



GE Engine Services

service solutions

engines
maintenance
material
finance
information

Acquiring Technology Now Made Easier

Financing helps customers invest in new technology during rough economic times.

The economic advantages of installing an engine upgrade kit are being demonstrated throughout the industry. Extended time on wing, reduced maintenance costs, and lower fuel burn are just a few of the benefits that many upgrades can deliver. The challenge is balancing the capital investment and benefit cash flow streams needed to install these kits. Upgrading an aircraft fleet requires a significant capital spend, and while current market conditions would seem to prevent this, customized financing can be the answer.

There is a long history of financiers and investors supporting the airline industry. Asset-backed financing for aircraft and spare engines is normal business; finding a low cost financing solution for servicing and maintaining equipment is a natural extension of that approach. That financing solution is now available. GE Engine Services, in partnership with GE Capital Markets group, is helping many airlines realize the benefits of reduced initial investment and extended payment terms.

This GE team has been working with the US Export-Import Bank using the tremendous depth and experience that GE has built with the bank for more than 50 years. The bank has long been a financier for U.S. manufactured aircraft and is responding positively to support the upgrade business. Interest payments are now at their lowest level since the jet engine came into commercial use. Some features of this financing approach include:

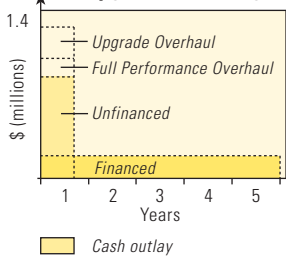
- No requirement for a letter of credit
- 90-day turnaround
- No requirement for a lien on equipment
- 100% financed fees

The results can be compelling. Extending the financing period allows airlines to reap the benefits of new technology immediately, while reducing the initial investment of the engine upgrade below that of a typical full performance overhaul (see illustration). For most upgrades, return on investment is before the next shop visit, allowing an engine a lifetime of benefits in exchange for manageable 5-year payment terms.

Financing upgrades for shop visit allows the operator to:

- Expand scope of visit to include upgrade technology
- Reap economic benefits
- Defer payments up to 5 years
- Benefit from current market low interest rates.

Cash Flow Impact of Upgrade Financing



GE90 Sets New World Record

The newest derivative of the GE90* jet engine has set another world record for thrust, reaching 127,900 pounds during final engine certification testing. The new record for the GE90-115B engine was set while completing a required FAA 150-hour block test. Designed as part of a growth strategy for the Boeing 777* aircraft family, the GE90 continues to surpass expectations and provide unmatched value for the airlines flying longer-range routes.

Visit www.geae.com for more information.



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MTU to Provide CF6 Overhaul Support for Another Decade

GE Engine Services (GEES) has extended its overhaul support agreement with MTU Maintenance for an additional ten years. The arrangement includes MTU's Hannover and Berlin facilities and covers CF6-50*, CF6-80C* and CF6-80E* engine models. MTU Hannover will perform overhaul while the MTU Berlin-Brandenburg facility will handle key repairs. For more than twenty years, GEES and MTU have worked together to ensure customers receive the highest quality overhaul service from a licensed provider along with the key repair support they expect from GEES.

Making it Better Now

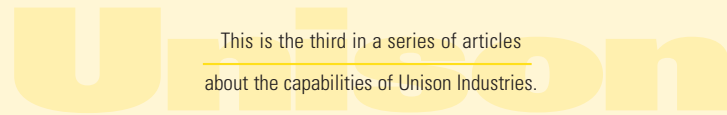
CFM56-5C/P Upgrade Kit Expected to Provide More than a 40% Improvement in Time Between Shop Visits

In conjunction with the development of a new production engine for the Airbus A340* Enhanced, CFM International is developing an upgrade kit to incorporate the latest CFM56-5C/P improvements into the existing -5C4 fleet. "The CFM56-5C/P upgrade kit allows us to inject the latest technology into existing engines, greatly enhancing the performance of the CFM56-5C4," said Bill Clapper, executive vice president of CFM.

The upgrade kit, which can be installed during a performance restoration shop visit, incorporates new 3-D aero design airfoils, including a new high pressure turbine blade design with 20 percent more cooling air flow. Benefits include up to a 1 percent improvement in specific fuel consumption (SFC). On average, a 1 percent SFC improvement translates to \$15,000 - \$20,000 additional fuel burn savings per engine per year. The most significant advantage of the kit, though, is a 13°C increase in exhaust gas temperature (EGT) margin. The additional EGT margin will help reduce maintenance cost by up to 10 percent and provide significantly longer time on wing between shop visits.

Both the engine and the upgrade kit will be certified in the fourth quarter of 2003. CFM plans to deliver the first CFM56-5C/P upgrade kits in November.

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PMAs, What's in a Name?

You may know them as PMAs, Permanent Magnet Alternators, engine dedicated alternators, or maybe even as permanent magnet generators. But whatever you know them as, you should know they are crucial components for providing power to the ignition exciter, FADECs (Full Authority Digital Engine Control), or other accessories on gas turbine engines.

A Permanent Magnet Alternator consists of a high-energy rare earth permanent magnet rotor that rotates within a steel stator core wound with high-temperature insulated copper windings. Electrically, they provide AC power proportional to engine speed. Depending on the conditioning electronics downstream, PMAs can be designed to operate either in voltage mode (open circuit) or current mode (short circuit).



PMAs must operate in very demanding conditions. Unison manufactures PMAs with operating temperatures of -65°F to 500°F, with 300°F being typical. Also, Unison's PMAs are designed to withstand vibration of 10 g's, although certain units experience up to 100 g's under extreme conditions.

Unison's PMAs provide power on the majority of commercial and military aircraft in service today. Unison's products are also the PMAs-of-choice for next generation aircraft. In fact, Unison has received a contract for developing PMAs for the system development and demonstration phase of the engines that will power the Joint Strike Fighter.

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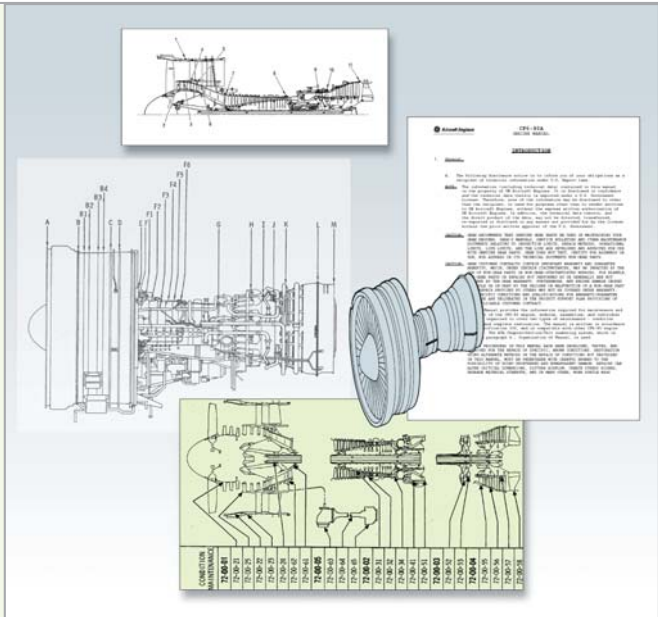
The FAA Accepted Info You Need, When You Need It!

The FAA has designated the GE Aircraft Engines (GEAE) Customer Web Center (CWC) on-line system of delivering technical publications as an “accepted” medium for distribution.

“We wanted it to be easier and more cost-effective for our customers to get this information,” said Kevin Kast, manager of technical publications for GEAE. “Now, access to these publications means the customer can address service and repairs issues when they need to.”

This designation will enable the timely release, access, and transfer of information and technical data from GEAE to its thousands of customers around the world. It provides a cost savings over paper-based publications in the form of reduced time and manpower requirements in the shop. It also ensures that the customer is getting the most accurate, up-to-date information, which guarantees the most effective service and repair of engines.

GEAE’s on-line medium was originally released with a “Non-Approved FAA Medium” disclaimer. After intensive research and extensive dialog with the FAA, the FAA notified GE that it would be permissible to remove the disclaimer from the CWC. GEAE removed the disclaimer this past September.



The information available on the CWC represents the same official information that is currently delivered on hard media such as paper and CD-ROM. Any modifications to data obtained through the CWC must still follow the same local approval process that would be required for data obtained through hard media.

If you are a GEAE customer who does not currently have access to the CWC, please contact the GEAE Customer Support Center (CSC) at gae.csc@ae.ge.com for access information.

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The New GEAE.com Better Navigation, Better Access...a Better Tool

The GE Aircraft Engines Web site is new and improved. The revitalized site, at www.geae.com, has been redesigned to be more “customer-centric” making it simpler to use and chock full of innovative features to allow easier navigation.

“The new site incorporates innovative Internet technology advances and design, and will build upon its world-class reputation among Web users worldwide,” says Karen Tripp, general manager of global communications at GEAE.

This was one of the first public Web sites launched by an aerospace company. It averages more than 750,000 hits a day and provides more than 1,200 pages of content. Since its launch in 1996, significant improvements have been made to the site, including the addition of the award-winning Customer Web Center. The CWC is a separate, secure-access site developed for improved 24/7 customer service. More than 360 global airlines use the CWC. It continues to thrive as an important customer tool with Web orders doubling this past year alone.



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CWC > productivity tip

No More Lost Paperwork Headaches

> It never fails. At the most inopportune time, you can't find that crucial paperwork. The Customer Web Center (CWC) can help. The CWC now offers Memo of Shipments (MS) and 8130 copies online so you can access them anytime.

CWC users can find the information by using the "Search" feature under "Spare parts," or searching for "purchase order status."

If the item has been shipped, the MS number can then be accessed and linked to the complete MS and FAA 8130 documentation.



The purpose of *Service Solutions* is to enhance communications with our customers. Please contact us if we at GE Engine Services can be of further service to you.

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J-AIR Banks on Accurate Operating Forecasts

J-AIR Co., Ltd., 100 percent subsidiary of Japan Airlines Company, has awarded GE Engine Services (GEES) a comprehensive engine maintenance contract. This is the second maintenance contract with Japan Airlines Group in three years.

The 10-year agreement to maintain the carrier's CF34* engines which power a fleet of Bombardier CRJ200* jets has GEES performing engine maintenance under GE's Maintenance Cost Per HourSM (MCPHSM) program. This program uses GE's maintenance network, engineering resources, and program management expertise to maintain an individual customer's fleet based on a flat rate per engine flight hour. This makes it possible for the customer to forecast operating costs with greater accuracy.

"Since launching the program, more than 40 customers have selected GE's MCPH customized solution to complement core competencies and optimize cash and asset efficiency," says Dan Heintzleman, president and chief executive officer for GE Engine Services.



GE Engine Services

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The CFM56 engine is a product of CFM International, a joint company of Snecma Moteurs, France, and General Electric Company.

CRJ is a trademark of Bombardier Inc.

777 is a registered trademark of Boeing Company.

A340 is a registered trademark of Airbus.