FLIGHT SAFETY FOUNDATION
Airport Operations
Vol. 26 No. 5 *For Everyone Concerned With the Safety of Flight* September–October 2000

Airfield Driver Training, Enforcement Help Prevent Aircraft-vehicle Collisions

Strictly limiting access of ground vehicles and ensuring that all drivers are authorized and qualified to operate on airport movement areas can enhance safety. Updating policies, procedures and training; using simulation technology; and identifying 'hot spots' also are believed to be effective.

FSF Editorial Staff

While coping with traffic growth, airports worldwide have worked to prevent collisions between aircraft and by airport vehicles. Whether airfield driver training, certification and enforcement are conducted by national civil aviation authorities, local airport operators, air traffic services or other organizations, international specialists believe that these measures can reduce the number of incidents and accidents. Nevertheless, they also have recognized a need for better data and analytical tools to study the relationship between airfield driver training methods and driver performance, and how airfield drivers affect the overall safety of flight operations.

Jane Garvey, administrator of the U.S. Federal Aviation Administration (FAA), in June 2000 said that "a million or more people [are] authorized to operate vehicles" on the airfields of U.S. airports — that is, any portion of an airport not accessible to the public, also considered the airside of the airport — that taxiing on an airport surface is considered the most hazardous phase of flight and that FAA projects a 35 percent growth in air carrier traffic during the next 10 years.[1]

Since January 2000, FAA has prohibited its personnel from driving on the airfield of any airport unless they have read *Airport Ground Vehicle Operations: An FAA Guide* and certified in writing that they have read and understood the contents.[2]

In underscoring the importance of airfield driver training, FAA said, "While aircraft crossing taxiways or runways without clearance may be involved in many runway incursions, people driving vehicles on the movement area may also be involved in a [vehicle/pedestrian deviation (VPD)]. While some airports have driver training programs for airport personnel, it is often assumed that FAA employees are qualified to drive on the airport by virtue of their profession. … The reading of this guide is an integral step to ensure that FAA employees are not involved in runway incursions or surface incidents."[3]

FAA defines a VPD as "any vehicle/pedestrian incursion resulting from a vehicle operator, nonpilot operator of an aircraft or pedestrian who deviates onto the movement area (including a runway) without [air traffic control (ATC)] authorization." Runway incursion is defined by FAA as "any occurrence at an airport involving an aircraft, vehicle, person or object on the ground that creates a collision hazard or results in a loss of separation with an aircraft taking off, intending to take off, landing, or intending to land." Not all VPDs are runway incursions.

U.S. Federal Aviation Regulations (FARs) Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, defines movement area as "the runways, taxiways and other areas of an airport which are used for taxiing or hover taxiing, air taxiing, takeoff and landing of aircraft, exclusive of loading ramps and aircraft parking areas." Safety area is defined as "a designated area abutting the edges of a runway or taxiway intended to reduce the risk of damage to an aircraft inadvertently leaving the runway or taxiway."

Ben Castellano, FAA manager of airport safety and certification, said that the latest FAA order updated a 1992 order on safe airfield driving by FAA employees as part of continuing efforts to prevent all types of runway incursions.[4]

Castellano said, "There were instances in which FAA's employees committed VPDs that resulted in runway incursions, although there were no records until we started the latest program. We found in the early 1990s that there was no internal FAA training program to drive on movement areas. We would get a brand new employee and there was no guarantee that the person would be trained in operating ground vehicles safely on the airfield."

An assumption exists that those FAA employees — while obtaining security identification badges at individual airports — will receive airport-specific driver training if they need to drive unescorted on an airfield, he said. FAA employees typically must meet the airfield driver training requirements of specific airports, but they also are required to know the content of FAA's guide, Castellano said.

"If nothing else, all FAA people should be familiar with the guide," he said. "They cannot drive on an airfield unless they have complied with the order."

Castellano said that the requirements of FARs Part 139 are general in nature and that airports comply by developing their own detailed procedures, including those for airfield driver training. FARs Part 139.329, Ground Vehicles, says that each airport certificate holder must meet following requirements:

- "(a) Limit access to movement areas and safety areas only to those ground vehicles necessary for airport operations;
- "(b) Establish and implement procedures for the safe and orderly access to, and operation on, the movement area and safety areas by ground vehicles, including provisions identifying the consequences of noncompliance with the procedures by an employee, tenant, or contractor;
- "(c) When an air traffic control tower is in operation, ensure that each ground vehicle operating on the movement area is controlled by one of the following:
  - "Two-way radio communications between each vehicle and the tower;
  - "An escort vehicle with two-way radio communications with the tower to accompany any vehicle without a radio; or
  - "Measures acceptable to the [FAA] administrator for controlling vehicles, such as signs, signals, or guards, when it is not operationally practical to have two-way radio communications with the vehicle or an escort vehicle;
- "(d) When an air traffic control tower is not in operation, provide adequate procedures to control ground vehicles on the movement area through prearranged signs or signals;
- "(e) Ensure that each employee, tenant, or contractor who operates a ground vehicle on any portion of the airport that has access to the movement area is familiar with the airport's procedures for the operation of ground vehicles and the consequences of noncompliance; and,
- "(f) On request by the [FAA] administrator, make available for inspection any record of accidents or incidents on the movement areas involving air carrier aircraft and/or ground vehicles."

Castellano said, "Part 139 essentially requires the establishment and implementation of procedures for safe and orderly operation of ground vehicles in movement areas and safety areas. Training is not specifically required, but airport operators must implement procedures. FAA expects that these will include a driver training program, which may be formal or informal."

Edward Dorsett, FAA airports representative to the agency's integrated team for runway safety, said, "We view the current method of regulating airfield driver training as being satisfactory. As a result of [FAA's Runway Safety National Summit in June 2000], there have been suggestions for specific regulatory changes to make a driver training program a part of Part 139 requirements. We currently are assessing these recommendations.[5]

"Driver training is a major factor in reducing the number of VPDs. Those persons who do have access to movement areas and safety areas need to be trained in signs, marking and communication procedures."

Castellano said that at U.S. medium-size airports and large-size airports, airfield driver training has become universally accepted as an effective element of surface safety.

"In some cases, training may be limited only to those drivers who have access to the movement areas because the number of people who drive on the airfield side of an airport can be

enormous," Castellano said. "For example, [Chicago O'Hare International Airport, Illinois, U.S.] and [Dallas/Fort Worth International Airport, Texas, U.S.] can have in excess of 20,000 people authorized to drive on the airfield — that is, to drive on movement areas and nonmovement areas. An airport, as part of its security identification program, normally will put in a basic driver training program, but not nearly as comprehensive as the program for drivers who have unrestricted access to the movement area." Drivers of tugs and commissary trucks typically are limited to the nonmovement areas, he said.

Castellano said that to check airport compliance with safety regulations, FAA looks at how airports implement their procedures based on the specific safety requirements in Part 139.

"We believe that enforcement is a major factor in implementing an airport surface safety program," he said. "The severity and frequency of occurrences have to be taken into account in enforcement procedures." (See "Some Aircraft Collisions Show Airfield Driver's Failure to Yield" on page 4.)

FAA Adds Capability to Analyze Vehicle Deviations

Castellano said that FAA's data on VPDs currently cannot be broken down into types of vehicle incidents and types of pedestrian incidents. (A 1990 Flight Safety Foundation article said that prior to a 1989 FAA order requiring the collection of VPD data, FAA did not have a measure of the deviations by vehicle operators.)[6] ATC controllers report these occurrences and FAA airport certification inspectors and safety inspectors investigate VPDs. The current forms contain data that would enable study of subcategories of VPDs, but until 2000, FAA had not developed a central database that would enable specific analysis of vehicle-deviation data, he said.

Dorsett and Castellano said that most airfield driver training programs are initiated at the airport level and focus on airport-specific training. Typically, the airport operator will work with the airlines and their airside contractors. In some cases, airports will focus on developing regulations for operating on the airport surface and conduct train-the-trainer courses. Airline training personnel will receive that information and, in turn, will train their own employees on rules and procedures applicable to relevant parts of the airport.

Castellano said, "There also has been collaboration in airfield driver training on the part of airports with other airport tenants and concessionaires. For example, at airports such as [Denver International Airport, Colorado, U.S.] or [Chicago O'Hare], which have a large airline presence, it can be very difficult for the airport itself to train all personnel."

Among 10 short-term initiatives coordinated by its Runway Safety Program, FAA currently is engaged with other government agencies, industry, academia and the U.S. Department of Defense in compiling a list of training materials relevant to preventing runway incursions — including best practices in airfield driver training. The purpose is to share with airport operators, airlines, pilots, fixed-base operators and other organizations the most successful methods for improving the safety of operations on the surface of any airport.

Dorsett said, "We already have had one meeting with these participants to gather material, which includes airfield driver training. We are sorting through all the material now."

Castellano said, "Many U.S. airports have developed their own videos for airfield driver training. They have incurred great costs using contractors in some cases; others have done videos internally. Examples are [Portland International Airport, Oregon, U.S.], [Seattle-Tacoma International Airport, Washington, U.S.] and San Francisco [International Airport, California, U.S.]"

In addition to the *Airport Ground Vehicle Operations* booklet, informational pamphlets and FAA advisory circulars, FAA provides through its regional offices videos that can complement the airfield driver training curriculum of an airport, air carrier or other organization. The FAA videos are available to the public without charge and can be duplicated, excerpted, edited or adapted to fit local needs, Dorsett said.

A driver placard also is available that shows the color, types and meanings of light gun signals from air traffic control towers; the designs, colors and meanings of each type of airport sign; the designs, colors, locations and meanings of each type of airport pavement marking; and blank spaces for drivers to write in the local ATC tower frequency and ATC ground control frequency.

Castellano said, "At one point, FAA had handed out 50,000 driver placards; they are in great demand again and have been reproduced. If a driver were to be caught out on the ramp without radio communication and could not remember the light-gun signals from the tower, this placard puts the information in front of the person."

How to Train Airfield Drivers Remains an Open Question

FAA's Castellano said that the agency has been reviewing various technologies that some airports are adopting. Typically, airports are faced with training large numbers of airfield drivers effectively and maintaining detailed records. Some of the technologies have been used in military training and in other modes of transportation, such as training of drivers to operate mass transit vehicles.

"We have not had enough experience with new types of training to know their value," Castellano said. "We are aware of several

Continued on page 6

Some Aircraft Collisions Show Airfield Driver's Failure to Yield

The U.S. National Transportation Safety Board (NTSB) Aviation Accident/Incident Database (AID) Report contained the following examples of occurrences involving airfield drivers:

- On Oct. 1, 1997, a Ryan International Airlines Boeing 727-51C was struck by an airport employee shuttle bus while taxiing for takeoff in a nonmovement area at Denver International Airport, Colorado, U.S. One pilot was seriously injured, one pilot received minor injuries, the shuttle bus driver received minor injuries, and the two bus passengers were not injured. The captain was trapped in the crushed cockpit; both lower legs, the right kneecap and right ankle were fractured. The airplane, on a domestic cargo flight, was destroyed.

  The report said, "Visual meteorological conditions prevailed, and the collision occurred during predawn hours. [The bus driver said that] because of a bus ahead, [he] drove at a 'moderate speed' for spacing. He did not observe any activity on the cargo ramp as he approached the intersection, and came to a complete stop at the stop sign. He looked both ways and turned on the four-way flasher lights. He said [that] his headlights and running lights were on, and [that] the interior lights were off. He observed the nose taxi light of an aircraft off to his right. He saw [that the] inbound aircraft to the right … had stopped. … He did not see the airplane approaching from the left as he started across the cargo ramp. He [said that he] 'inched' the bus forward, stopped, looked both ways again, and proceeded across the cargo ramp. The bus's radio, tuned to the bus channel (800 mHz), was on but [the driver said that he] paid no attention to [the radio].

  "In the background, [the bus driver said that he] heard a voice yell 'Hold, hold, hold!' He thought [that the voice] was referring to the aircraft on his right. Suddenly, he saw a bright light through the left window and he was thrown to the floor. He estimated his speed to be less than five miles per hour [8 kilometers per hour] at impact. … One of the bus passengers [said that] he saw the approaching airplane clearly and he yelled 'Whoa!' five times before the collision, but the driver did not respond.

  "The airplane crew [said that] they did not see the bus until seconds before impact. [The first officer said that he] saw 'something dark' off to the right and yelled a warning to the captain. He did not see the bus's headlights. He had just completed the checklist when 'something dark caught my eye off to the right.' He did not see any lights. [The second officer said that she] looked out the window and saw the bus 'hazy, gray, not very discernible.' It was about 30 feet [9.1 meters] away, 'going fast, steady speed, and he made no attempt to stop. I do not think he saw us.' There were no lights inside the bus, and she did not see its headlights.

  "Airplane skid marks, measuring 22 [feet (6.7 meters)] and 24 feet [7.3 meters] in length, were noted on the taxiway. No bus skid marks were noted on the roadway. … [The driver was] hired [on a part-time basis] as a bus driver on April 25, 1997. He holds a Colorado commercial driver's license [CDL] … [and] said that he had 36 years' driving experience, and had held the CDL for five months. He had been off [work] for two days, and he considered himself well rested before the accident.

  "[A] human performance specialist was dispatched from NTSB headquarters to assist in the investigation. According to the [human performance] report, two problem areas were identified: numerous obstructions to vision in the accident area, and a deficient bus driver training program. The report noted that when positioned at the intersection and looking west towards the cargo ramp, a small hill with a chain link fence on top blocks the view of approaching airplanes. For a period of time, only the top portion of an airplane's vertical stabilizer can be seen. (According to [the airport's] management, if a vehicle is positioned at the intersection and its driver looks west, he will see approximately 750 feet [229 meters] of the taxiway, or has approximately 45 degrees left-side field of vision before the hill becomes an obstruction.) Night and adverse weather conditions can further diminish the field of view.

  "Although the cargo ramp is well illuminated on the north side, no such lighting exists on the south side and this would be the side of an airplane closest to a vehicle stopped at the intersection. ([Airport] management said the south side of Taxiway Sierra Charlie is not illuminated from Taxiway Sierra Alpha west for 1,300 feet [396 meters] because this is the defined southern edge of Taxiway Sierra Charlie, and only ramp aircraft parking areas are illuminated.)

  "The bus driver training program consists of reading a study guide, watching a videotape on airport driving, and taking an airport familiarization ride with a company trainer. ([The airport] recommends that each company conduct their 'familiarization tours' for its employees during the shift that the employee works. The driving video was filmed during daylight hours to educate the drivers on airfield markings and signs.) No provisions are made for driver training in night [conditions] or low-visibility conditions.

  "According to Denver Municipal Airport System Rules and Regulations … Section 130.03-1 [said,] 'Aircraft shall have the right of way over all other vehicles.'" NTSB said, in its final report, that the probable cause of the accident was "failure of the bus driver to yield the right of way to oncoming traffic due to his inadequate visual lookout. Factors were visibility restrictions, inadequate driver training by management, and the flight crew's inadequate visual lookout due to their attention being diverted by performing the pretakeoff checklist." NTSB AID Report no. FTW98FA001.

- On Jan. 6, 1998, at 1210 local time, an American Airlines Boeing 727-223 was struck by a ground tug while taxiing for takeoff at the Philadelphia International Airport, Pennsylvania, U.S. The captain, first officer, flight engineer, four flight attendants, and 107 passengers were not injured. The driver of the tug received serious injuries. The aircraft received minor damage. Instrument meteorological conditions existed and an instrument flight plan was filed. The scheduled domestic flight was conducted under U.S. Federal Aviation Regulations Part 121.

  The NTSB report said, "The pilot [said] that after push back from the gate, they were taxiing to spot no. 2 in the 'nonmovement' area when they felt an impact. The captain

Some Aircraft Collisions Show Airfield Driver's Failure to Yield *(continued)*

[said] he thought the airplane had experienced a blown tire and neither he nor any of the cockpit crew saw the tug prior to impact. The cockpit voice recorder was removed from the airplane and verified the pilot's statement. [U.S. Federal Aviation Administration (FAA)] inspectors gathered witness statements, which indicated that the tug, pulling baggage carts, did not attempt to slow up or avoid the airplane. The FAA inspectors [said] that there were no skid marks left by the tug prior to the collision.

"When the airplane came to a stop, the tug was under the airplane's right main wheel mount, and one of the baggage carts being towed was impacted by the left main wheel mount. The damage to the airplane was confined to the leading edge of the left wing root and to the bottom of the fuselage. The tug was found at the scene with the engine running and the transmission engaged. … The driver's training record was reviewed and current, with his last physical completed Oct. 14, 1997. The driver was on vacation from Dec. 23, 1997, through Jan. 5, 1998. After a two-week vacation, this was the tug driver's first day back at work.

"He had been operating this tug since 0430, without any reported mechanical problems. The emergency room doctor stated that the tug driver had lost 11 pints of blood from the injuries sustained in the accident. No symptoms of any medical events which would have caused the driver to lose consciousness were discovered. Test results for drugs and alcohol were negative. Two nights after the accident, while recovering from his injuries, the tug driver called his supervisor and relayed, 'that while driving the tug, he had dropped his water container, and was reaching down for it. That was the last thing that he could remember.'" NTSB, in its final report, said that the probable cause of the accident was "failure of the tug driver to see-and-avoid the taxiing airplane." NTSB AID Report no. IAD98LA021.

- On Sept. 2, 1998, about 1805 local time, a Douglas DC-9-30 operated by US Airways struck a refueling vehicle at Philadelphia International Airport. There were no injuries to the captain, first officer, three flight attendants, 81 passengers and refueling truck driver. The airplane received substantial damage, and the fuel truck was damaged. Visual meteorological conditions prevailed for the international passenger flight operated on an instrument flight rules (IFR) flight plan under FARs Part 121.

  The NTSB report said, "The airplane landed on Runway 27R, and exited the runway to the right at a high speed turnoff, K-4. The airplane continued with a right turn and passed through intersection Oscar, headed straight toward the alleyway entrance between Concourses A and B. [The flight] was cleared to change from tower frequency, to ground control, and then to US Airways ramp control. The flight was scheduled to arrive at gate B-8. In a written statement, the captain [said,] 'I cleared the left side of the aircraft and proceeded toward the gate area. Just prior to entering the alleyway between Concourses A and B, my peripheral vision caught an object to our left. I immediately applied full brakes and immediately felt something contact the aircraft.' … The operator of the refueling truck had recently transferred experienced drivers, including the accident driver, from other airports to increase the work force at Philadelphia.

  "The accident driver first received two days of on-the-job training, which included riding with another driver. He also passed his Philadelphia Airport vehicle airport operations area test, after which he was released for work. The accident occurred on his third day of work. He reported that he had serviced an airplane on the west side of Concourse A.

  "As he approached the alleyway entrance between Concourses A and B, he observed a US Airways B-737 to his right just outside of the outer service road. He [said,] 'I proceeded down the roadway and stopped before the stop sign next to [the B-737]. The [B-737] was to the right of the tanker. I looked around and did not see anything else coming or going. Seeing that the [B-737] was not going, I proceeded on looking to the left to see if any planes were taxiing out. I looked to the right again, and I saw the DC-9 moving fast toward the tanker. I made a complete stop. When I saw [that] the aircraft was not stopping I tried to kick it in reverse, but by the time I put it in reverse the aircraft had struck the lift on the right side of the truck.'

  "The investigation revealed that the outer service roadway crossed the alleyway entrance between Concourses A and B. Printed on the roadway in white letters was, 'Stop for aircraft.' According to airport operations personnel, a driver would not be expected to stop if no aircraft were present. Vehicle drivers were instructed that airplanes have the right of way. Additionally, the investigation revealed that the US Airways B-737 parked adjacent to Concourse A would have obstructed the fuel truck driver's view of the approaching DC-9, and the flight crew's view of the fuel truck, until the fuel truck had passed from behind the airplane. Visibility to the right was further restricted for the fuel truck driver by refueling hoses located to the right of the cab.

  "At the time of the accident, the fuel truck had driven 150 feet ahead of the 'Stop for aircraft' sign. The front wheels of the fuel truck (empty weight 42,000 pounds [19,051 kilograms]) were displaced two feet [0.6 meters] laterally to the left. Skid marks were found from the left main landing gear of the DC-9, which measured 47 feet [14.3 meters]. The ramp was dry."

  NTSB, in its final report, said that the probable cause of the accident was "the failure of the fuel truck driver to follow airport operating procedures, and yield the right-of-way to the airplane." Contributing factors were the stopped airplane, which obscured the fuel truck from the approaching airplane and the approaching airplane from the fuel truck, and the lack of visual aids on the vehicle to help compensate for restricted driver visibility to the right, NTSB said. NTSB AID Report no. NYC98LA177.

- On Oct. 11, 1998, about 1854 local time, a McDonnell Douglas MD-88 operated by Delta Air Lines sustained substantial damage when it was struck by a baggage tug while taxiing for takeoff at Cincinnati/Northern Kentucky International Airport, Covington, Kentucky, U.S. NTSB,

Some Aircraft Collisions Show Airfield Driver's Failure to Yield *(continued)*

in its final report, said that the two flight crewmembers, five flight attendants, 114 passengers and the tug driver were not injured. Instrument meteorological conditions prevailed, and an instrument flight rules flight plan had been filed for the scheduled passenger flight that was conducted under FARs Part 121.

In a written statement, the captain said that the airplane was taxiing west abeam "B12" and "B10," when he and the first officer saw a "bag tug" approaching. The tug was between the "A" and "B" concourses moving at a fairly high rate of speed, with the driver looking away from the airplane. The captain added that the driver was unaware of the airplane. The captain and first officer then applied maximum braking and the airplane "was almost stopped" when the tug impacted the side of the airplane.

The report said, "According to a passenger, the airplane pushed back from the gate and started to taxi [to] the runway, when she saw a tug 'quickly' approaching from the right. She could also see that the tug driver was looking to his right and nowhere else. She continued, 'He never slowed down, never turned. He drove under the plane, right under us, full speed. I thought we crushed him. He reappeared, windows broken, metal superstructure of [the] tug listing and drove rapidly away.' The passenger [said,] 'I think he had earphones on.'

"According to company records, the tug driver received a total of 30 hours of training in the month of August. The training covered ramp and operation self-directed training, dangerous goods handling, basic ramp procedures and driver training. The tug driver's employment was terminated after the accident, and he was not available for comment nor did he submit a statement." NTSB said, in its final report, that the probable cause of the accident was "the tug driver's failure to maintain a proper visual lookout." NTSB AID Report no. NYC99LA023.♦

simulators that digitize a specific airport and its environment enabling a driver trainee to experience various scenarios. Mostly, ground vehicle simulators are being used to train [aircraft rescue and firefighting (ARFF) drivers] and other personnel to drive in the movement areas."

Dorsett said that several U.S. airports are developing self-paced, computer-based training programs.

"Airports today are very dynamic and have airport-specific situations for airfield drivers," Dorsett said. "Today we say that drivers should learn, not memorize, the required knowledge and skills."

Will James, staff vice president, accreditation and training, for the American Association of Airport Executives (AAAE), said that almost all U.S. airports currently have airfield driver training programs and that their most common problem is record-keeping. They must keep current records of all persons authorized to drive on the airfield.[7]

James said, "FAA mandates that airports design a program on how to operate ground vehicles safely. This includes elements such as speed limits and how to be escorted. Records of training must be kept for the last six months, and every airport has a different method of doing this. FAA may send a letter of correction or take other enforcement action if records are not maintained properly."

Typically a memorandum of understanding exists in which the airport tells the airlines its driving requirements, he said. Many airports operate 24 hours a day, and many different organizations, such as fixed-base operators and caterers, have a need for employees to drive on the airfield. Airports and airlines typically train their respective employees to drive. Airfield drivers who operate in the movement areas typically receive training every year or every six months, he said.

James said, "At large airports — such as [Atlanta Hartsfield International Airport, Georgia, U.S.] and Seattle-Tacoma — there may be a need to train 8,000 [drivers] to 12,000 drivers per year. At [Boston Logan International Airport, Massachusetts, U.S.], the annual number is about 6,000 drivers."

In the early 1990s, some conventional airfield driver training programs comprised — over several days — the memorization of airport diagrams; classroom study and testing on airport operating regulations, ATC communications, airport signs, marking and lighting; accompanying an instructor driving on the airfield; and practicing driving on the airfield during daytime and nighttime with an instructor, followed by a practical test.

In contrast, James said that many airports and airlines currently expect their employees to complete their basic airfield driver certification and security training in one day. Training must provide information about day driving conditions, night driving conditions and snow driving conditions that the driver later will experience on the job. ATC often does not want training activities to be conducted on the airport because of safety concerns about additional traffic, he said.

To address the need for high-volume driver training, testing and integrated record-keeping, AAAE developed a self-guided course that is in the client-evaluation phase. The computer-based training course uses a touch-screen interface, video images of the driver trainee's airport and interactive learning methods. The driver trainees will study four subject areas,

spending an average of 45 minutes per area. The current course does not cover driver-ATC communication. Students must answer correctly 100 percent of multiple-choice questions to proceed to the next content area, James said.

"AAAE sends a model script to the airport," James said. "The airport looks at its problem areas and will say how the training should be focused." Airports then can test drivers on airfield "hot spots" (locations of repeated incidents) and local driving regulations. A maintenance agreement allows for new signs and procedures to be added. AAAE then customizes the model program with video clips for each operator and airport, James said.

Driver Trainees Recover from Simulation of Being Lost

Al Jordan, president of FAAC, a U.S. company that makes simulators for airfield driver training, said that Detroit Metro/Wayne County Airport, Michigan, U.S., has used the technology for one year.[8] Similar to some pilot-training simulators, the simulator uses a real vehicle cab with video screens in the windshield and side windows. The screens show computer-generated images for a geographically specific "visual world" that represents an airport. The images respond to driver control inputs; programmable vehicle dynamics show, for example, braking differences on dry surfaces vs. slippery surfaces.

Jordan said, "The main advantage is for airport familiarization, and the biggest advocates [for acquiring these simulators] in Toronto, [Ontario, Canada,] were the air traffic controllers." To reduce ground vehicle operations, ATC preferred that driver practice and testing not be conducted on the airfield, he said.

He said that the following factors support the use of a simulator for airfield driver training:

- The appearance of the airport can be changed digitally to simulate weather, lighting and visibility conditions;
- The simulator generates aircraft and ground vehicles moving on the ground, requiring the driver trainee to handle radio communications, respond to clearances from instructors and take right-of-way decisions in real time;
- Scenarios can be taught for which a wrong decision could be fatal if practiced near real aircraft; and,
- Airports can create training scenarios that mimic actual airfield hot spots and other problems of a unique operating environment.

Jordan said that data will be collected on airfield driver training for drivers using the simulator and drivers trained by other methods. To date, independent studies have found that simulator training is effective for military drivers, mass transit drivers and commercial trucking drivers, he said.

"We hope to come up with statistical evidence of the effectiveness for airports," Jordan said. "But there is a far lower accident rate in aviation, and collecting data will take time."

He said that the basic airfield driver course at Detroit currently includes four hours of simulator time.

"Within an hour, a driver trainee will pick up a lot of information," Jordan said. "For airport familiarization, the more time spent, the more familiar the driver will be with the airfield. We have the capability to begin a task at night in a foggy situation, for example. We get students lost and teach them how to recover — how to get help and get back safely to a known location. Realizing the [effects] of mistakes is part of the training.

"We want to suspend disbelief. When people first hop in a simulator, their initial behavior and driving traits show that they are driving the simulator. In 10 seconds to three minutes, however, they typically stop driving the simulator mentally and begin driving the vehicle. You see them leaning into a turn. When we cross that boundary, that is when we begin doing real training. The driving is not real, but we can duplicate the decision-making skills and other driving traits that transfer over to real driving."

European Airfield Drivers Learn Various Restrictions

David Gamper, director of technical safety and facilitation for Airports Council International (ACI), said, "It has become pretty common worldwide for airports to have a structured driver-training system and to issue an airside driver permit. In Europe, for example, such programs are well done and entrenched, and typically, applicants are approved or not approved based on stringent testing."[9]

Gamper said that the primary method of sharing best practices in airfield driver training has been through international committees such as the Airside Safety Group of the International Air Transport Association (IATA), which learn methods from ACI member airports and share them in ACI's *Apron Safety Handbook.*

A September 2000 report by ACI presented data on 341 airports in all regions of the world.[10]

The report said that in 1999, 1,591 incidents (85 percent) of 1,871 total apron incidents involving aircraft were circumstances in which stationary aircraft were struck by passenger-handling equipment, aircraft-loading equipment and aircraft-servicing equipment. Full-year data were counted for the first time in this report.♦

Notes and References

1. Garvey, Jane. Speech during the Runway Safety National Summit. Washington, D.C., U.S. June 26, 2000.

2. U.S. Federal Aviation Administration (FAA). "Airfield Driver Training for FAA Employees." Order 5200.7A, June 15, 1999. *Airport Ground Vehicle Operations* is a 20-page booklet available to the public without charge as FAA publication no. ASY-300 98/001. The guide says, in part, "Remember also to be courteous to your fellow drivers, pay attention, do not get distracted, follow the rules and regulations and set a good example. Eventually you will attain a comfortable working knowledge of how to safely get around."

3. FAA. "Airfield Driver Training for FAA Employees." 2.

4. Castellano, Ben. Telephone interview with Rosenkrans, Wayne. Alexandria, Virginia, U.S., October 5, 2000. Flight Safety Foundation, Alexandria, Virginia, U.S.

5. Dorsett, Edward. Telephone interview with Rosenkrans, Wayne. Alexandria, Virginia, U.S., October 5, 2000. Flight Safety Foundation, Alexandria, Virginia, U.S.

6. Pope, John. "The Airport Side of Runway Incursions." *Airport Operations*, Volume 16 (September–October 1990), 2.

7. James, Will. Interview with Rosenkrans, Wayne. Alexandria, Virginia, U.S., September 22, 2000. Flight Safety Foundation, Alexandria, Virginia, U.S.

8. Jordan, Al. Telephone interview with Rosenkrans, Wayne. Alexandria, Virginia, U.S., October 13, 2000. Flight Safety Foundation, Alexandria, Virginia, U.S.

9. Gamper, David. Telephone interview with Rosenkrans, Wayne. Alexandria, Virginia, U.S., September 19, 2000. Flight Safety Foundation, Alexandria, Virginia, U.S.

10. Airports Council International (ACI). *ACI Survey on Apron Incidents/Accidents.* September 2000.

Further Reading From FSF Publications

"Methods of Preventing Runway Collisions Evolve in Europe and the United States." *Airport Operations*, Volume 26 (July–August 2000).

Airport Operations

Staff: Roger Rozelle, director of publications; Mark Lacagnina, senior editor; Wayne Rosenkrans, senior editor; Linda Werfelman, senior editor; Karen K. Ehrlich, production coordinator; Ann L. Mullikin, production designer; Susan D. Reed, production specialist; and Patricia Setze, librarian, Jerry Lederer Aviation Safety Library.

Subscriptions: One year subscription for six issues includes postage and handling: US$240. Include old and new addresses when requesting address change. • Attention: Ahlam Wahdan, membership services coordinator, Flight Safety Foundation, Suite 300, 601 Madison Street, Alexandria, VA 22314 U.S. • Telephone: +1 (703) 739-6700 • Fax: +1 (703) 739-6708.