

## Flexible Asset Management Options Keep Fleets Flying



OnPoint\* Solutions are helping customers change the way they manage their engine assets. When customers are faced with immediate or short-term needs, GE's Engine Leasing and Engine Exchange programs ensure they have the powerplants required to keep their fleets flying. Especially during the summer months, historically a busy time in the shops, engine leasing and exchange opportunities help customers bridge gaps in engine availability during their high-demand periods.

### Spare Engine Leasing

Short-term lease support can protect customers against temporary revenue interruptions due to scheduled and unscheduled engine removals. "Our short-term rental engines offer a cost-effective means to bridge a temporary gap in spare engine coverage," says Don Biocca, portfolio marketing manager. "We assume the financial risks and administrative responsibilities of spare engine ownership by handling all configuration, shop maintenance and asset management issues."

Engines may be leased for one day to a full year to cover high-demand periods. Explains Biocca, "We have leasable assets positioned around the world. Depending on the location and configuration required, engines can be ready for pickup within a 24- to 48-hour turnaround."

### Engine Exchange

When faced with an immediate need for an engine and the cost of returning that engine for overhaul, customers can use the Engine Exchange program to avoid disruptions in service. Customers trade in a shop-visit-ready engine for an overhauled GE or CFM\* engine in a single

transaction. Engine Exchange is currently available on CF34-3, CFM56-3 and CF6-80C2 engines.

Because the transfer is simultaneous, there is minimum impact on flight schedules. Fair market value for the customer's engine is credited toward the sale price of the GE or CFM powerplant.

"With Engine Exchange, the benefits are threefold," says Matt Stone, marketing director, Services New Product Development. "We provide immediate engine availability, a time-on-wing guarantee, and reduced risk with complete upfront pricing. In addition, we provide a complete engine records package, including OEM guarantees and a full back-to-birth trace on all life-limited parts (LLPs).

"We supply the customer with the engine they need," says Stone, "and they are back up and flying with minimal turnaround time."

Both major airlines and regional operators can benefit from the Engine Leasing and Engine Exchange programs—employing one or both options to maintain their inventory levels and operational flexibility. "We work with customers to achieve a customized solution," says Biocca. "In addition, both programs can be coupled with OnPoint maintenance and material solutions to optimize a customer's overall fleet management. Customers get the engines—and service—they need in quick, easy, available-today transactions."

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### Spare Engine Leasing Benefits

- Lease engines for one day to one year
- Flexibility to cover scheduled, unscheduled and last-minute AOG (aircraft on ground) maintenance
- Cost-effective means to bridge temporary gaps in spare engine coverage
- Access to and support for virtually all GE and CFM engines

### Engine Exchange Benefits

- Immediate engine availability (vs. 45- to 65-day turnaround for a typical time and material overhaul)
- Guaranteed time-on-wing performance
- Reduced risk

# I-A to GEnx: Six Decades of Leadership

GE introduced the United States' first jet engine in 1942. In the intervening six decades, jet engine technology has enjoyed astounding growth and refinement, as engine manufacturers have not only met, but in many cases anticipated, the increasing demands of customers and regulatory agencies.

Because advances in engine technology must be tried and proven before implementation, testing has experienced parallel development and has emerged as an essential constituent of every engine program.

With acknowledgment of and respect for those who led the way at the beginning, consider the testing of GE's earliest engine, the I-A turbojet, and GE's newest engine, the GEnx\*.

## 1942: I-A Turbojet

Until 1941, GE's experience with aircraft engines was limited to the production of turbo-superchargers that enabled aircraft such as the Boeing B-17 Flying Fortress to fly higher with greater payloads.

When GE was selected to produce the United States' first turbojet engine, no U.S. engine manufacturer had experience in this revolutionary technology. However, GE had years of experience and expertise in the design and production of stationary gas and steam turbines. So entrusting this new project to such a "novice" proved to be an astute decision.

In scarcely more than six months, on March 18, 1942, GE attempted to test its first I-A engine in a specially constructed test cell, dubbed "Fort Knox," at GE's Lynn (Massachusetts) River Works. The engine stalled well before reaching full power, and the test was terminated.

The select group of turbine technicians went to work on modifications and corrections, and the first successful test was completed one month later, on April 18.

The handwritten log records the event on a single page, including a reference to remedying "a good deal of trifling troubles" before trying to start the test.



Six months later—13 months after GE was awarded the one-sentence contract—the I-A engines powered the United States' historic first jet-powered flight.

## 2006: GEnx Turbofan

On March 19—64 years and several generations of engine technology removed from that first test in 1942—GE began testing its newest commercial engine, the GEnx, at GE's Peebles Test Operation (PTO) with resounding success.

On a run to full power on March 21, the engine attained a thrust level of 76,000 pounds (corrected to 80,500 pounds, sea level, standard day conditions), exceeding the thrust level of 75,000 pounds at which it will be certified.

The test log for this first test comprises 127 pages.



During more than 100 hours of engine testing, approximately 600 sensors mounted throughout the engine transmitted hundreds of

data readings—on temperatures, pressures, clearances and vibration—through literally miles of instrumentation wiring to banks of monitors within the control building.

No issues arose during testing, and post-test borescope inspection produced no adverse findings.

This first engine to test (FETT) is a GEnx-1B engine for Boeing 787\* aircraft. Other models of the GEnx in development are the GEnx-1A, for Airbus A350\* aircraft, and the GEnx-2B, for the Boeing 747-8. In all, 17 GEnx engines will be tested in the engine development program leading to certification by the U.S. Federal Aviation Administration.

## The First U.S. Turbojet

- **September 4, 1941, Washington, D.C.:** Three months before the United States entered World War II, representatives from GE met with representatives of the U.S. War Department (now the U.S. Department of Defense) and the U.S. Army Air Corps (now the U.S. Air Force). Major General H.H. "Hap" Arnold, Deputy Army Chief of Staff for Air, advised the group that they could consult and arrive at any decision, so long as GE accepted a contract to build 15 jet engines based on the design of the W-1 engine of England's Frank Whittle. (In this case, the engine manufacturer was selected first, then the aircraft manufacturer.)
- **April 18, 1942, GE Lynn River Works, Lynn, Massachusetts:** Within scarcely more than six months, working under a one-sentence contract, GE successfully tested the I-A engine, based upon the Whittle engine, but enhanced by innovations proven during GE's long experience with gas turbines and turbosuperchargers.
- **October 2, 1942, Muroc Dry Lake Bed, California (now Edwards Air Force Base):** Two GE I-A engines, each rated at 1,250 pounds of thrust, powered a Bell XP-59A aircraft in the first flight of a United States jet-powered aircraft.

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# OnPoint Celebrates Successful First Year

GE - Aviation's OnPoint\* Solutions had a successful first year, signing 18 customers to service agreements.

"OnPoint Solutions are about flexibility, quality performance, increased productivity and strong customer support when and where our customers need it," says Brad Mottier, vice president and general manager of the services operation for GE - Aviation. "Since launching OnPoint at the 2005 Paris Air Show, we have continued to listen to our customers and tailor our services to meet their specific needs. The contracts that we have signed with these customers over the last year demonstrate that they prefer our new approach and recognize the value that GE brings to their business."

OnPoint Solutions are flexible long-term commitments designed to meet customers'

unique engine services needs. Backed by GE's world-class support, these solutions help lower our customers' cost of ownership and optimize utilization of their assets. OnPoint services include overhaul, on-wing support, new and used parts, component repair, technology upgrades, engine leasing, diagnostics and other products.

OnPoint was launched last year with AirAsia. Since that time, GE has signed customers around the globe, including Cathay Pacific, Emirates Airlines, Shenzhen Airlines, Singapore Airlines, Southwest Airlines and TAM Brazilian Airlines.

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**OnPoint**  
Services that perform. Solutions that save.



# GE Strother Facility Completes CF34-10E Overhaul Demo

GE's aircraft engine services facility in Strother, Kansas, has demonstrated full CF34-10E overhaul capability ahead of schedule. Historically, GE demonstrates and certifies a host of possible repairs as a new product enters service, with a full-overhaul demonstration scheduled within a year of the first anticipated shop visit. In the case of the CF34-10E, the Strother team accomplished both the piece-part inspection and repair and the full-overhaul demonstration within months of the engine's entry into service (EIS).

"We inducted an early production engine into Strother in May 2005, six months before EIS," says Dwight Wilson, product leader, Small Commercial Services. "We disassembled it to the piece-part level and validated our tooling, engine manual procedures, limits, repairs and other processes to support a shop visit within a 45- to 60-day turnaround time range. By moving up the shop validation phase for the

CF34-10E, we ensured a better capability to service the product from day one."

Numerous cross-functional GE teams as well as Revenue Sharing Participants were instrumental in this undertaking. "We stretched the Strother team of professionals to achieve this goal with the intent of leveraging their learnings to other overhaul facilities around the globe," says Bill Fitzgerald, vice president of Global Services Overhaul. "The CF34-10E engine is one of many new, technologically advanced products set to hit the market in the coming years. We fully intend to replicate Strother's success on engines such as the GENx\*, GP7000\* and others to follow."

GE's Branded Service Providers, such as MTU of Germany and IHI of Japan, will also gain the



experience demonstrated at the Strother OEM facility. "We value these relationships tremendously," says Brad Mottier, vice president and general manager of the services operation for GE - Aviation. "Our goal is to make Strother and the GE-branded family of service shops the repair sites of choice."

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# Ten Years, 10,000 Engines Covered by OnPoint Diagnostics



GE - Aviation's OnPoint\* Diagnostics has expanded its monitoring program to cover 10,000 GE and CFM\* engines operated by more than 150 customers. This brings the engines covered to more than 50% of the GE and CFM powerplants in commercial service around the world. This milestone was reached with the activation of LOT Polish Airlines' diagnostics monitoring service in May.

LOT has been a customer for more than 15 years, operating a fleet of CF6\* and CF34\* engines. With this service, LOT and GE's diagnostics engineers are now able to view the same trending data online and work together in a real-time environment to improve the reliability of LOT's fleet. LOT also operates a CFM fleet, which will be monitored by Snecma and integrated into GE's diagnostics service later this year.

The diagnostics program began in 1996 as part of fleet management and was first offered as a service to customers in 1998. The up-to-the-moment monitoring software and analytical tools have proven beneficial for customers,

including China's Shenzhen Airlines. Based in Guangdong Province, Shenzhen recently presented GE with a model of its CFM56-7B-powered 737-900 as a token of appreciation for the OnPoint partnership.

Shenzhen Airlines utilizes the diagnostics data analysis for fleet management as well as reliability reviews with the CAAC (Civil Aviation Administration of China). "We thank GE's diagnostics team for its great effort to support us with comprehensive engine monitoring service whole-fleet coverage," says Yang Jia Bao, Shenzhen Airlines' vice president, Maintenance & Engineering.

"I believe this new technology will bring big value to Shenzhen Airlines by helping reduce our operation and ownership costs. It will also significantly improve engine reliability. Diagnostics is a great tool to help us meet our goals."

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