Titanium Market Update: Real Turbulence or Just Noise?

Highlighting Key Trends From Our Latest Survey and Updated 5-Year Demand Forecasts
Basic Introduction:

- Longbow Research provides quarterly updates on various metal and aerospace markets (including specialty materials) through proprietary survey work and separate industry analysis.
- We utilize a network of industry contacts who participate in quick surveys and we turn the commentary/data into analytical charts (each quarter). Then, we provide a finalized report that highlights demand momentum, end-market strength/weakness, inventory positions, and lead times/pricing trends.
- We have collected 10+ years of titanium data, which drives our global industry models. In the specialty materials space, titanium activity is compared against nickel-based alloys, aluminum plate, and exotic alloys.
Agenda:

1) Review our 3Q18 specialty material survey results (highlight key charts): titanium; nickel-based alloys; aluminum plate; stainless steel; and exotic alloys. Look at the end-market breakdown, lead times, downstream inventory intentions and consensus outlooks.

2) Discuss our long-term outlook for the main end-markets: assumptions for all important aerospace and industrial groups (the volume puts and takes for 2018 and 2019).

3) Review the industry models, including our updated titanium demand forecast - looking out to 2022 (the 5-year update). Look at melt supply.
Bottom-line: The Ti Market is Still Strong

- Titanium is within the “sweet spot” of global demand, driving restored distributor/mill confidence and pricing leverage. Industry growth is back to the healthiest level we have seen since 2011 – up 6-7% global, +8-9% WW.
- Our industry model is showing +5-6% global demand growth potential in 2019, supported by steady aerospace demand and favorable industrial & energy activity. **Aero inventory could be too long heading into next year’s 737/A320 production ramp.
- We do not see the “peak” before 2021-2022, assuming the aerospace OEMs hit the LT delivery targets and the macro environment stays relatively healthy.
- Titanium sponge and melt operating rates should start moving higher.
Highlights from our September Survey

- **The impressive specialty materials demand growth is holding into September.** We calculated the average comp for all premium alloy-levered companies at +7-8% y/y, which is in-line with our 2Q18 survey. Despite some stated concerns about “lagging production” for aerospace suppliers, and talk about extended inventories, consumption growth appears to be holding.

- **Full-year expectations moved higher on 2H strength and communications schedules from buyers.** The average growth forecast for 2018 moved up to +8% (versus 2017), representing a 210-basis point improvement since our last survey. Nickel-alloy expectations seemingly changed the most q/q, despite the relative volume weakness in August-September.
Highlights from our September survey

- **Good breath: Sequential strength calculated for 10 of 14 individually-tracked end-markets.** The average 3Q18 order comp improved versus 2Q18 for: commercial airframe; jet engine; aero aftermarket; military/defense; fasteners; energy exploration; and chemical processing.

- **The inventory outlook still leans positive, albeit less-aggressive.** A net +24% of distributors/fabricators plan to build specialty material inventories over the next 2-3 months. This is down from a +46% level in 2Q18, but still considered a fairly bullish leading indicator.
Specialty Materials Survey Analysis - Quarterly Trend
Estimated Volume Growth By Specialty Alloy Product Type

Titanium
Nickel-Based Alloys
Alum Plate
Exotic Alloys
Specialty Materials Avg.

Chris D. Olin, Vice President, Sr. Research Analyst, Longbow Research
Specialty Materials Survey Analysis - Quarterly Trend

Long-Term Growth Trend For TITANIUM (2007-Present)

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Specialty Materials Survey - Quarterly Trends
Estimated Titanium Volume Growth By Sub-Channel (Upstream, Midstream, Downstream)

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Specialty Materials Survey Analysis - Quarterly Trend
Current 12-Months Outlooks -- By Specialty Alloy Product Type

Contact outlook by product:
- Titanium: +8-9%
- Nickel-Alloys: +8-9%
- Aluminum Plate: +2-3%
- Exotic Alloys: +6-7%
- Specialty Stainless: +9-10%

3Q feels like the peak in demand growth.

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Specialty Materials Survey Analysis - Quarterly Trend

Estimated Growth For Total Aerospace Sector

Excess Inventory?

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Specialty Materials Survey Analysis - Quarterly Comparisons

Estimated Growth For The Individual Aero Categories

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Specialty Materials Survey Analysis - Quarterly Comparison

Estimated Growth For The Individual Industrial-Based Categories

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Chris D. Olin, Vice President, Sr. Research Analyst, Longbow Research
Specialty Materials Survey Analysis - Quarterly Trend

Total Supply Channel Inventory Intention (All Metals)

Above 0% = Inventory Replenishment (Bullish)

Below 0% = Inventory Liquidation

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Titanium Monthly Report

Long-Term Lead Time Trend, Ingot Products Only (# of Weeks)

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Titanium Monthly Report

Estimated Titanium Lead Times By Product Type (Using Survey Averages)

Sheet capacity is tight, next area for major investment?

Chris D. Olin, Vice President, Sr. Research Analyst, Longbow Research
Last week, we lowered the 2019 outlook:

- Our 2018 forecast for Western World demand is 260-265M lbs., global demand seen at 435-440M lbs. However, we lowered the 2019 outlook by one point (global) to +5-6%. There is quite a bit of “noise” in the market.
  1) Rolls-Royce and Pratt & Whitney seeing another round of engine performance challenges;
  2) We believe there is too much inventory in the aerospace channel (parked fuselages);
  3) China growth is likely to slow due to trade uncertainties with the US;
  4) Rising interest rates;
  5) GE still having problems with its gas turbine business.

This is the first time we “lowered” expectations in 2-3 years. Still a good year but we are looking for a bumpy 1-2 quarters.

Chris D. Olin, Vice President, Sr. Research Analyst, Longbow Research
Titanium Industry Model
Estimated Inventory Within The Channel - Aerospace Holdings Vs. Upstream Supply (mm lbs.)

Estimated point of inventory cycle

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Longbow Research Macro Index

Estimated Channel Confidence (All Markets) - Monthly and Quarterly Averages (Avg, Contact Score from 10-1)

Quarterly Trend
Monthly Trend
6-Month Average

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Titanium Industry Model

Estimated General Industrial Demand (mM lbs.)

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Titanium Industry Model

Estimated Western World Demand -- By End-Market (mm pounds)

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