Overview of the Russian Market for Titanium Mill Products – Speaker Notes
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Slide 2: 2011 Russian Market

- As you can see, the aerospace market, including engines, airframes, and rocket manufacturing consumes roughly 60% of the titanium produced in Russia. There is also a significant consumption by the marine and shipbuilding industry, the power generation industry, chemical process and mining applications, as well as other uses of titanium.
- The proportion of aerospace to non-aerospace uses is very similar to the ration in the rest of the world, reflecting the fact that the Russian industry is of similar maturity to the other developed countries in the world regarding the uses of titanium.

Slide 3: Russian Aircraft Production Forecast

- In speaking specifically of Russian aircraft production, you can see that in general the production rates are stable or increasing for most programs.
- On the commercial side, the Sukhoi Superjet is enjoying market acceptance both inside and outside of Russia. The jet had its entry into service in April 2011, is capable of carrying 75 – 95 passengers, and has received 246 aircraft orders from 22 different airlines.
- The Antonov An-148 is also a regional jet sized aircraft capable of carrying 68 – 99 passengers. Its high wing design makes it capable of landing on rough airfields while avoiding foreign object damage. Its entry into service was June 2009, and the airplane has collected more than 250 orders to date.
• The MS 21 is a new aircraft currently under development, designed to compete in the 150 – 212 seat category. It is designed to replace the Tupolev Tu-154 and Tu-204/214 in the Russian market, and compete globally in the single aisle market for aircraft. Entry into service is planned for 2017.

• For Transport and Special Purpose aircraft, the IL 476 is an updated version of the IL 76, and can be configured as either a cargo or tanker aircraft. Again, its high wing design allows it to operate from undeveloped airfields with lower risk of foreign object damage, making it especially useful in emergency response transport for civilian evacuations and to deliver humanitarian/disaster relief aid around the world, especially to undeveloped areas, as well as civilian and military missions to lesser developed parts of the world.

• For military aircraft, Sukhoi continues to be the major producer of fighter aircraft. The Sukhoi Su 30 series are based on the original Su 27 design, which entered into service in the 1980’s. The latest design is the T50, a fifth generation stealth fighter expected to enter into service in 2015.

• The MIG 29 fighter and the Yak 130 fighter trainer aircraft also remain in production.

Slide 4: Aircraft Industry Structure

• In recent years many various companies involved in the manufacture of aircraft and engines have been combined into a few companies with broader reach, as the production rates did not support the many different companies that existed in Soviet times.

• United Aircraft Corporation oversees the development and production of the fixed wing airframes, while United Engine Corporation oversees the development of the engine side of the business. And Helicopters of Russia takes charge of rotary wing aircraft manufacture.
Slide 5: Russian Aerospace Market Demand

- The general growth in aerospace manufacturing will lead to an increase in consumption from 3750 MT in 2010 to 8000 MT in 2014 and shows a further increase to 9000 MT by 2017.
- The previous peak for this market was approximately 5000 MT in 2007, with demand falling off due to the economic problems in 2009 to a low of about 3000 MT.
- The new civil programs will generate a new peak in demand in the coming years of this decade, similar to the projections shown for the rest of the world.

Slide 6: Russian Industrial Market

The Russian industrial market is similar to the market in the rest of the world, with corrosion resistant applications in power generation, chemical processing, mining, and energy production leading the list of demand drivers. In addition, the Russian market has a substantial demand from the shipbuilding industry which is not usually found outside of Russia.

Slide 7: Shipbuilding Industry

- United Shipbuilding Corporation was created on the basis of the shipbuilding and ship repair enterprises and Design Bureau and includes 80% of all shipbuilding projects in Russia.
- In civil shipbuilding the company is involved in the creation of oil drilling and production platforms, offshore technology, and the construction of specialized ships for Arctic operations. There are plans to build three icebreakers to provide navigation along the Northern sea route.
- In the military shipbuilding – production of submarines, mini submersibles, and construction of frigate merchant ships, escort vessels, destroyers and aircraft carriers all consume varying amounts of titanium.
As you can see the consumption of titanium by this industry is expected to increase from 1300 MT to 2100 MT and remain stable at that level for several years.

Slide 8: Power Generation Industry

- The Power Generation industry in Russia consumes titanium primarily in the condenser section of power generating plants, particularly nuclear plants.
- Currently there are 31 units operating in Russia.
- There are 10 new plants in the planning / construction stages
- A further 28 plants are envisioned to meet the growing energy needs of the country.

Slide 9: Power Generation Titanium Demand

- In general, the design of power plants in Russia consumes 250 MT – 300 MT per unit.
- The forecast reflects an expectation of 2 – 3 units per year to be built.
- Represents welded tubing along with fabricated equipment like heat exchangers and other ancillary pieces of equipment required in the construction of power plants.

Slide 10: Total Russian Industrial Demand

- In total we expect the Russian demand for industrial demand to grow from approximately 3000 MT in 2010 to approximately 4500 MT in 2014 and remain relatively stable at that level through 2017.
Slide 11: Total Russian Demand for Titanium

- In total, the Russian market will grow from approximately 7000 MT in 2010 to a little over 12000 MT in 2014 and then nearly 14000 MT in 2017, taking into account the growth in all the various market that consume titanium.

THANK YOU VERY MUCH FOR YOUR TIME AND ATTENTION.
RUSSIAN TITANIUM MARKET

TITANIUM 2012
ATLANTA, GA

OCTOBER 2012
RUSSIAN AIRCRAFT PRODUCTION FORECAST

**COMMERCIAL**

- SSJ-100
- An-148/158
- MS-21
- Tu-214/204

**TRANSPORT AND SPECIAL PURPOSE**

- Il-476
- BE-200

**MILITARY**

- SU30, SU34, SU35, T50
- MIG-29
- Yak-130
UNITED AIRCRAFT CORP
- SU-34 AND SU-35 PRODUCTION RAMP-UP
- Т-50, THE FIFTH GENERATION AIRCRAFT DEVELOPMENT AND RAMP-UP
- AN-148 & SSJ-100 REGIONAL AIRCRAFT SERIAL PRODUCTION RAMP-UP
- IL-476 TRANSPORT AIRCRAFT DEVELOPMENT AND RAMP-UP
- DEVELOPMENT OF NEW SINGLE-AISLE AIRCRAFT (MS-21)

UNITED ENGINE CORP
- SAM-146 ENGINE PRODUCTION RAMP-UP
- DEVELOPMENT OF ADVANCED 9-18T THRUST ENGINE FAMILY FOR MS-21 AIRCRAFT – PD-14
- DEVELOPMENT OF ADVANCED ENGINE FAMILY FOR MILITARY AVIATION (117-C)
- FAMILIES OF ADVANCED HELICOPTER ENGINES

HELICOPTERS OF RUSSIA
- KA-62 HELICOPTER MANUFACTURED BY AAK “PROGRESS”
- KA-52 ATTACK HELICOPTER MANUFACTURED BY AAK “PROGRESS”
- KA-32 MULTI-PURPOSE HELICOPTER MANUFACTURED BY KUMAPP
- MI-38 HELICOPTER MANUFACTURED BY KVZ CAN CARRY UP TO 30 PASSENGERS
- MI-28N ATTACK HELICOPTER MANUFACTURED BY ROSTVERTOL
- MI-26 MULTIPURPOSE HEAVY HELICOPTER
- MI-17 TRANSPORT HELICOPTER MANUFACTURED BY KVZ
- DEVELOPMENT OF KA-92 AND MI-X1 HELICOPTER PROJECTS
THE DEMAND FOR TITANIUM BY THE AEROSPACE MARKET IS EXPECTED TO GROW FROM 3,750 MT IN 2010 TO 9,000 MT IN 2017.
SHIPBUILDING: BUILDING OF DIFFERENT RATED-VESSELS, SUBMARINES AND DRILLING PLATFORMS

NUCLEAR POWER ENGINEERING: CURRENT NUCLEAR POWER PLANT MODERNIZATION AS WELL AS POWER PLANT CONSTRUCTION COMPLETION AND NEW PROJECTS

CHEMICAL INDUSTRY: PRODUCTION OF SULPHATES, TEREPTHALIC ACID, CHLORINE AND CHLORINE-CONTAINING COMPOUNDS, AND CHEMICAL FERTILIZERS

NONFERROUS METALLURGY: INCREASING DEMAND IN Cu, Co AND Ni IN PRODUCTION OF WHICH TITANIUM IS REQUIRED.

OIL & GAS EXTRACTION: FITTINGS, FLANGES, PIPELINES, HIGH PRESSURE VESSELS, HEAT EXCHANGERS, STOP VALVES; CNG.
UNITED SHIPBUILDING CORPORATION

• CIVIL SHIPBUILDING – CONSTRUCTION OF DRILLING AND MINING PLATFORMS, OFF-SHORE EQUIPMENT, ICE-RATED VESSELS FOR ARCTIC EXPLORATION, AND SHIPS FOR SEAWAYS.

• MILITARY SHIPBUILDING – SUBMARINE BUILDING, DEVELOPMENT OF ONE-MAN SUBMARINES, BUILDING OF FBM SHIPS, ESCORT VESSELS AND DESTROYER LEADERS FOR RUSSIAN NAVAL FORCES