

**When it comes to maintaining the 2,500 acres of grounds, 23 buildings and three runways located at the Philadelphia International Airport, proactive maintenance, cross-trained employees, constant communication and a short work order paper trail are vital.**

What can maintenance professionals in industry learn from the work of Aviation Facility Manager Liciardello and his crew? This Best Practices report shows how the airport:

- Uses proactive maintenance to reach uptime goals.
- Cross-trains employees for more flexibility in responding to problems.
- Emphasizes constant communication between departments and top management.
- Reduces the work order paper trail.

### **Coordinated communication**

Even though the facility services department is cross-trained to a degree, the 400-member crew is divided into several functions. These include a technical services department that handles, purchasing warehousing and insurance; a building maintenance crew; a custodial staff; an electrical services department, which maintains all electrical systems; a pavement and grounds crew; a utility maintenance unit, which includes the HVAC equipment; a fleet maintenance group; a work control and planning function, which creates and distributes workorders; and an electronic services section that maintain voice, video, data and network equipment.

The key to keeping such a large facility services department in working order is communication, according to Liciardello. Each of the department heads regularly meet with their employees to discuss priorities and jobs for the week. This group of managers also gets together with Liciardello on a weekly basis. Following this meeting, Liciardello meets with senior management and Dennis P. Bouey, director of aviation, to go over any policy changes and major projects and the general condition of the departments.

In addition, the work control staff has its own weekly meeting, as well as a quarterly one with each of the departments to discuss any problems or issues concerning the work order system. This division is a necessity because the facility services department receives an abundance of work orders from a variety of sources.

Members of the maintenance staff, other airport employees and even passengers can pick up one of the airport phones or send a fax to report a problem in any area of the facility. These requests are directed to the work control center, which enters non-emergency and low priority problems into the Computerized Asset Management System (CAMS). Based on these entries, the computer generates a list of scheduled activities and workorders are delivered to the appropriate department.

The CAMS also tracks follow-up information and contains asset, labor resource, material cost and safety regulation tables that are sometimes necessary when performing a repair. In addition, when a new piece of equipment is acquired, the planners in the center work with the receiving department head to develop a maintenance plan for the life cycle of the asset.

### **Reducing paperwork**

Radio communications are often used for maintenance requests that don't merit the same treatment as a PM or repair on a vital piece of equipment. If the work control center receives a call that fits this category, it radios the task to the appropriate department. The person designated to respond to unscheduled trouble calls for the day goes out and performs the task. Once the job is complete, he calls the work control center and gives a report on the condition of the asset and the repair. At this point a work order is generated.

"This system eliminates the steps involved in generating a work order, sending it over to the shop and then having a mechanic fill out more paperwork, but it still allows us to quantify and track even minor problems which could reflect some sort of trend or failure," Liciardello says.

To further reduce paperwork, Liciardello says an electronic system is being devised. "We are going to have the work control network extended to all the shops so they will have terminals to allow electronic transmission of all work orders," he notes. "Then through a scanning or data entry function, those work orders will come back completed to be reviewed and finalized."

The first step toward the new system includes testing personal notebooks for use with the digitized workorder process. A crew member would take the notebook on his rounds and fill out information about whatever repair, PM or inspection he is performing for each asset. When he returns to the shop at the end of the day, the information would be down loaded into the main system and become a scheduled task on a timetable within the CAMS.

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While the goal of advanced preventive/predictive maintenance programs in industry is 0% downtime, this goal is very rarely reached. Reactive maintenance is still the norm in industry: fix a component after it has broken.

Just what does it take to keep so many airplanes flying safely and efficiently? Aircraft maintenance professionals offer many answers: strict scheduling, meticulous documentation, outstanding preventive and predictive measures, and stringent adherence to regulations are important factors in the success of aircraft maintenance. But the skill, training and dedication of maintenance personnel also plays a critical role. In these respects, experts agree that airline industry maintenance sets the standard for all maintenance endeavors.

## Preventing problems

While predictive maintenance techniques provide valuable insights into an airplane's long-term health, it's the day-to-day preventive activities that keep it safe and reliable. Airline preventive maintenance is not haphazard: schedules, standards and repair routines are clearly spelled out and communicated.

"Everything is based on a pre-established schedule of what we want to accomplish," says Marlar, "and each item on the airplane is looked at in that schedule based on its predicted wear-out and life cycle."

Documentation is imperative in the airline industry. From the crew's pre-flight checklist to ongoing maintenance records, nothing can be done to an airplane without being properly documented. Marlar stresses that documentation is perhaps the most vital aspect of airline maintenance, and something that industrial maintenance professionals should take note of to improve their own operations. "I think that would be the most important thing I would talk to somebody about [in another field]: documentation and the ability to analyze what the conditions are and repeat the solutions," he says.

Feelar cites scheduling as a key reason for the success of aircraft maintenance. "You've got a \$50 million airplane, you can't take it out of service for maintenance," he stresses. "So you break the maintenance schedule down into bits and pieces. The airline industry has probably perfected that to a higher level than other industries."

"Everything we do is documented," stresses Marlar. "Every person, every crew has to keep a turnover log of all their jobs. Ninety percent of the jobs that they perform are done to a cookbook-type guide." The other 10 percent of the jobs are rudimentary enough that qualified maintenance technicians can do it without the checklist, but they must have a technical manual to back them up.

American Trans Air tracks the maintenance history of its planes with a computer system, backed up by a card file. United has an extensive computer system to keep tabs on the maintenance of its planes. "The airplanes are so sophisticated that they talk to the computer," says Sickels. "For example, I can sit at my desk and tell you to the minute how many hours each of our planes have on them, because the computer tracks each flight and updates the time the airplanes take off and land."

The computer systems on modern jet aircraft are able to automatically transmit maintenance information back to the ground shortly after takeoff.

Capitalizing on computer technology, Boeing Commercial Airplane Group, Seattle, WA, made life easier for aircraft maintenance personnel by introducing an extensive on-line database in May 1996. It

includes numerous technical drawings and parts lists, as well as service bulletins, a maintenance manual, and specifications and processes for parts and materials - literally a one-stop shopping forum for airplane mechanics. The on-line service should prove a welcome alternative to searching through endless pages of manuals or aperture cards, which have been the standard means of storing airplane drawings and parts lists for decades. A set of cards for a single aircraft type can number well over 100,000, and can easily be misfiled or damaged, so the use of on-line databases should prove more efficient and accurate.

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