

The evolution of ATI Aerospace



Allegheny Technologies Incorporated (ATI) is fortunate to be part of the unprecedented opportunity which exists in the aerospace metallics sector. It is an exciting time to be amidst the record backlog and major increases in demand for titanium and superalloys. The next-generation jetliners are game-changing aircraft with respect to fuel-efficiency, passenger comfort and improved maintenance. Our innovative response powers us into the future by taking advantage of all of our ATI resources and capabilities.

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Market sector approach

ATI Aerospace integrates ATI's historic aerospace capabilities to offer our aerospace customers a variety of proven metallic and manufacturing resources needed to make the commercial and military aircraft and the jet engines that power them, in the 21st century. We have been a world leader in the development and manufacture of mission-critical metallics, including titanium and titanium alloys, nickel- and cobalt-based superalloys and specialty alloys, for more than five decades. The ideas behind the creation of ATI Aerospace evolved from our belief that unprecedented opportunity exists in the aerospace metallics sector to collaborate with our customers to help solve the challenges they face in developing and manufacturing today's and tomorrow's aircraft and jet engines. We believe that ATI Aerospace possesses the resources and capabilities to assist our customers in dealing with the materials, manufacturing and security of supply challenges they face in providing the world's airlines with more fuel-efficient, maintainable and comfortable commercial aircraft. ATI Aerospace has the capacity to manage the specialty metals supply chain in a manner unique to this industry – to help minimize the volatility and

Table 1
Titanium growth in aerospace: number of pounds in an airframe

Boeing	Airbus	Military
Model – Pounds Used	Model – Pounds Used	Model – Pounds Used
737 20,000	A320 25,000	F-15 50,000
747 90,000	A330 37,000	F-22 100,000
777 120,000	A340 50,000	A400M 80,000
787 250,000	A380 150,000	JSF 80,000

risks, to deliver the quality and to provide the stability and credibility required by our global customers.

Trends/drivers for change

Today's aerospace market is changing with the advancements in aircraft engine and airframe design and operating requirements fueled by growth and competition. Engine development trends are toward the demand for green engines which operate with reduced noise, reduced emissions (SO₂, CO₂, NO₂), and improved fuel efficiency which requires higher operating temperature and lighter materials. Reduced operating costs for the airlines is also driving engine development trends with reduced maintenance intervals and reduced part counts. Airframe trends are toward the use of composite structures where titanium is used. The advantages that titanium

brings to the composite structure include the strength-to-weight ratio, thermal and galvanic compatibility, oxidation and corrosion resistance, fatigue and fracture resistance, carbon and epoxy compatibility and superplastic forming and diffusion bonding to allow the use of large-scale parts. Airline operators gain operating efficiency, improved maintenance and passenger comfort; all of which potentially contribute to improved airline profit potential.

Expanded titanium usage

ATI Aerospace has significantly expanded its product portfolio to offer airframe original equipment manufacturers (OEMs) a broad scope of titanium and titanium alloys for commercial airframe applications. ATI's products enable aerospace engineers the freedom to design and build aircraft that



Figure 1. Titanium is used in many applications on today's commercial aircraft

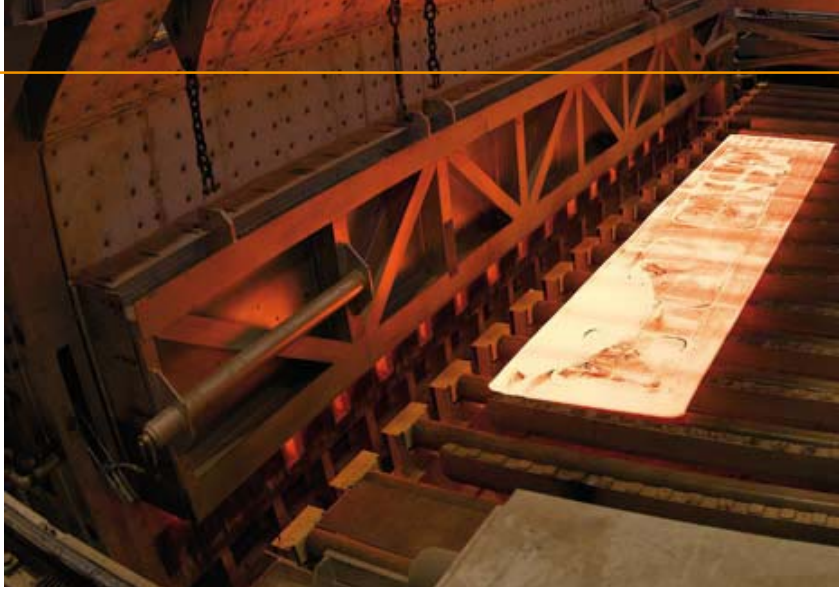


Figure 2. ATI's Specialty and Titanium Plate facility in Washington, PA

meet today's needs for safe and sustainable transportation.

Industry estimates today show significant titanium growth in both commercial and military aircraft. An example of the growth in titanium airframe usage as estimated by the industry is shown in Table 1.

What has ATI done to support this growth?

ATI is uniquely innovative in its ability to not only support but also be an integral part of the expanded use of titanium. This involves not only capital investment but also the technical support that goes hand-in-hand. ATI understands that the next generation of alloy development involves many aspects including understanding customers' needs, good ideas, talented people, and necessary equipment and process capabilities, including testing. Alloy development is accomplished in our organization in a formalized manner using the ideas generated by various disciplines like technology, operations, sales and marketing. Once the stage gate process allows advancement, our extensive technical staff of metallurgists, chemists, engineers and others go to work creating new compositions in developmental ingot sizes first. Extensive market research drives this effort. ATI 425® titanium alloy is an example of such efforts. This alloy was developed to reproduce the strength of conventional titanium 6-4 with the added advantage of being able to be cold rolled in order to enable production of thin sheet, strip, foil and tubing for applications ranging from seamless tubing for hydraulic systems to seat tracks. Orthorhombic Titanium

Aluminides are another exciting breakthrough. They can be used to produce thin foils with structural strength at 1200 °F (649°C). This innovative product is designed for use in manufacturing lightweight, creep-resistant structures. Developed for metal matrix composite rotor disks, these composite materials offer high ductility and compatibility with silicon carbide fibers. The rising use of composites in the coming years of commercial airline production is increasing the use of titanium and titanium alloys, with the global demand for titanium mill products projected to surge to 350 million pounds by 2011. Meeting this increased demand will be critical to the success of global airframe and engine OEMs. To provide certainty in supply ATI has committed to investing more than \$900 million (USD) to increase our titanium sponge production and

enhance our titanium and specialty metals melting, fabricating, and finishing capabilities. These major capital investments include:

- Upgrading and expanding our titanium sponge facility in Albany, Oregon.
- Building a new premium titanium sponge facility in Rowley, Utah.
- Expanding and upgrading our Specialty and Titanium Plate facility in Washington, Pennsylvania.

A still-glowing section of specialty plate emerges from the annealing furnace at ATI's Specialty and Titanium Plate facility in Washington, PA, as shown in Figure 2. Next stop along its thermomechanical processing path will be quenching. Both processes are designed to impart desired performance properties for aerospace applications.

We are adding new premium titanium melting, forging and finishing at our Bakers, North Carolina, facility. Shown in Figure 3 is one of our forge presses. We are constructing a 10,000 ton press in Bakers, NC, the largest of its kind in the world dedicated to producing titanium and nickel-based superalloy mill products. Press forging is a thermo-mechanical process that imparts desired performance properties for aerospace applications. We are excited about our future in the aerospace market. ATI's leadership in the global aerospace industry is due to a combination of product and process innovation along with continuous process improvement. ■

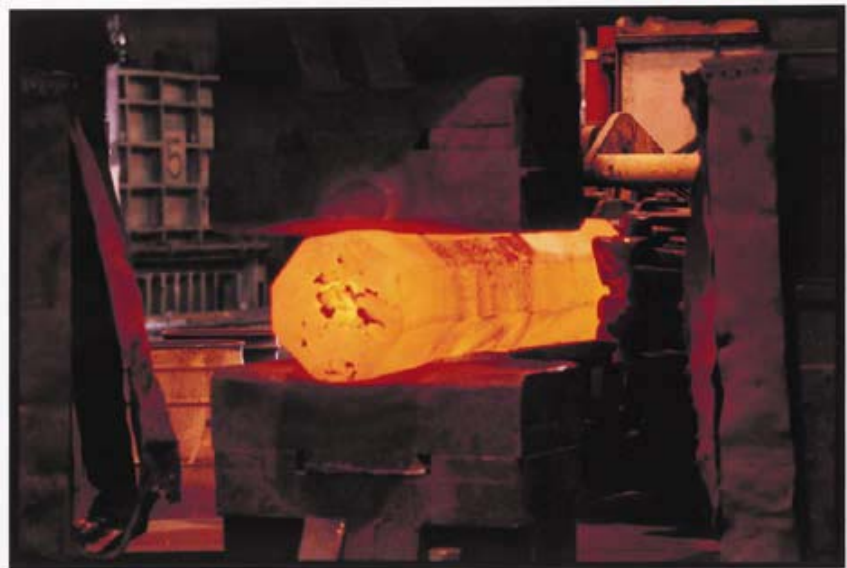


Figure 3. ATI's Bakers, NC forge press