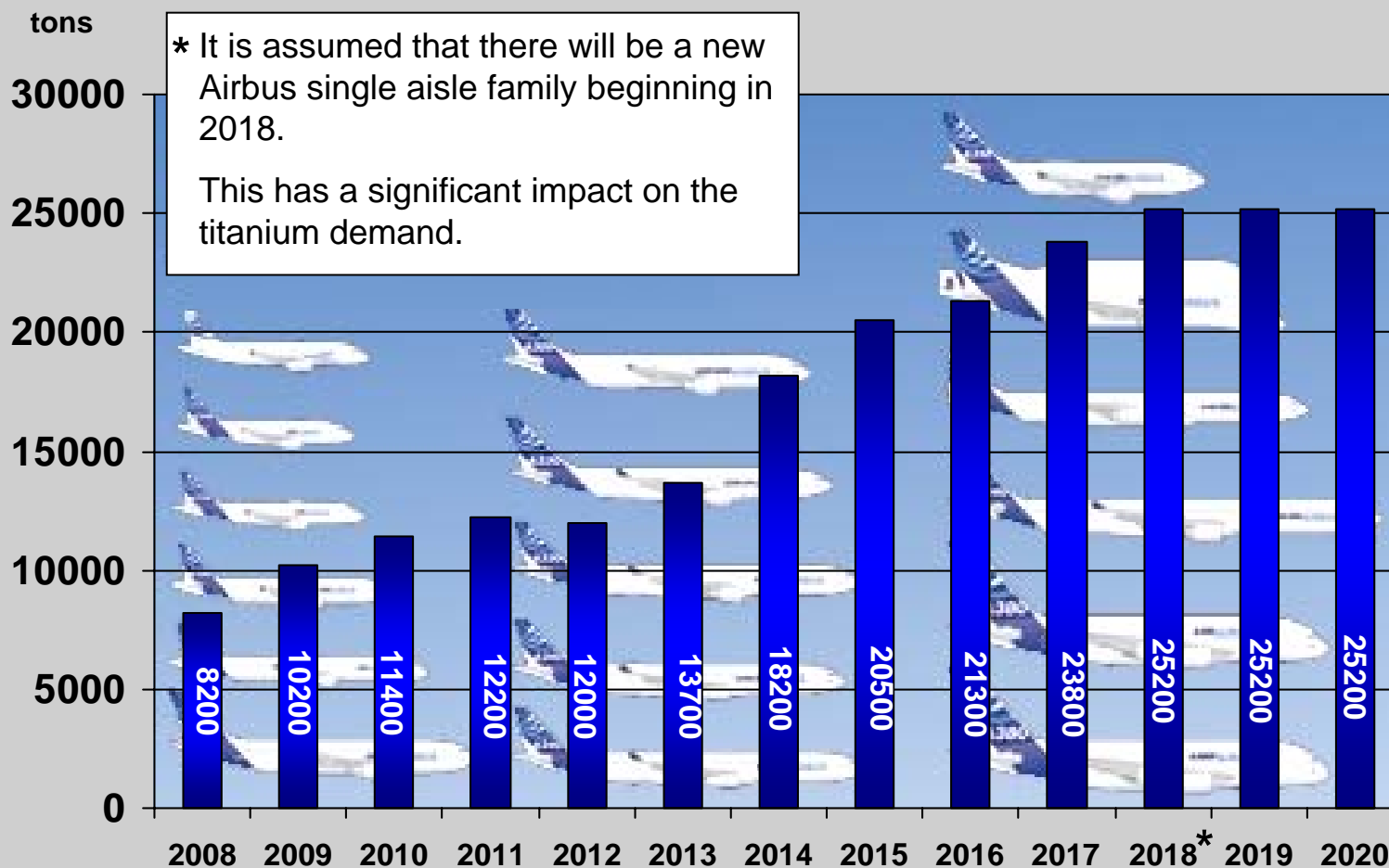
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Airbus Titanium demand according to projected airplane deliveries 2008 to 2020 by weight (mill products)



Source: THE AIRLINE MONITOR/own research

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Major Threats for the Titanium Industry

Aerospace Industry

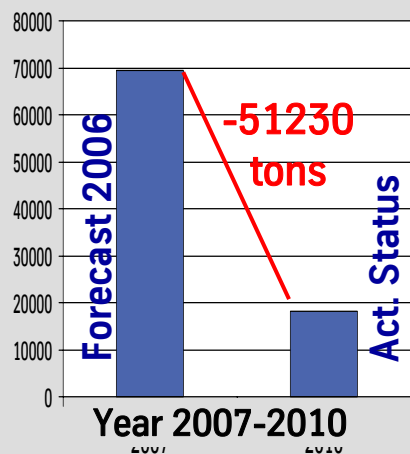
- Co₂ emission ↓ and fuel cost ↑
- GDP sensitive passenger and freight restriction
- Technical delay of Boeing 787 and Airbus A380



Gap in Ti demand A380/B787



- Current overstocking
- Future lower build rates
- Drastic reduction in material prices for semis



Industrial Applications

- Financial crisis
- Decreasing raw material prices
- Change in trade balances



Delayed investment in projects for

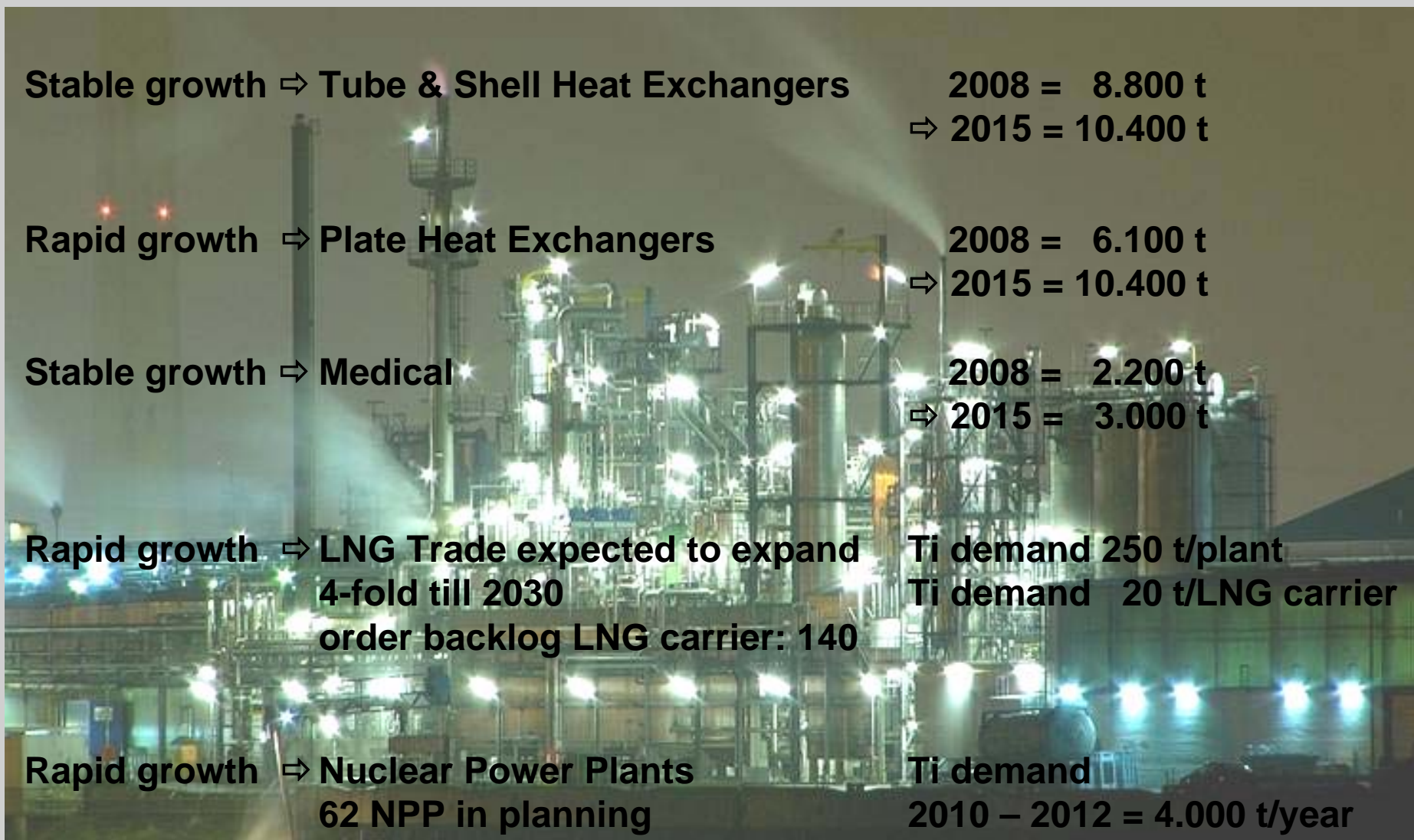
- Chemicals
- LNG-Market
- Container Ships
- Mining
- Oil & Gas



Power and Desalination are still performing well



Industrial market still demanding



Source: own market research, IEA

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Titanium demand for liquified natural gas LNG (1)

Demand for transportation of LNG is increasing rapidly.

World gas consumption in 2007

= 2850 billion m³

Local consumption: 84 %

Transportation by pipeline: 12 %

Transportation by LNG tanker: 4 %



Gas transportation \leq 3200 km = pipeline

Gas transportation \geq 3200 – 8000 km = LNG tanker

Source: Siemens, High Performance Tube

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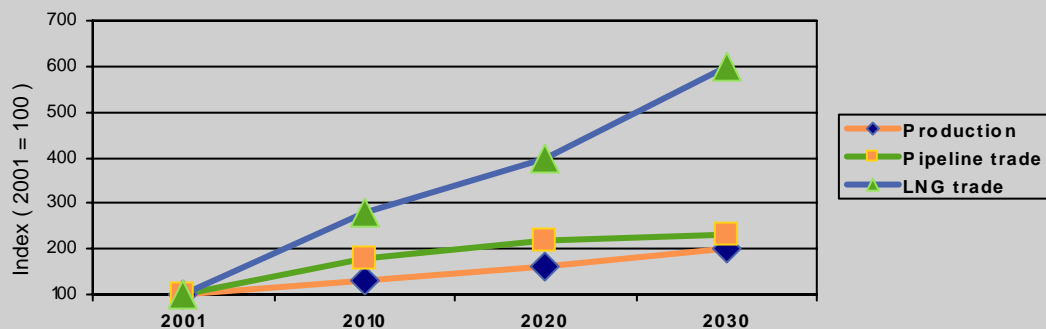
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Titanium demand for liquified natural gas LNG (2)

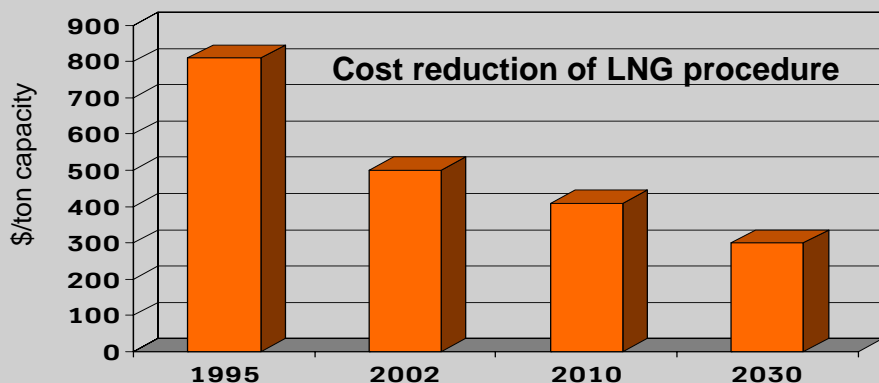
LNG trade is expected to increase 4 times



World gas consumption 2007 = 2850 billion m³
 2030 = 4275 billion m³

LNG in 2007 = 4 %

LNG in 2030 = 16 %



Titanium demand for LNG

| | |
|-------------|--------|
| LNG plant: | 250 to |
| LNG tanker: | 20 to |

Source: Siemens, High Performance Tube



Titanium demand for nuclear power plants (NPP)

2007 = 442 NPP in operation

2007 = 28 NPP under construction

2007 = 62 NPP in planning

Next 15 years = 160 NPP in planning



| Country | Under construction | Final planning | Total demand |
|--------------|--------------------|----------------|--------------|
| India | 7 | 4 | 20 |
| China | 5 | 5 | 19 |
| Russia | 4 | 1 | 8 |
| USA | 1 | - | 13 |
| South Africa | - | 1 | 24 |
| South Korea | - | 8 | - |

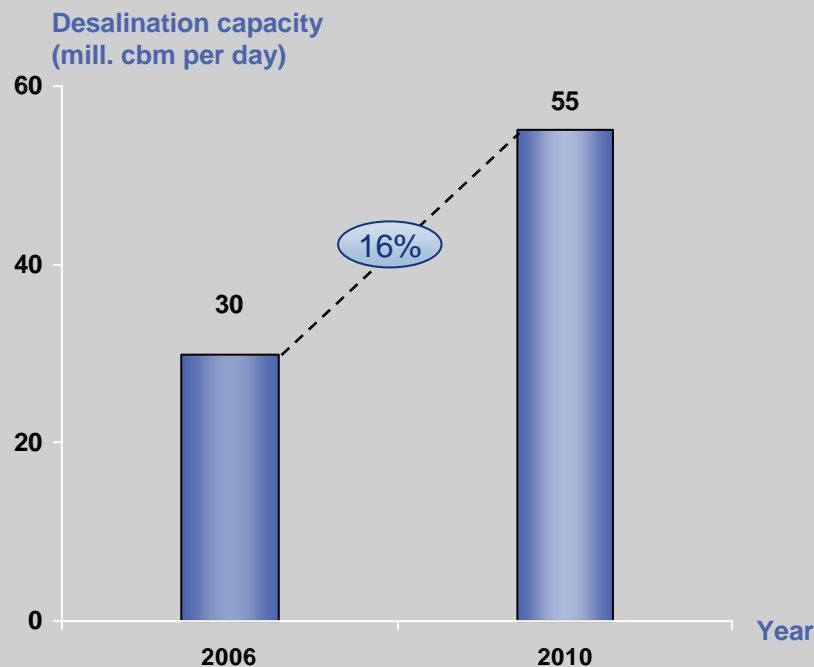
Source: Valmet

**Titanium demand for NPP:
2010 – 2012 = 4000 to/year**

Seawater desalination I

Installed seawater desalination capacity will increase by 16% per year.

Desalination: Capacity growth (world)*



* Thermal processes

Source: own interviews/research



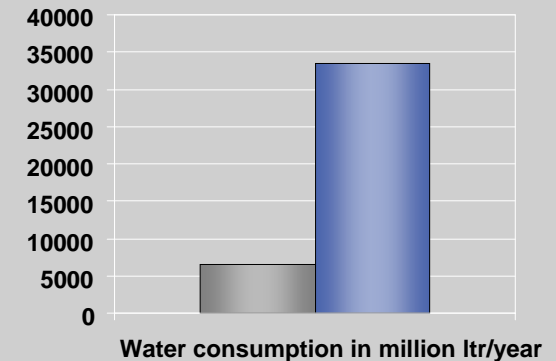
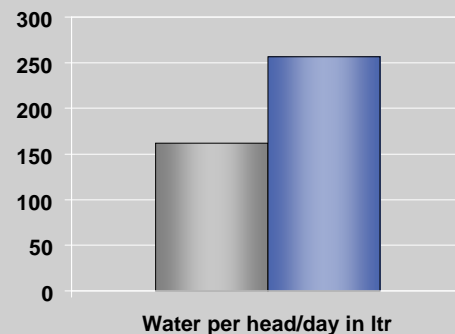
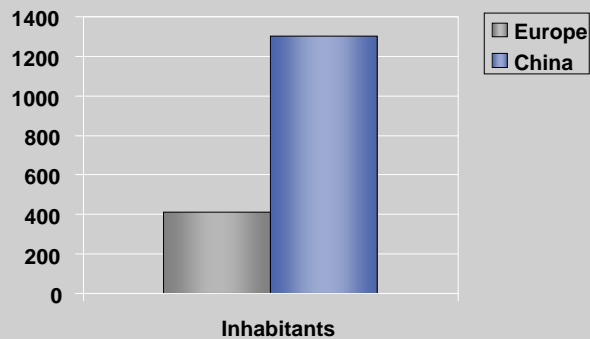
Titanium demand depends on the size of the desalination plants (thermal process).

Characteristic plant capacities and titanium requirements are:

- 240,000 – 270,000 m³/day
drinking water output: 70 t titanium
- 800,000 m³/day
drinking water output: 400 t titanium

Seawater desalination II

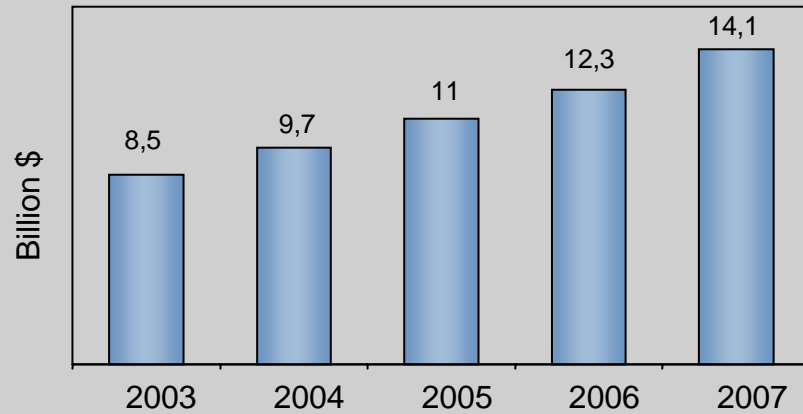
- Demand growth in the last 70 years
 - Water consumption: 6-fold increase
 - World population: 3-fold increase
- Consumption of available fresh water
 - today: 50%
 - in 2025: 70%
- Driving force
 - Rising consumption in Middle East
 - China will become an important market for desalination plants, due to rising water demand.



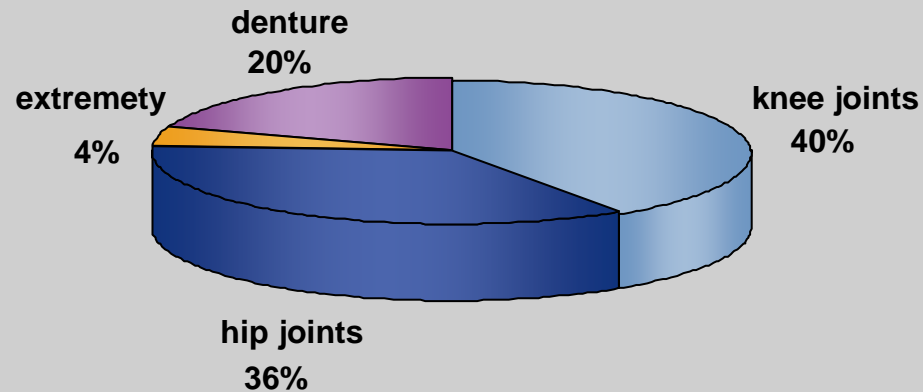
Source: own interviews/research



World Medical Market (I)



Medical Market by application



Source: Zimmer



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World Medical Market (II)

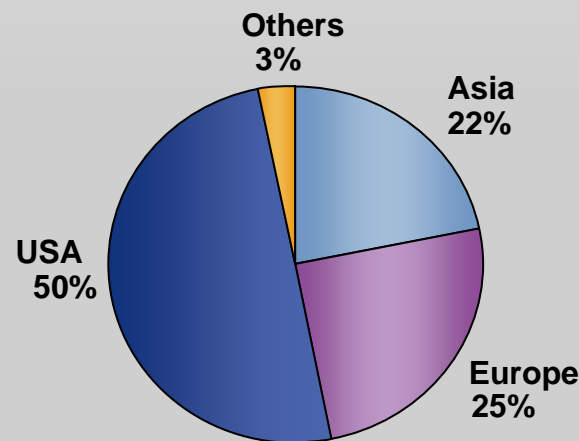
The orthopaedists use 2,2 Million different orthopaedic part of titanium

World titanium demand by medical application in 2007

| | | |
|------------------------|----------------|------|
| • Spinal columns | 340 t | 16 % |
| • Denture | 450 t | 20 % |
| • Implants | 1,150 t | 52 % |
| • Surgical instruments | 90 t | 4 % |
| • Others | 180 t | 8 % |
| • Total | 2,210 t | |



World Medical Market by Region

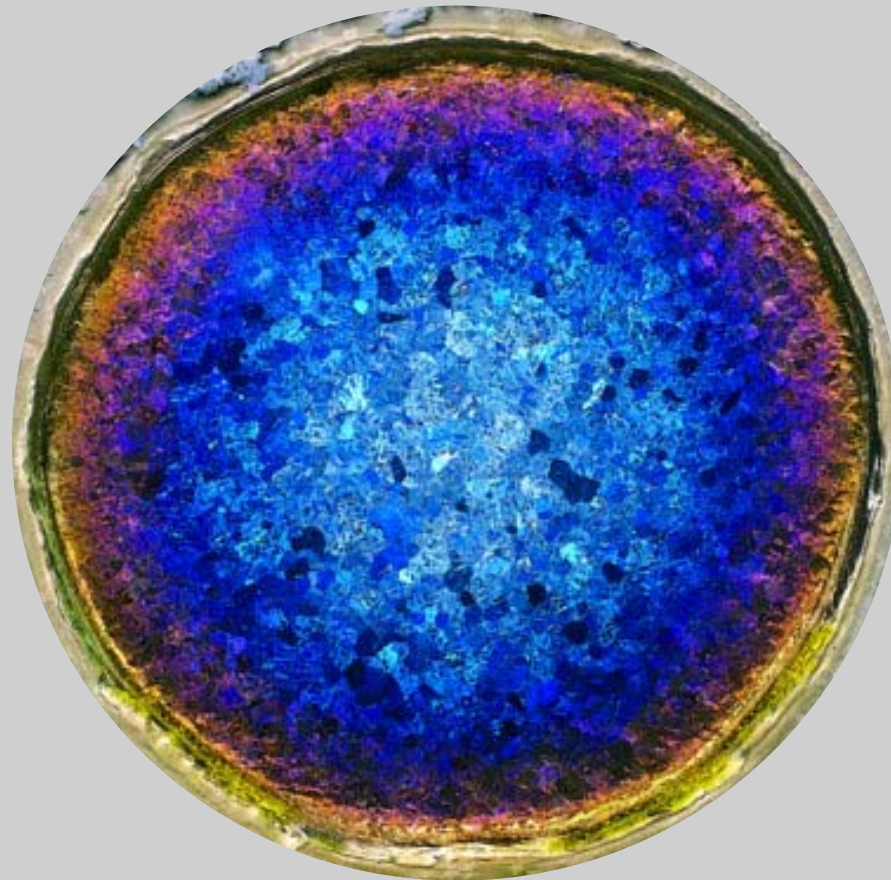


Source: Smith & Nephew, Zimmer

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