

More than one-third of a system's life-cycle cost is maintenance. AFLC aims to get that job done better, cheaper, and faster.

Squeezing More From the Logistics Dollar

THE C-141 StarLifter's secondary exhaust nozzle is a major Air Force logistics headache. This crucial part is based on twenty-five-year-old technology, and its high rate of corrosion and cracking gives it the dubious honor of being the top consumer of maintenance man-hours on the C-141's TF33-P-7A engine.

When the nozzles cannot be repaired in the field, they are sent to Warner Robins Air Logistics Center, Ga. Crews there will fix eighty-two nozzles this year, at an average cost of \$37,415 each. That comes to \$3 million, so it is not surprising that Warner Robins has been seeking a long-term solution to the problem.

In October 1987, officials displayed the cantankerous nozzle at a technology fair. An enterprising contractor seeking new business said that, with modern materials and manufacturing processes, he could build one ten times more reliable. A development contract was let. Now USAF is anticipating the day a decade hence when each C-141 will be fitted with highly reliable secondary exhaust nozzles.

"It'll take us a while, but with this

[new nozzle] we're going to fix a long-standing problem," Warner Robins Commander Maj. Gen. Dick Gillis told an AFA acquisition and logistics symposium held last April in Arlington, Va.

Lower Cost, Higher Sophistication

This change in nozzles exemplifies many of the actions that Air Force leaders at the symposium said they must take to squeeze more return out of logistics dollars in years ahead. USAF's logistics infrastructure will have to become more innovative and responsive in the way it does business, maintained Gen. Alfred G. Hansen, Commander of Air Force Logistics Command (AFLC). USAF technology fairs, such as the one that sparked the nozzle contract, are an attempt to manage better and generate ideas at lower cost.

In addition, the General asserts, Air Force logistics will have to become more technically sophisticated. State-of-the-art materials and processes must be adapted to support today's weapon systems. In the future, reliability and ease of main-

BY PETER GRIER

AFLC is implementing new programs to get the most from every available asset. Efficiency, responsiveness, and long-term sustainability cost savings have all been boosted. Here, maintenance personnel from the 410th Bomb Wing, K. I. Sawyer AFB, Mich., spend a Saturday afternoon squeezing a little more from a wing B-52.



tenance must be designed into new systems from the outset.

"We have had to take a deep look at ourselves and those things that could be better organized and more efficient," claims General Hansen, "because we recognized that budget funding had gone down and was going to continue to go down."

One of the AFLC Commander's prime goals at the outset of 1989 was to make his command pay more attention to customers. Traditionally AFLC had not seemed particularly user-friendly, believing that its role was merely to keep spare-parts bins full. Thinking of Strategic Air Command, Tactical Air Command, and other users as "customers" in the commercial sense may have been something of a cognitive leap.

Quality is another area of emphasis. General Hansen says AFLC is embracing the Zen-like approach to quality control that Ford Motor Co. and other US corporations have used to help turn their businesses around. AFLC production workers now have a Quality Bill of Rights that permits them to challenge "business as usual" and to place the pursuit of quality above production.

This is not just window-dressing. Already, three AFLC workers have been able to shut down production lines because they were seeing products of dubious quality. What's more, claims General Hansen, "we made those three people heroes."

Competitive Contract Changes

Congressionally mandated changes in procurement are altering the way AFLC does business. A case in point is AFLC's attempt to increase use of competitive contracts. Over the last decade, AFLC use of competition has approximately doubled.

At Warner Robins, competitive contracting has increased by fifteen percent during the past year, says General Gillis. Today, some forty percent of dollars spent annually by the Center are let in competitive contracts. The overall figure remains lower than it might otherwise be, says General Gillis, because much of the electronic warfare equipment he needs is so complex that it can be bought from only one contractor.

Changes in USAF force structure have brought about dramatic plan-

ning problems. Only a few years ago, AFLC was expecting to support forty tactical fighter wings; then the figure was lowered to thirty-seven; then it dropped again, to thirty-five. This has led to parts being bought to support planes that won't arrive.

"I have got one hell of a problem trying to plan logistics support for a phantom outfit that is here today and gone tomorrow," says General Hansen.

Cuts in AFLC's own budget cause greatest concern. No longer can AFLC count on purchasing large quantities of parts to ease supply problems. Parts availability peaked in 1987 and has been sliding downhill since. In general, AFLC is buying only peacetime spares. War reserve materiel isn't getting funded.

"If we don't have those massive piles of spares, we have to look in other areas to make sure there is combat capability," says General Hansen.

For logisticians, USAF officials maintain, smarter acquisition practices will become critical. The case of the C-141 nozzle was one example cited by General Gillis of acquisitions that could help ease logistics tasks. Among others:

- A new 60,000-pound loader. This vehicle and 25,000-pound and 40,000-pound variants are crucial tools for Military Airlift Command. In days gone by, they were purchased from the lowest bidder, period. But the smaller models have not lived up to expectations, so AFLC is taking a new approach for the 60,000-pound loader. In September, two contractors will be picked to build two prototype loaders apiece. MAC will test them to see which version it prefers. Once a winner is picked, a second competition will be held, this one for a contractor to produce the winning design.

"This is a long-term operation," notes General Gillis, "but we're going to get a loader that is workable, and with a mean time between failures so far in excess of what we have that MAC is going to have a warfighting weapon."

- LANTIRN. The Low-Altitude Navigation and Targeting Infrared for Night pod system will be repaired and maintained in a new, paperless automated depot. When the depot is complete, Robins will have

in-house capability for fixing some 300 repairable pod parts.

LANTIRN tech data will be digitized on a computer database. Training will be done by video. Material handling and storage will be automated. The depot computer will track individual parts by serial number and will collect failure data from the field.

"We will virtually eliminate all paper associated with the LANTIRN project," says General Gillis.

Modernizing Management Tools

Acquisition strategies aren't the only means being studied by AFLC to wring more logistics out of the budget. General Hansen listed three other primary changes that he is pursuing at AFLC: improving efficiency of the logistics infrastructure, improving responsiveness, and cutting costs of longer-term sustainability.

Modernization of AFLC management tools is viewed as a key means for improving the command's efficiency, according to General Hansen. Currently, AFLC is developing perhaps the largest military support data system in the world, with nine core systems that will each contain 3,000,000 to 4,000,000 lines of software code.

In the stock control and distribution data system, for instance, a part-tracking task that previously might have taken seventy-two hours will take perhaps as little as twelve seconds. "We can tell a director of maintenance somewhere whether or not that part is going to arrive, at what hour, and what the mode of transportation is," says General Hansen.

AFLC is studying automated warehousing systems for its \$28 billion inventory and is restructuring inventories where possible to achieve Japanese-style "just-in-time" deliveries. It has set up a joint working team with AFSC to study ways of getting new weapon systems off contractor support and into full in-house depot maintenance as fast as possible.

A final efficiency change is a deceptively simple one: AFLC is focusing its repair operations on problems that can actually ground an airplane, rather than trying to fix absolutely every problem, large or small. Setting priorities in this man-

ner, notes General Hansen, has already increased the mission-capable rate of the F-16 fleet by eight percent.

Restructuring AFLC

To help make the AFLC bureaucracy more responsive to user problems, General Hansen has restructured large portions of his sprawling command, moving 18,000 workers to different slots.

A large part of this change revolves around an increase in the power of the AFLC system program manager. In the past, system program managers were figureheads, says General Hansen, with few workers and small budgets under their direct control.

nization focuses on logistics for space. In the past, most space system support has been carried out by contractors and has been marked by miscommunication and Air Force loss of control over system configuration. The Air Force is now moving to "normalize" space logistics, in General Hansen's phrase, and will put space support under AFLC's purview.

One result is the appearance of a budding AFLC space depot in Colorado Springs. Plans call for the depot, which employs 330 workers today, to grow to 1,200 workers over the next five years. It will have total responsibility for supporting NORAD's Cheyenne Mountain Complex and is planning to bring satellites

the whole thing the air of an adults' science fair. In some instances, says General Hansen, "we'll go ahead and write a contract right there" if a contractor proffers a workable idea.

A carrot-and-stick approach is being adopted at AFLC for improving contractor performance on certain stock items. The carrot is a "Blue-Ribbon Contractor" designation for firms that deliver on time, with good quality. Such recognition, officials say, can lead to more business. That is because, on applicable contracts, AFLC is authorized to pay up to twenty percent higher than the lowest bid in order to do business with a proven, Blue-Ribbon contractor. All 241 stock-item classes carried at Warner Robins are open to Blue-Ribbon competition.

The stick is the Contractor Responsibility Review Program (CRRP), which rates company performance on a kind of report card used by AFLC managers in determining purchase decisions. The CRRP isn't perfect. "We got a nastygram the other day from a guy we said was sixty percent delinquent on two of his contracts," says General Gillis of Warner Robins. "He wrote and said, 'Your data is screwed up. I never delivered anything late in my life.' He was right."

Even so, the report cards are going to be a fact of life, claims General Gillis. CRRP will be one of his main tools to raise on-time delivery rates, which currently hover in the fifty percent range rather than the AFLC goal of eighty-five percent. Warns the General: "If a contractor consistently fails to deliver on time, we will not award future contracts to him, period."

New Technology in Old Systems

Weapon master plans are another means of addressing the cost of sustainability. They lay out the expected logistics expenses over the service life of an aircraft or other system, showing effects of modifications on the support budget. As a result, decision-makers will be better informed about the costs of updating a weapon. "We're actually working on a ten-year projection on an airplane, cradle to grave," says General Hansen. "It's the first time we've done that."

The most promising way to cut

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Now item managers and buyers have been placed under the system manager's authority. "For the first time, we have the people who are making the requirements and the people who are buying the things talking together," says General Hansen. "We're finding out that we're able to process our purchase requests much faster. Quality has gone up on our purchase requests."

Seven hundred new AFLC process action teams—basically suggestion and quality-control groups—are now at work. Recently, such a team at the San Antonio Air Logistics Center devised a new coating for the augmentor on the back end of the F100 engine. AFLC maintains that the new process will extend the life of the typical augmentor by two and a half years.

Another recent AFLC reorga-

and other space systems under its logistics authority.

Contractors and Sustainability

Squeezing the most out of the AFLC budget will also require cutting sustainability costs. Revamping the AFLC infrastructure can solve only part of the problem. The command will have to work with contractors to make sure that weapons in the future need less maintenance and supply.

General Hansen points to wider use of the technology trade fair as one answer to this long-term need. These gatherings, held at logistics centers across the country and advertised in *Commerce Business Daily*, feature parts that are causing trouble, whether they involve avionics or engine components. The parts are laid out on tables, giving

sustainability costs is the use of new technology. In the past, scientific advances tended to pass AFLC by; now the command has a chief scientist to provide an AFLC liaison to the scientific community. The idea is to ease the logistics burden by inserting new technology in old systems.

Example: the F-111D digital signal transfer unit. At present, two particularly complex circuit boards in the unit each cost \$24,000 and sustain a mean time between failures of forty hours. These units can be replaced by a single board at a cost of \$3,000 and a mean time between failures of 5,000 hours. The secret? The new board has one Very-High-Speed Integrated Circuit

are giving a quick logistics payoff in the short term, even bigger savings can be achieved by giving attention to the support needs of a weapon in its design. That is the job of the Acquisition Logistics Center.

The potential importance of such an approach can be seen in a just-completed Air Force study of a High Reliability Fighter concept. The study took a baseline aircraft—representing capabilities from the F-16, the F-15, and other existing planes—and concluded that, in a thirty-day campaign, it could kill about 5,000 targets. Then, using technologies that are now available or will be available by the year 2000, the study rated a hypothetical fighter whose reliability and ease of

Logistics Applications (MITLA) program is one high-tech effort to make AFLC inventory efforts more efficient. It uses “smart cards”—small memory/logic devices carrying a silicon chip—to mark and track Air Force parts and workers. For personnel, smart cards can store all service records, replacing paper files that must be moved on reassignment. For parts, the smart cards will be able to transmit information, such as remaining product shelf life, over data networks back to AFLC headquarters.

Another experimental effort is the Micro Miniature Time Stress Measurement Device, known as the Micro TSMD. This device is like a tiny weather station, a combination of microchip and miniature sensor placed in a weapon to record temperatures, G-forces, and other environmental parameters to which equipment is subjected. Data are tapped by diagnostic tools.

First test of the Micro TSMD will be on the electronic warfare system of the F-4G Wild Weasel. Eventually it could become a partner in logistics with MITLA. “A MITLA tag can identify and record that a failure has occurred and track the maintenance actions required to fix it,” explains General Spiers. “The Micro TSMD gives the details as to why the failure occurred.”

Even computer-created cartoons are being enlisted to improve logistics. “Crew Chief” is an experimental, computer-graphics simulation of a maintenance technician. Engineers designing weapons with computer-aided systems now can plug Crew Chief into their workstations and find out how hard it might be for a real person to maintain the new system. Crew Chief shows whether a human can reach all bolts, whether he can see in tight spots, and whether he’s strong enough to remove a module.

“It actually simulates maintenance actions,” says General Spiers. Someday, Crew Chief might finally put an end to one of the favorite imprecations of real chiefs experiencing problems getting something off of or into a plane: “The guy who designed this should have to do it himself.” ■

The amount of money saved by designing for better logistics could be great. According to one estimate, maintenance accounts for about thirty-five percent of the life-cycle cost of military systems.

(VHSIC), a cutting-edge microchip that packs an unprecedented amount of processing power into a tiny space.

The Seek Igloo radar system, located at remote sites in Alaska, also will benefit from a VHSIC retrofit. Currently, Seek Igloo signal-processing units fail once every twenty-nine days, on average. With new VHSIC technology and a modular architecture, mean time between failures is being lengthened to seven months, and the size of the processing unit is shrinking. Life-cycle cost savings are estimated at \$315 million.

“With these kinds of results, we need to get VHSIC into more of our systems,” says Maj. Gen. Joseph Spiers, Commander of the Air Force Acquisition Logistics Center. While upgrades to existing weapons

maintenance had been maximized. Target-kill capability rose to 9,000.

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High-Tech Inventory Control

Use of new technology in other areas also could save big bucks. AFLC stocks an inventory of 2,000,000 items worth \$25 billion. Keeping track of this inventory and moving it worldwide is an intricate and expensive task, and any improvement in efficiency could have a big payoff.

The Microcircuit Technology in

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