Passengers arriving at Chicago’s O’Hare International Airport are used to hearing flight attendants announce, “Fasten your seatbelts and return your trays to the upright position.” The announcement could very well include, “You’re in for a smooth landing.” That’s because passengers approaching runway 9L 27R will be landing on new asphalt.

Although most passengers are not conversant with pavement technology, they do expect a runway that enables the pilot to make a smooth and safe landing. They also don’t want their travel arrangements interrupted due to construction delays.

In addition to smoothness and speed of construction, the aviation industry also demands low maintenance and a low initial and life-cycle cost. Hot-mix asphalt meets the demands of the public and the industry. Thus, it is no surprise that O’Hare would choose to do an asphalt overlay project as part of its $12.1 million runway 9L 27R rehabilitation project.

History of the runway

Runway 9L 27R had last been rehabilitated in 1988. At that point, the project consisted of overlaying the existing surface with 4 in. of asphalt and an extension of the 27R approach. The 9L approach also required removal and replacement of 15 in. of portland cement concrete (PCC).

The project schedule allowed for a continuous 30-day closure. During this closure, the contractor was to complete the concrete paving at both the 9L and 27R approaches.

In 1998, the City of Chicago Department of Aviation (DOA) completed a pavement evaluation and a plan was developed to rehabilitate the runway. McDonough & Associates, a Chicago-based design firm, was tasked with establishing the scope of rehabilitation. The design consisted of removing an 800-ft x 25-ft x 15-in. lane of existing PCC pavement and approximately 1,000 sq yd of full-depth PCC patches at the 9L approach, a variable depth asphalt overlay on the remaining 7,000 ft of runway and the upgrading of existing electrical systems.

The project included 45,000 tons of asphalt, 5,000 sq yd of asphalt partial-depth patches, 1,500 sq yd of full-depth PCC removal and replacement and 200,000 sq yd of asphalt concrete milling.

A quality project

Field supervision was assigned to Alfred Benesch & Co., a consulting engineer firm in Chicago. In conjunction with DOA, the DOA Construction Manager (CM) and Benesch the team began reviewing all documents associated with the contract, scanning for errors or omissions that could potentially jeopardize the project’s schedule, cost or quality.

“Doing it right the first time prevents having to do it over a second time,” said Dr. Bruce Brummel, CM’s Director of QA/QC. “Our team’s close review of the project plans was integral to the project being completed on time and under budget.” The project began July 5, 2000, and was completed Sept. 7.

The team included the chosen contractor, E. A. Cox Construction Co. Prior to submitting bids, prospective contractors were given an opportunity to visit the project site as well as to attend a pre-bid conference to ask any questions that pertained to the contract documents. After being awarded the project, E. A. Cox Construction Co. supplied a quality control program and staff. Benesch also developed a quality assurance program working in conjunction with CM to provide materials testing and inspection.

Grove is director of communications for the National Asphalt Pavement Association.
The runway was reprofiled and particular attention was paid to the survey layout. Spreadsheets were developed and monitored to ensure the new profile grade was constructed properly. Benesch provided materials testing through a sub-consultant, STS, and also provided inspection and coordinated all of the work with DOA operations.

“A great amount of time and effort was spent on the quality aspect of this job,” said Daniel Gross, resident engineer, Alfred Benesch & Co. “Weekly progress meetings were held to review the contractor schedule, progress and quality issues. A daily meeting was held during the five-day, around-the-clock runway closure.”

**Overcoming rocks in the road**

“After several months of design and plan review,” said Alan Dadian, CM’s project manager, “the biggest obstacle was to convince airlines to close the runway in order for concrete repairs to be completed.”

Typically, over the past five years, runway work at O’Hare has been completed at night between the hours of 10:30 p.m. and 6 a.m., with the work consisting of asphalt overlays. These overlays can be completed at night with a minimal impact to air traffic.

After several meetings between the Federal Aviation Administration, airlines, CM and the Chicago DOA it was agreed that the runway would be closed nightly for 65 days, with a sub phase of five continuous days to complete the necessary concrete repairs. To ensure that the end dates were met, the DOA placed liquidated damages for the 65-day schedule and special liquidated damages for the five-day sub phase in the event the contractor exceeded the established schedule. With these restrictions, the contractor decided to work seven nights a week.

“Some of the other ‘rocks in the road’ included the location of existing utilities, night vision, clean-up and clearance of the runway by 6 a.m. every morning, and weather delays,” said Gross.

The success in addressing these concerns is attributed to team effort, communication and coordination. “We made every effort to keep DOA operations informed and updated about the project,” said Dadian. “In addition, problems were identified and solved as early as possible. Quick responses resulted in quick resolution and allowed the project to move forward.”

Some of the difficulties associated with this project had to be worked out. One of these difficulties is night vision. The contractor supplied plenty of mobile generators with light plants, which were moved into position and strategically placed to illuminate the areas to be worked in on a given night. Placement of barricades and lighting was the first order of business on a nightly basis.

Clearing the runway by 6 a.m. every morning for aircraft traffic was very important. Representatives from Benesch, the contractors and DOA operations reviewed the entire runway before opening it to make sure that everything was clean and that the runway was restored to an operational condition. The runway was not opened without the DOA approval. Several sweepers worked throughout the night to stay on top of the cleaning operation.

“We were fortunate that the weather cooperated for the most part,” said Gross. “DOA allowed the contractor several time extensions on weekend mornings to help them stay on schedule, which compensated for any delays due to weather that the contractor incurred.”

Once the contract was awarded, the DOA provided a staging area for the contractor and a location for a new mobile CMI triple-drum asphalt plant.

The design consisted of removing an 800-ft x 25-ft x 15-in. lane of existing PCC pavement and approximately 1,000 sq yd of full-depth PCC patches at the 9L approach.
staging area for the contractor and a location for a new mobile CMI triple-drum asphalt plant. The plant was capable of producing approximately 400-500 tons per hour.

E. A. Cox set up a testing laboratory next to the plant, which met the DOA requirements and the project specifications. The lab was equipped with the testing equipment necessary for the QA/QC inspectors to perform tests on the asphalt material produced each night. Before any mix was placed in the field, a test batch was produced to make sure it fell within the parameters and guidelines of the project specifications.

In addition, the DOA allowed a section of an existing runway to be used for a test section, which also was required for the specifications. The work performed on this test section simulated the effects of a typical nightly operation and enabled the team to confirm the operation was smooth and the asphalt being placed was acceptable.

QA/QC testing was performed on the site as well as in the lab. Rolling patterns were established, temperatures taken and nuclear density tests were performed to ensure proper compaction. The asphalt placement on the project was subject to FAA mix design criteria and the percent-within-limits (PWL) requirements.

Receiving 100% pay using FAA PWL specifications has often proved to be very difficult. However, due to partnering and a commitment from all members of the construction team, including designers, inspectors, QA/QC personnel and contractors and their crews, the contractor received over 100% pay for all HMA paving including longitudinal joints. The key to this success—working together as a team and paying attention to what is required and what it takes to meet the requirements.

**Airport funding rises**

With the passage of the Aviation Investment and Reform Act for the 21st Century, increased funding for airport construction and rehabilitation is virtually assured through fiscal year 2003. The Airport Improvement Program was reauthorized by AIR-21. In fiscal year 2001, its funding jumps by more than 50% to $3.2 billion, up from $1.9 billion in fiscal year 2000. Funding rises slightly in both 2002 and 2003. About 54% of all AIP grants go toward funding runway, taxiway and apron projects.

With this funding, airport owners and the aviation industry can take advantage of the benefits of hot-mix asphalt for airport construction.

**Why asphalt**

“Putting together a pavement that is low-maintenance, has excellent smoothness and a fast construction time is critical to the airport’s operation,” said Dr. David Newcomb, vice president of research and technology at the National Asphalt Pavement Association.

Airport runways constructed of hot-mix asphalt are smooth, durable and fast to construct. They meet the needs of both the aviation industry and the public. 

Due to time restrictions, E. A. Cox Construction worked seven nights a week.