ATEC JOURNAL

FALL 2013
Volume 35 • Issue 2
ISSN 1068-5901

Dusty, from the movie *Planes*

Aviation Technician Education Council

ATEC Journal is the official publication of the Aviation Technician Education Council. It is published twice yearly by ATEC, 2090 Wexford Court, Harrisburg, PA 17112, (717) 540-7121. The publisher and editors of this journal do not accept responsibility for statements made by advertiser herein or for the content of opinions expressed by authors of articles published. Information contained in the Journal is for the purpose of education only and is not meant to provide actual instructions for any type of maintenance procedure. For more information about ATEC, contact:

Dick Dumarcsq; Executive Director; ATEC
2090 Wexford Court, Harrisburg, PA 17112
Phone: (717) 540-7121 FAX: (717) 540-7121
Email: ccdq@aol.com

STAFF

Editor Thomas W. Wild
Art Director Mindy Irby
Email domenic.proscia@vaughn.edu for notification of new issue on the web

ISSN 1068-5901

ISSUE/AD CLOSING DATES & ADVERTISING RATES/ISSUE

ISSUE	***CLOSING DATE***	***DISTRIBUTION DATE***
Fall	Sept. 15	Nov. 15
Spring	April 1	May 1

ADVERTISING RATES PER ISSUE

1/2 page: four-color $125.00
Full page: four-color $250.00
2 Full page: four-color $350.00

Information to be published in ATEC Journal and advertising materials can be sent to:

Thomas W. Wild
205 North Highland Court, Oxford, IN 47971
Phone: (765) 426-3102 FAX: (765) 494-2305
wildt@purdue.edu

Advertising and billing questions should be directed to:
LuAnne Davis; ATEC, 2090 Wexford Court, Harrisburg, PA 17112

As an aviation educator, industry person, or administrator, I'm sure you have many teaching techniques that are unique. These ideas can be communicated to other educators through an article published in the ***ATEC Journal***. Authors are encouraged to submit their articles, whether scholarly, research, application, or opinion, by submitting a disk copy by mail or by submitting the information by e-mail of the article to the editor for consideration. The article's illustrations, photographs, citations and structure should be included. Biographical information should be supplied for each author listed (i.e., name, current position, institution/company/organization, location, academic degree, etc.)

The ***ATEC Journal*** is a peer reviewed/refereed publication. Article submissions or questions concerning the ***ATEC Journal*** publication guidelines should be directed to the editor:

Thomas W. Wild, Editor
ATEC Journal
wildt@purdue.edu

EDITORIAL BOARD

Bringing Workplace Traditions to the A&P Student

Matthew Harrison
Assistant Professor in Aviation Technologies
Southern Illinois University Carbondale
545 N. Airport Rd., Murphysboro, IL 62966
harrison@siu.edu
618-453-9205

ABSTRACT
For students seeking an FAA Airframe and Powerplant (A&P) certificate from a traditional school environment they will find that the courses offered are approved by individual FAA Flight Standards District Offices. The material that must be taught in these courses is found in FAA Part 147, which dictates what is to be taught, and to what depth. Since the FAA on a case-by-case basis approves each school, no two training programs will be identical. Because of this approval process the quality of training may depend on specific course structure and the type of equipment the students are trained on. Along with training in an FAA certificated program, students will often be trained in aviation workplace traditions. In SIU's A&P certificate program, the semester before students are ready to start testing for the certificate, they are enrolled in two courses: AVT 340 Airframe Inspections and/or AVT 345 Powerplant Inspections. These courses bring together all the information the student has learned in the Airframe and Powerplant training program. These types of capstone style classes are usually the last chance to incorporate training into the A&P student's education. In addition these classes tend to have students that are educated at the highest level before becoming certificated and are generally prepared to be employed by the work force. This paper will look at an example of using real-life scenarios/airworthy equipment in the classroom and forms used in the industry to enhance the student's ability to retain and transfer the A&P curriculum into the post-education work environment.

INTRODUCTION
Many students that venture into aviation technical training will find themselves crossing the threshold into this career within the structures of a traditional learning environment such as a college or university setting. These brick and mortar institutions do not just train future aviation technicians on a whim or in a "just in time" format but they use structures set forth by the Federal Aviation Administration (FAA). The FAA creates and publishes standards on how students can obtain an FAA Airframe and/or Powerplant Mechanics certificate under Part 147, which deals exclusively with having a school accredited to issue the prerequisite training needed to acquire these mechanic certificates. In addition to the mandatory training the aspiring technicians must receive, the quality of the training rests almost exclusively with the school that is providing the facilities/courses and to a similar degree, the instructor providing the individual classroom experience within those courses.

Before a school can train the students to become FAA certified mechanics, the FAA must accredit the school. The guidelines for this process are laid out in detail and can be found in FAA Advisory Circular (AC): 147-3A: Certification and Operation of Aviation Maintenance Technician Schools. This AC covers everything from grading and how to document student attendance to the level of degree of instruction that must be given to each aircraft system/subsystem. After being involved with the department's curriculum committee and the FAA on changing things within the courses in the schools accreditation manual, the author learned that the courses could still be accredited even though they may deviate from the criteria that is laid out in the AC. The FAA can individually approve programs based on how they complete tasks in Part 147 or how they can complete them while deviating. In the final accreditation, the FAA looks at the guidelines set forth in the AC but also what you have available in the program and can then issue an individual accreditation. What this really means is that even though every school is accredited following the AC guidelines, no two are alike. This in turn shows that even though Airframe and Powerplant (A&P) technicians receive the same certificates no matter where they receive the training, the actual training is as varied as there are schools to train them. The quality of the training the aspiring technician receives and the program focus on transferring the skills to the job environment hinges upon the individual technician school and its instructors.

SKILL TRANSFER
The ideal training environment for students and future employers is one that allows for a smooth transfer of the skills developed in the classroom and laboratory to practical job situations once the student becomes certificated and employed. This transfer can be accomplished in several different ways depending on the structure of the Airframe and Powerplant courses within each training program.

One method to accomplish this transfer is to use capstone style courses, which essentially take all the material the student has learned throughout their program, and bring it into one or two courses at the end of the program. In the department of Aviation Technologies at Southern Illinois University these capstone courses are AVT 340 Airframe Inspections and AVT 345 Powerplant Inspections. These courses are offered as summer courses that occur at the end of a fall and spring sequence of courses only and are distinct from other courses in the program in that no new material is included in their curriculum. The majority of the course time is spent conducting inspections on various aircraft. Inspections on aircraft require a higher degree of technical skill about aircraft operations and how each system works together but it is unique in that it utilizes all the skills and training the student received in earlier coursework. So while the material being presented isn't necessarily new, it is being presented in a manner that closely follows the process that students will use upon becoming certificated.

In a collegiate environment, this type of skill transfer becomes important because of the amount of time that passes between coursework and use of that material in later courses. If one were to receive the same training on the job, the transfer of skill would be near immediate to the job being performed but would only be specific to the task being accomplished at that time. So how can the classroom compete with the type of training the student would expect to see once they enter into the workforce? While classroom methods used such as exams every few weeks or weekly quizzes for material learned is acceptable for a lecture course, these methods become more problematic in the laboratory setting of a course that meets only once a week or so during the normal layout of a 16 week semester. Too much time passes between learning of the material in lecture one day and application of it in the laboratory a few days later to be reflective of a 40+/hour industry work week.

In the A&P training program at SIU, the last two courses the students will take before becoming eligible to test for the FAA certificates are the AVT 340 and AVT 345 inspections courses. These courses differ from a standard semester in that they are scheduled to meet 4 days a week, 4 hours every day and for 8 weeks. The time slot is further broken down into 1-hour lecture and 3-hour laboratory time slots. This time positioning parallels the just-in-time format that the student will see as they enter the workforce. The student spends a small amount of time reviewing the task they are about to accomplish right before they head out to perform the reviewed/newly-learned skill on the aircraft. In addition to the difference in format and since these courses are every day there are less chances that the student will have to learn material and then wait a week or more to put it into use that is typical in the traditional 16 week course format.

Another major concern in the student's ability to transfer what is learned in the classroom to the job is the types of equipment or projects available to aid the training. This can be a function of many things: department budget, and updated equipment or instructor experience. In the case of this instructor, annual inspections that were being done as part of a community service project for an organization that gave underprivileged kids the chance to fly airplanes were used in the inspections courses. This is a very unique example in that the equipment used in the classroom was fully certified and airworthy. The federal aviation regulations are very specific in stating that each person performing an annual or 100-hour inspection shall do the work performed. The FAA states in FAR 65.95 (a) (2) that an IA may perform an annual, or perform or supervise a progressive inspection according to FAR 43.13 and FAR 43.15 (Federal Aviation Administration, 2012). They clearly do not give provisions for supervising an annual inspection like they do for a progressive inspection. If the students were the ones performing the inspection for the purpose of the annual or 100 hour, this would definitely be a violation. However in this situation the instructor is an A&P with an Inspection Authorization (IA) and would perform the inspection himself while the students shadowed and assisted in the maintenance tasks.

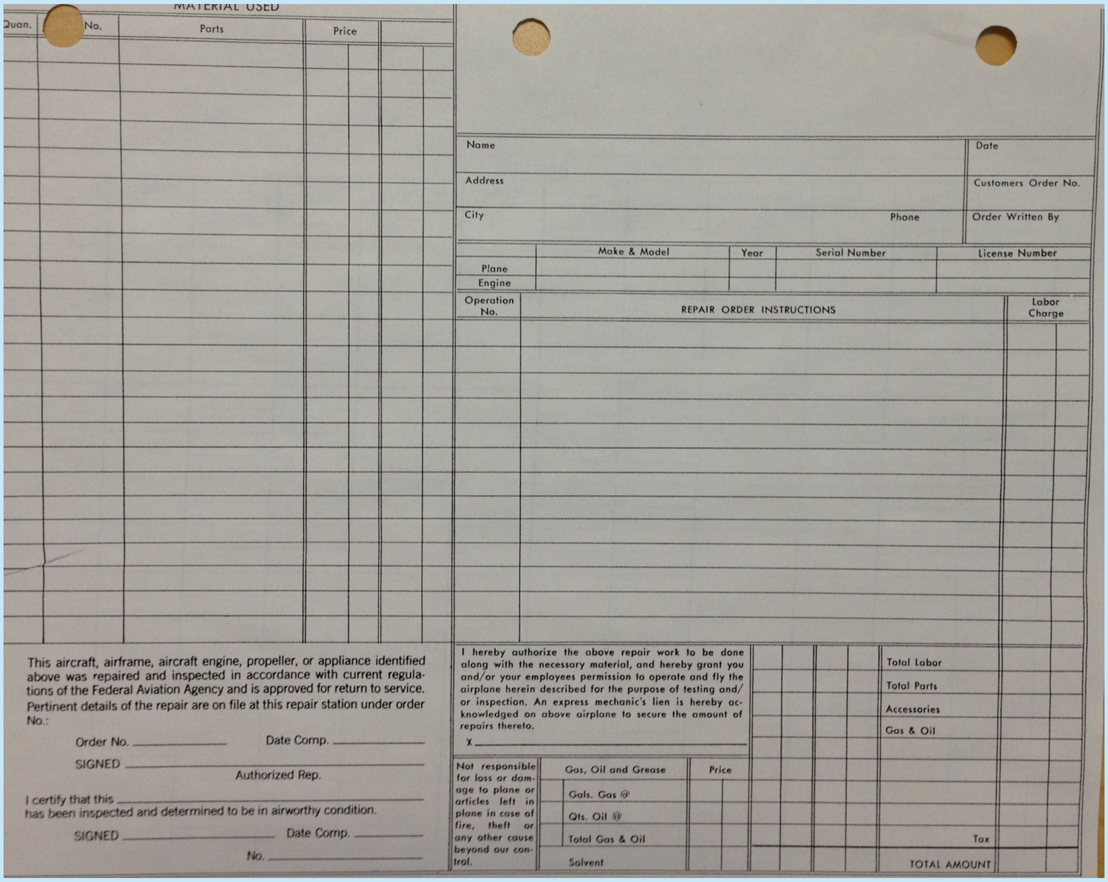
WORKPLACE TRADITIONS

Throughout this course, the students are required to treat it as a real job. They follow routine items that a future employer will have them do when they are part of the work force. The students complete maintenance work orders and log time just as a corporation would. They complete work orders (figure 1) that are identical to a local service shops forms and time sheets (figure 2) that are very similar to the form a time clock would stamp as the employee clocks in and out of different tasks. An actual time clock could be used here but right now paper method is used because of the expenses associated with the purchase of a time clock. In addition the students are performing inspections so they use the same forms the A&P/IA would typically use to log discrepancies (figure 3) found during the inspection.

The work order is usually the initial form a customer would complete before the repairs would begin the aircraft. It is the contact that they enter into with the technician for the completion of the project. The form contains items such as: customer name, address and contact information, model number and serial number of the aircraft, special requests from the customer, parts list and bill total area. For many companies, this form is the main method of communication with the customers.

The time sheet takes place of the physical time clock machine that exists in many company facilities. This form links the specific worker to the logging of exact hours the technician will put in on a particular project. Some companies will bill different hourly rates based on the type of work being performed is. For example a shop might charge $100.00 per hour for avionics work, but $90.00 an hour for standard shop work. The time sheet then becomes a way to isolate specific work with specific charges.

The last form discussed is the discrepancy sheet. This is the diary for the inspection. As the inspection checklist



MATERIAL USED

Quan.	No.	Parts	Price

Name	Date
Address	Customers Order No.
City / Phone	Order Written By

	Make & Model	Year	Serial Number	License Number
Plane				
Engine				

Operation No.	REPAIR ORDER INSTRUCTIONS	Labor Charge

This aircraft, airframe, aircraft engine, propeller, or appliance identified above was repaired and inspected in accordance with current regulations of the Federal Aviation Agency and is approved for return to service. Pertinent details of the repair are on file at this repair station under order No.:

Order No. ________ Date Comp. ________

SIGNED ________ Authorized Rep.

I certify that this ________ has been inspected and determined to be in airworthy condition.

SIGNED ________ Date Comp. ________

No. ________

I hereby authorize the above repair work to be done along with the necessary material, and hereby grant you and/or your employees permission to operate and fly the airplane herein described for the purpose of testing and/or inspection. An express mechanic's lien is hereby acknowledged on above airplane to secure the amount of repairs thereto.

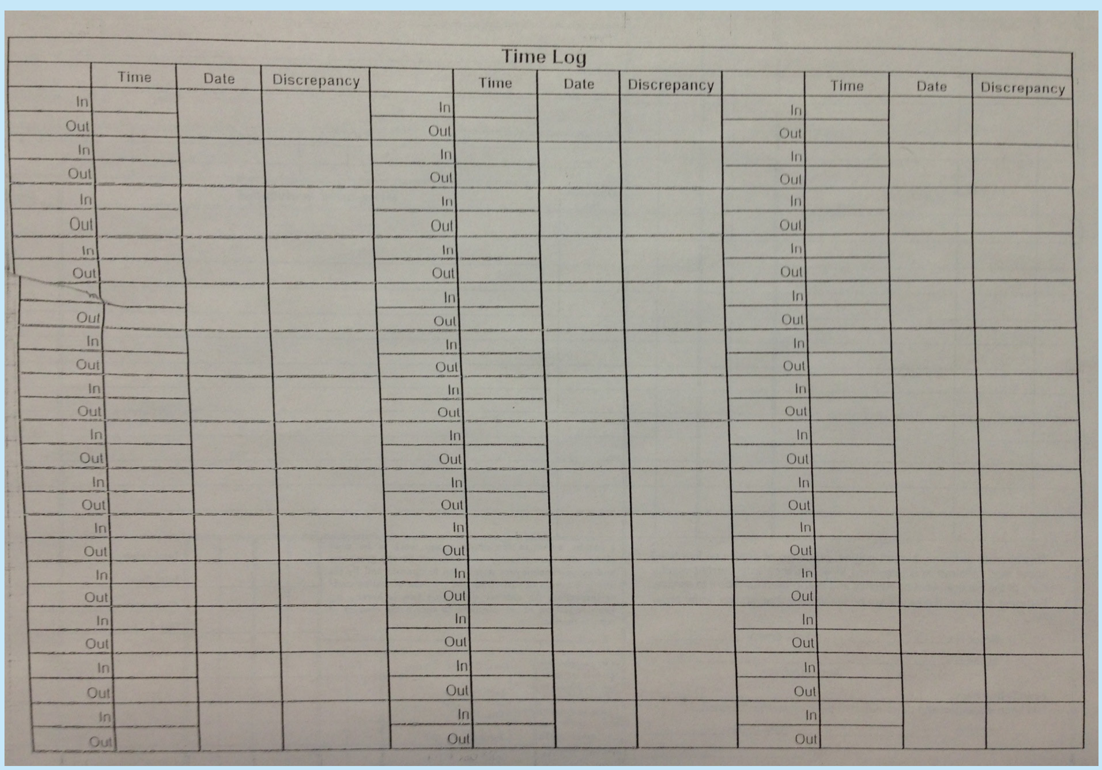
X ________

Not responsible for loss or damage to plane or articles left in plane in case of fire, theft or any other cause beyond our control.

Gas, Oil and Grease	Price
Gals. Gas @	
Qts. Oil @	
Total Gas & Oil	
Solvent	

Total Labor	
Total Parts	
Accessories	
Gas & Oil	
Tax	
TOTAL AMOUNT	

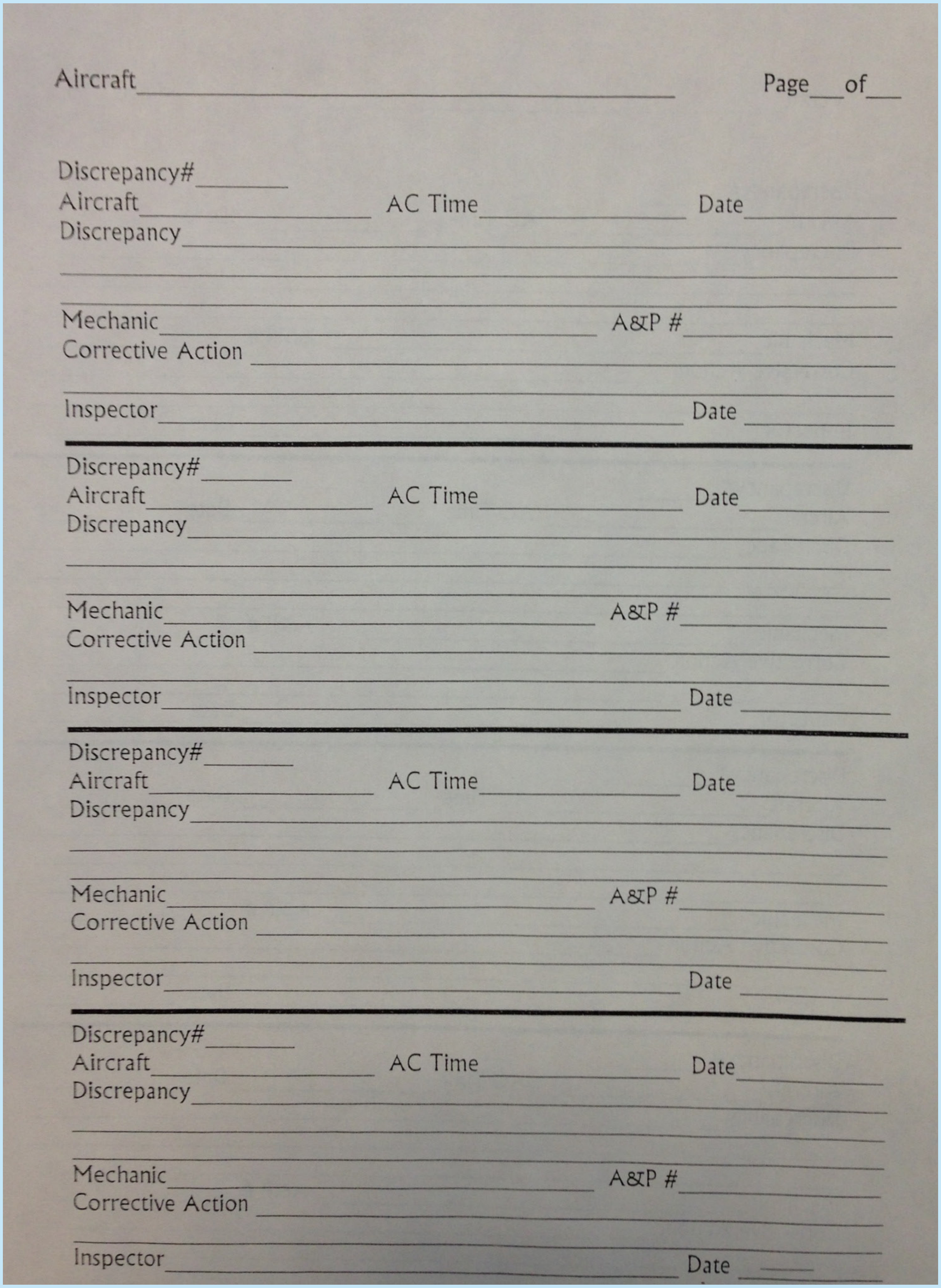
Figure 1. Work Order



Time Log

	Time	Date	Discrepancy		Time	Date	Discrepancy		Time	Date	Discrepancy
In				In				In			
Out				Out				Out			
In				In				In			
Out				Out				Out			
In				In				In			
Out				Out				Out			
In				In				In			
Out				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out				In				In			
In				Out				Out			
Out											

Figure 2. Time Sheet



Aircraft________________________________ Page___of___

Discrepancy#________
Aircraft____________________ AC Time__________________ Date______________
Discrepancy____
____
____
Mechanic____ A&P #__________________
Corrective Action ____
____
Inspector____ Date _____________

Discrepancy#________
Aircraft____________________ AC Time__________________ Date______________
Discrepancy____
____
____
Mechanic____ A&P #__________________
Corrective Action ____
____
Inspector____ Date _____________

Discrepancy#________
Aircraft____________________ AC Time__________________ Date______________
Discrepancy____
____
____
Mechanic____ A&P #__________________
Corrective Action ____
____
Inspector____ Date _____________

Discrepancy#________
Aircraft____________________ AC Time__________________ Date______________
Discrepancy____
____
____
Mechanic____ A&P #__________________
Corrective Action ____
____
Inspector____ Date _____________

Figure 3. Discrepancy Sheet

is followed, items that have failed the inspection become numbered items on these sheets. There are spaces for notes on the discrepancy, corrective actions, signature blocks etc. Each discrepancy can then be tied back to the work order and time sheet to keep track of who is working on what task and for how long. It is a handy way to divide and conquer repairs if there are more multiple technicians working on the aircraft.

CONCLUSION

These are simple additions that are outside of the FAA and school accreditation but will have a lasting impact on skills that the technicians will be using. They will also leave familiar with many types of industry paperwork that is well beyond FAA requirements but an excellent industry practice. In situations where airworthy aircraft can be used in the classroom, the credibility of the program is enhanced through 100 percent skill transfer. It's an everyday exercise in the most common jobs performed as aircraft technicians and a great opportunity for the students because it is real. The students also act in ways that are not seen in the normal class setting. They are very aware that these aircraft will leave the confines of the class and go airborne. The student's can take pride in the fact that they had a part in returning an aircraft to service. Real world examples are paramount in aviation training. It's a great example of everything they are working towards as an aspiring aviation maintenance technician. This author also realizes that this particular situation is not the norm. Most aircraft owners are interested in having the work done only by the certificated professional and in an expeditious manner. The owner of these aircraft appreciated the community service aspect and having the maintenance done by the school actually allowed the organization to take on more needy students because the expenses were very low compared to what a the industry would charge for the same annual inspections and service. An important point to note with this type of situation is that the success of this example relies on an instructor willing to take on this responsibility. It would worthwhile to consult your department for liability issues with accidents and responsibilities before undertaking this type of instructional maintenance.

Including customer's airworthy aircraft in classroom training when possible is as authentic as training can possibly be in the education environment. But having this option is not always possible. When this is not possible then it is imperative that the instructors continue to keep the students engaged with the simulations on non-flying aircraft as much as possible. Investigate avenues where new technology can be brought into the classroom and the students can at least be exposed to it. Cold call companies for donations. If you can afford equipment or are close to being able to afford items, call and ask for discounts. In this author's experience, many companies are willing to be generous with discounts when asked. In addition, consider going non-certificated when buying new, much of the equipment is the same but you are paying a premium for a certification.

Nothing in this article is earth shattering. It shows some simple methods that make a difference in transitioning the student from A&P courses to the work place. These methods could be employed in earlier courses but may not be ideal since the skill level of the student is much lower. The FAA accreditation of a program leaves flexibility to meet the needs of the industry and the students while maintaining a high degree of thorough education. As educators it is our job to teach the skills the industry wants and to the standards the FAA wants, but with dwindling assets. It is relatively inexpensive to incorporate your experiences and these "projects" used in the industry to give the students a leg up in the work force, but the advantage may come when the students (and the employer) realize the transition isn't too problematic.

REFERENCES

Federal Aviation Administration. (2012). *Far/amt 2013, federal aviation regulations for aviation maintenance technicians*. Newcastle: Aviation Supplies & Academics.

Federal Aviation Administration. (2005). *Advisory Circular 147-3A: Certification and operation of aviation maintenance technician schools*. Retrieved 25 March 2013 from the FAA website: http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%20147-3A/$FILE/AC%20147-3A.pdf

BIOGRAPHICAL INFORMATION

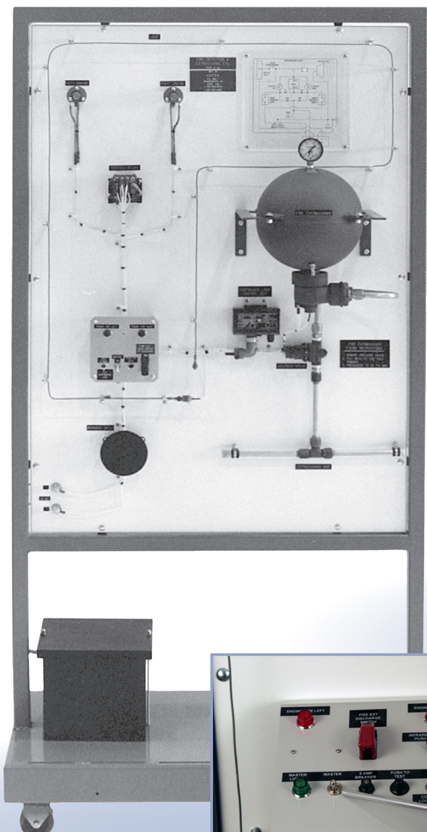
Name: Matthew W. Harrison
Affiliation: Southern Illinois University
College of Applied Sciences and Arts
Department of Aviation Technologies
Location: Carbondale, Illinois
Title: Assistant Professor
Degrees: M.S. Ed., Southern Illinois University
B.S. Aviation Management, Southern Illinois University
A.A.S. Aviation Maintenance Technologies, Southern Illinois University

Great Training Systems; Greater Training Choices from AVOTEK®

Avotek goes beyond building quality training systems for the AMT lab. Provided with select* trainers, Avotek includes trainer-specific Computer Based Training modules to aid instructors in getting greater benefit from the systems.

Each CBT disc features:

- An introduction to the trainer
- An explanation of the system theory and operation
- A basic component overview and trainer operation guide



- Classroom and lab concepts reinforced through photos and animated videos.
- Ideal for individual student or small group study
- Helps build critical trouble shooting skills

**CBT's currently available for the following Avotek training systems: AV12, AL14, AL36, AL37, AS60, AS61, AS66, AS76, H90, F51. See www.avotek.com for trainer details or contact the sales department at:*

AVOTEK®

P.O. Box 219 Weyers Cave, VA 24486
800-828-6835 | Int'l 540-234-9090
www.avotek.com • sales@avotek.com

Human Error and Safety in Engine Test Cells

David L. Stanley and Christopher Brock
Purdue University

ABSTRACT
Numerous engine testing facilities are in operation around the world, each of which presents its own set of safety challenges. Aviation and aerospace testing facilities, in particular, operate components to the edge of design limitation in order to satisfy requirements for durability and reliability, incurring elevated levels of risk, as a result. The human operator introduces a number of safety-related concerns which must be given thoughtful consideration for both the design of the facilities and equipment as well as test operations. This paper focuses on human error and safety in this environment, the issues, and the methods used to address them. Little is written about the subject of human error in engine test facilities, specifically; for this reason, the subjects as they relate to other industries and settings will be studied to determine their application and importance to these environments. As safety is integrated in the culture of the testing facility, numerous benefits accrue both in the learning environment and the development of a laboratory that closely parallels those found in the industry. The National Test Facility for Fuels and Propulsion (NaTeF), housed in the Department of Aviation Technology at Purdue University, will provide a context for the application of the subject matter and principles discussed herein.

Aircraft and aerospace engines, in contrast to most powerplants used in over-the-road applications, must often operate continuously at or near maximum power under circumstance where failure may create life-threatening scenarios. In order to develop confidence in these engines, testing is essential, and is conducted for several distinct reasons. These reasons may include: design evaluation to measure and confirm performance, research and fault diagnosis, and analysis of failure modes and rates. In the academic setting, these engine operations may take the form of an educational exercise, focusing on the operation and performance of the powerplant itself, on testing procedures and methodology, or both. Regardless of the reasons for conducting engine tests, these operations conducted with high-speed internal combustion engines, including turbine engines, present some level of danger and risk that must be understood and mitigated to the extent possible. In this environment, human error is certainly an issue deserving study, as no system can be completely safe when human operators are involved. This paper focuses on the operational testing of engines, where safety is of paramount concern, with special attention paid to test cells in the university or educational setting.

As a part of this effort, studying the types of human error that may occur in the testing environment will be useful, to the extent possible. According to James Reason (1990), errors may be grouped according to the cognitive stage at which they occur. Errors made in the planning stage are referred to as mistakes, lapses are those errors that occur in storage, and slips are errors that take place in the execution stage. Generally speaking, mistakes may relate more to design, while lapses and slips are the errors made by the operator (p. 13).

ENGINE TEST FACILITIES

Engine and component test operations create risky environments, where a lack of planning and inadequate or improper safeguards multiplies the threat to the operators and others in the immediate area. In academic test cells, testing of engines may be performed for purely educational purposes, rather than for design confirmation, initial break-in, or performance evaluation. Nonetheless, in these teaching facilities many of the same risks apply, while the additional factor of inexperienced operators adds an additional layer of uncertainty and potential safety concerns. In general, engine test cells present a number of significant risks, including the possibility of fire, explosion, and toxic gas. High speed turbine engines create great rotational inertia, which, in the event of a hardware failure, may lead to high kinetic-energy shrapnel that challenges any containment method. It's also important to note that bad circumstances with engines may escalate rapidly, resulting in excessive RPM and potential for explosion. Engine testing may also generate high levels of noise, which is particularly the case with outside engine stands. According to Ted Ferry (1988), a noisy environment may dramatically impact on communications and response time, both of which are critically important in an engine test cell where close coordination among operators and the ability to react to emergencies quickly is required.

In short, engine test cells demand respect and careful attention to design in order to mitigate the risks and ensure a safe test environment. Assuming that all human error cannot be prevented and that accidents will happen, it makes sense to focus on minimizing the potential results of such problems. In recognition of this, test facility design and planning for safe operation should focus sharply on prevention of outcomes that endanger lives and equipment. In an engine test cell, the most significant threats to safety are fire and shrapnel from an exploding engine. Containing these extreme emergencies to the test cell itself, which should be physically separated from the control room, is the design challenge for the facility. Outdoor test stands, on the other hand, have no containment capabilities and therefore more risks are associated with their operation.

NATIONAL TEST FACILITY FOR FUELS AND PROPULSION

The National Test Facility for Fuels and Propulsion (NaTeF) at Purdue University provides a context for the issues under discussion. The labs and test cell in this facility serve an educational purpose for students in the Aeronautical Engineering Technology program, but are also used extensively for final testing and evaluation of alternative aviation fuels. NaTeF, which was funded by the United States Air Forces to develop advanced capabilities for testing of alternative aviation fuels, is located in the Niswonger Aviation Technology Building at the Purdue University Airport and includes several engine test cells with advanced data and exhaust emissions analysis capabilities. A materials laboratory provides the capabilities to analyze the impact of new fuels on materials and components. When the NaTeF engine test cells are used for research and testing, the operators and crew are typically experienced with operations and procedures; it is during the educational operation of the test cell when inexperienced personnel are often involved. These applications create additional challenges which demand careful planning and training to mitigate any risks involved.

ANTECEDENTS TO ACCIDENTS

In the book “Investigating Human Error: Incidents, Accidents, and Complex Systems” the author, Barry Strauch, identifies several antecedents, or precursors, to accidents in the transportation system (2004). Of these, the authors of this paper have identified four as relating directly to human error in the engine test environment: equipment and safeguards, the operator, company/regulators, and maintenance and inspection. These four aspects, each of which has an associated human error component, are crucial in the test cell environment to ensure proper functionality and safety. For the purposes of this paper, the focus will be on equipment, safeguards surrounding the equipment, and the maintenance of the high performance equipment being used. Given that little is written on this subject for test cells and facilities specifically, each topic will be examined in the context of other industries or settings where similar risks may apply. Where a correlation is apparent, inferences will be drawn between that information and the test cell environment.

EQUIPMENT AND SAFEGUARDS

Safeguards, in the context of this work are defined as measures intended to prevent harm or damage to people, equipment, or facilities, and are essential in any situation involving complex equipment and systems. They are found in virtually all industries with complex equipment, and for the purposes of this paper, are particularly noteworthy where the consequences of failure may threaten human life. This is certainly the case with power generating plants and with aircraft; therefore, examples from both will be studied for application to the testing environment.

The importance of safeguards in certain critical environments, including specifically aviation, cannot be overstated. According to Reason (1997), in the Chernobyl nuclear disaster, the operators made the decision to essentially remove several layers of defense from the reactor in order to conduct a test, thereby setting the stage for catastrophe (p. 11). The Chernobyl accident had many other causes in addition to inappropriate closing down of the safeguards, and represents an extreme example of what may happen under these circumstances. Nonetheless, as a result of human error by the operators, both in execution and in planning, thousands of people were killed or injured (Kletz, 2001) . Although Chernobyl was not a testing facility, this example serves as a reminder of the potential consequences that may occur when safeguards are disregarded or disarmed by the human operator.

The accident at the Three-Mile Island nuclear power plant was caused by both mechanical and human failures involving confusing instrumentation and information. This particular accident demonstrated that equipment design in complex systems may affect operator performance (Strauch, 2004). According to the Report of the President’s Commission on the Accident at Three-mile Island (1979), mechanical breakdowns caused the initial problems, and mistakes by human operators exacerbated the situation. At the outset of this incident, several pumps that provide water to the steam generators stopped operation leading to a rapid increase in reactor coolant temperature. An operator apparently did not observe two lights that indicated certain valves were closed thereby preventing the flow of water from emergency feed pumps to the reactor. If these had been open, as they should have been automatically, the situation would not have developed as it did. The emergency demanded that the operators intercede to overcome equipment failures; the operators, however, complained in the investigation that followed that the alarm panel provided no useful information, leaving them to guess as to what was actually occurring and how to respond (1979). Failure to maintain equipment properly was also cited as a cause for the incident. The errors in this incident ranged from mistakes related to design to slips in execution. In hind sight, it appears that inadequate safeguards were in place to prevent serious problems from occurring.

DESIGN FOR SAFETY

Strauch, in his book *Investigating Human Error* identified four components of equipment design that should be considered: visual information, aural information, tactile alerts, and controls (2004). Standard engine instrumentation obviously provides information via visual means. Information that is displayed or arranged poorly may lead or contribute to operator error. Many complex systems have a display or trend indicator for each component or subcomponent. Given a high number of components and accompanying instrumentation it would be nearly impossible for one operator to predictably and accurately observe an anomaly or improper trend. While a problem occurring under these circumstances might be attributed to human error, in reality, the poor design of the system made it unlikely that a human could safely operate the system (Strauch, 2004).

According to Strauch, aural information helps mitigate the drawback of visual information, which is that the operators must look for and identify the correct instrument or display (2004). Audible information, if designed properly, can draw the attention of the operator to a problem, avoiding the necessity of visually identifying one issue among the many on display. The use of aural alerts in a noisy environment may be problematical; however, they are found in aircraft (where noise levels on the flight deck may be high) to warn of proximity to the ground, for instance.

Kinesthetic/tactile alerts, which utilize motion to alert operators to potential problems, are rare in test facilities. A stick shaker, as an example, causes the control yoke in some large aircraft to vibrate, warning of an impending stall. If these warning systems are utilized, careful design is required to avoid bombarding the operator with excessive and confusing information. Regardless of the care given to design, it remains critically important to train operators in correct response action (Strauch, 2004). These alerts are particularly useful where the operator is consistently in physical contact with a critical control; this is generally not the case with engine test cells.

The final segment of equipment design is the controls, which should be ergonomic and intuitive to use for the operator (Strauch, 2004). Failure to give careful thought to the operation of such controls and positioning with respect to the associated instrumentation and with consideration of the risks involved may lead to increased occurrence of human error. Aircraft instrument panels and controls are designed today in accordance with regulations that standardize the layout, shape, color, and operation of the primary controls. This is not always the case in engine test cells, where engine instruments are often installed in racks and controls are arranged separately and bear little resemblance to those found in an airplane.

MAINTENANCE AND INSPECTION

Over time, as physical systems operate, they deteriorate and performance degrades; inspections and regular maintenance are required to counter this and restore equipment to normal operation and function. According to Kinnison, preventative maintenance is performed to slow the decline in performance which occurs naturally over time (2004). Systems are also subject to breakdown and failures, creating a need for corrective action, repairs, or overhaul to restore the system to operational status (2004). "The maintenance environment also differs substantially from those of most system control stations in complex systems. Unlike those, the maintenance environment may be subject to temperature extremes, poor illumination, distracting ambient noise and difficult to access components" (Strauch, 2004). In other words, maintenance must often be performed under difficult conditions, while the design and projected life cycle of equipment and complex systems relies on the performance of maintenance as it was originally conceived. In turn, this requirement makes it necessary that the equipment and facilities be designed to facilitate the proper performance of maintenance and that the organization pay heed to the critical value of maintenance, including support for required equipment and training of the responsible personnel. Unfortunately, the design of existing, legacy equipment did not always follow this philosophy in the past; for these systems, the proper performance of maintenance and repair may be a challenge.

On June 10, 1990 a BAC 111 took off from Birmingham International Airport. "At 0733 hrs as the cabin staff prepared to serve a meal and drinks, and, as the aircraft was climbing through the 17,300 feet pressure altitude, there was a loud bang, and the fuselage filled with condensation mist. It was at once apparent to the cabin crew that an explosive decompression had occurred. The commander had been partially sucked out of his windscreen aperture" (Air Accidents Investigation Branch, 1992, p. 3). The flight crew was able to restrain him, land the airplane and no loss of life occurred. In the ensuing investigation, the cause of the accident was determined to be improper maintenance, in this case, the improper installation of the windshield, a failure on the part of the company to properly supervise the maintenance environment, and a design problem (Air Accidents Investigation Branch, 1992). The human errors included mistakes (design problem), and slips in the execution of the windshield installation.

This accident made the point that, while a problem may be directly caused by the actions or inactions of an individual or a team, the environment in which they operate may affect and even limit the ability of the individual to perform his or her duties. Taking this a step further, one individual may have been ultimately responsible for the improper performance of the work on the aircraft in question; however, that person may have been working under circumstances, including the management philosophy and support for the activity, that made successful completion of the task difficult, if not impossible. In order to address the root cause of the accident, a thorough evaluation of the overall maintenance environment was required.

DISCUSSION

The NaTeF test cells, which are the focus of this paper, currently house turbine engines with piston engine installations also under development. A TFE-109 turbofan engine with thrust rating of approximately 1350 pounds, and a PT6-67A turboprop rated at approximately 1250 shaft horsepower are located in the two inside test cells. These cells are equipped to measure engine parameters of RPM, temperature, pressure, power and both gaseous and particulate exhaust emissions. Fire and containment protection are provided in both laboratories, as is remote viewing of the engines via cameras. The control rooms are located adjacent to the test cells, where remote engine operation and data collection are conducted.

SAFEGUARDS

Safeguards are critical to engine testing facilities due to the high-risk operations conducted therein. Safeguards are designed to protect both the operators and other people in the surrounding environment and the equipment under test. The complexity of safeguards is dependent upon several factors, including the number of issues impacting on safety, the degree of risk involved, and the level of operator training and readiness in the particular test environment. Operators must be thoroughly familiar with the systems and the safeguards, as nothing can be considered failsafe. Under certain circumstance, it may be necessary, for example, for the operator to shut off a safeguard, particularly if it is not functioning correctly. However, history is replete with examples of accidents caused by turning off these systems in error, as was the case in the Chernobyl accident.

A safeguard may be as simple as a sign or as a complex as an automated system that actively controls, directs, or limits human behavior. A gate blocking access to an area, for instance, is an increased safeguard in comparison with a sign stating, “Keep Out”, and may be warranted due to the level of risks involved in that environment. It should be noted, however, that some baseline or minimal level of knowledge of risk is generally assumed for the application of safeguards. Pedestrian crosswalk signals, for example, are designed with some minimum communication skills in mind. Consideration, unfortunately, must also be given to the cost of safeguards, an example of which is crosswalk signals, where the risks include fatal injury if a pedestrian ignores or fails to see the signal and walks into oncoming traffic. Good safeguards are generally autonomous, in that they operate independent of human intervention, but are operationally verifiable.

A checklist may be viewed as a type of safeguard, as it leads the operator sequentially through steps essential for correct and safe operation. When correctly designed and executed, it protects against operator error that may lead to hazardous situations. For example, in the NaTeF test cell a sign is prominently posted that displays the correct sequence of steps – a checklist - to be followed in the event of a turbine engine fire. The information displayed includes steps to be taken to prevent further harm to the engine, procedures for actuation of the fire suppression system, and the need to evacuate the test cell where oxygen will be displaced when that system is deployed to combat the fire.

Clearly, safety devices that function automatically rise to a different level. For example, an electronic safety device in the NaTeF turbine engine test cell automatically shuts down the engine in the event of an engine over-speed situation. This function occurs without intervention or input from the operator, although proper operation of the system requires the input of certain information in advance of the engine run. Such systems are clearly necessary in engine test cells, given the potential for disaster and the speed at which problems occur and may escalate. Nonetheless, even these systems are only as good as the information input to them, and may fail. Even with elaborate safety systems in place, the human operator must be trained to observe and respond appropriately when circumstances dictate.

EQUIPMENT

Equipment, both that under test, and that used to conduct experiments, defines the test facility. The equipment under test generally determines the risks involved, including the possibilities of fire, explosion, toxic gases, and shrapnel. The instrumentation providing information relative to the tests being conducted must do so in a way that enables the operator to quickly react in a logical and timely manner. The number of displays and the organization of those displays are key to effective response. Conspicuity, interpretability, and trend portrayal of the displayed information are characteristics important in the layer of the instrumentation (Strauch, 2004). Designed correctly, the information displays enable operators to perform the required testing, while also providing the information in a form that allows for good decision-making relative to safety. Information displays that are improperly or illogically designed could potentially cause confusion in an emergency situation or lead to poor test results.

Test personnel must divide their attention across at least three distinct operations: the operation of the test article, conduct of the test and collection of required data, and safety of operations. In the NaTeF engine test cells, individuals are specifically assigned to one of these responsibilities, allowing them to focus their attention in one area only. Clearly, teamwork is of paramount importance to enable efficient operation and quick response. The opportunity for human error arises under these circumstances, and makes training even more important. Certainly, resources are not unlimited; however, it is fundamentally important to follow a philosophy of continuous improvement in areas of quality and particularly with respect to safety. Dain (2002) commented on this when he said, "While recognizing that errors and accidents are unavoidable, we must continuously examine and improve the design of equipment and procedures, personnel, supplies and materials, and the environment in which we work to reduce error and mitigate its effects" (p. 254).

MAINTENANCE AND OPERATION

The BAC 111 incident illustrates the possible ramifications of improper maintenance, and the need for a corporate investment in proper maintenance philosophy. In the educational environment, these responsibilities may fall to the instructor, although some programs have facilities managers to perform these duties. Generally speaking, it is best to have different people in charge of maintenance and operation in order to avoid a conflict of interest and confusion in priorities; this is not always possible in higher education, for example, which creates a need for the individual wearing 'two hats' to separate these functions and responsibilities carefully.

Record keeping is critical for all engine systems, and this is also the case in the NaTeF turbine engine test cell where a logbook is maintained of operational cycles and time, and maintenance performed. A key element of maintenance is obviously scheduling, and the logbook enables planning for these events, and recording of the work done. The operational checklist includes an inspection for foreign object debris (FOD) in the test cell, oil level, fuel leaks, and engine roll down times following shutdown, which are indicative of bearing condition.

Virtually every activity creates an opportunity for learning, and this is clearly the case with maintenance and operation procedures, as well. Care must be taken by the instructor to ensure that the critical tasks are completed even as the procedural steps are used to illustrate certain lessons for students. Program and course objectives often make it important that students actually operate all elements of the test cell, leading to the possibility that they may be at the controls when emergency conditions arise. Obviously, such an approach with inexperienced operators at the controls may increase the risks, while the potential distraction associated with teaching may also lead to errors and over sights. Safety, therefore, must be designed into the system and procedures at a robust level. Dividing the critical tasks for engine control, test cell operation, and emergency procedures across several individuals trained to work together is an important step in this direction; close adherence to carefully developed and thorough checklists is another.

SUMMARY AND CONCLUSIONS

In conclusion, operators and those who design and operate engine test cells should study safety, human error, and human factors for applications to these complex, and sometimes dangerous test environments. An understanding of human error – the different types, causes, tendencies, and ramifications – is critical in order to develop appropriate safeguards and procedures. Instrument and control arrangement should be carefully designed to facilitate proper operation and simplify emergency responses. Checklists should be carefully designed to include both operational and safety procedures; they must be followed in a disciplined manner. Critical conditions, including maximum RPM, temperatures, and pressures must be identified, and situations identified that would make human intervention necessary. Clearly, automatic safety devices should be used to prevent engine runaway and other potentially damaging results. Even so, nothing replaces training of test cell personnel to enable appropriate response to emergencies. In the educational setting this is particularly challenging, given the number of inexperienced operators involved, and makes it necessary to build in layers of redundancy for safe operation.

The test cell is a great environment in which to teach safety. The range of safety-related issues is broad, extending from the potential for minor problems to the possibility of serious or even fatal injuries. Instructors in these laboratories should be prepared to challenge students to assume responsibility for the operation of the test cell when and where possible, while also maintaining a safe environment. Given a solid background in engine operation and technology, students in the test cell should be ready to study the potential safety issues and human error possibilities and develop emergency response plans.

REFERENCES

Air Accidents Investigation Branch (1992). *Report on the accident to BAC One-Eleven, G-BJRT over Didcot, Oxfordshire on 10 June 1999.* London: HMSO.

Dain, S. (2002). Normal Accidents: Human Error and Medical Equipment Design. *The Heart Surgery Forum*, 254-257.

Ferry, Ted S. (1988). Modern Accident Investigation and Analysis (2nd Ed.). New York: John Wiley & Sons.

Kinnison, D. A. (2004). *Aviation Maintenance Management.* New York: McGraw-Hill.

Kletz, T. (2001). *Learning from Accidents.* Woburn, MA: Gulf Professional Publishing .

Report of the President's Commission on the Accident at Three-mile Island (1979). Retrieved from http://www.threemileisland.org/downloads/188.pdf.

Reason, J. (1997). *Managing the risks of Organizational Accidents.* Burlington, VT: Ashgate Publishing Company.

Reason, J. (1990). *Human error.* Cambridge: Cambridge University Press.

Strauch, B. (2004). *Investigating Human Error: Incidents, Accidents, and Complex Systems.* Burlington : Ashgate Publishing Company.

ATEC 2014 Preliminary Conference Agenda

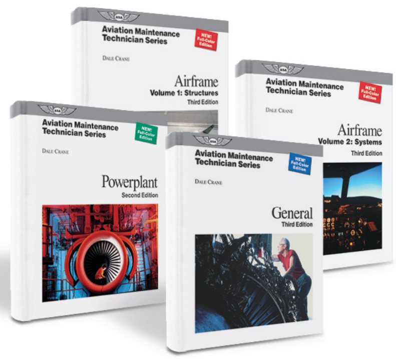
April 6-8, 2014, San Antonio, Texas

Menger Hotel

Saturday, April 5	AMTSociety IA Renewal at the Menger Hotel. Register at www.amtsociety.org.
Sunday, April 6	
8:30-11:00	ATEC Board Meeting (all members welcome)
10:00-5:00	Registration
11:00-12:00	Lunch on own
12:15-5:30	Professional Development Sessions
12:15-1:15	**Interactive Session 1 "Using Technology to Enhance Lectures"- Dr. James May**
1:30-3:00	**Interactive Session 2 "Using Technology to Enhance Lectures"- Dr. James May**
3:00-3:30	Break with Exhibitors
3:30-3:35	*Sponsor Spotlight*
3:35-5:00	**Session 3 Part 147 OpSpecs and Implementation Into the Classroom- Raymond Thompson**
5:45-7:00	Networking Reception-Exhibit Area
Monday, April 7	
7:30-4:30	Registration
7:30-8:30	Continental Breakfast – Exhibit Area
8:30-8:45	Welcome/Board Floor Nominations-*Raymond Thompson, President ATEC*
8:45-9:00	**"Getting the Most From Your ATEC Website"**
9:00-9:05	*Sponsor Spotlight*
9:05-10:30	**Keynote: "Human Factors Issues" – Don Wilson, President of Safe Start**
10:30-11:00	Break with Exhibitors
11:00-11:05	*Sponsor Spotlight*
11:05-12:00	**"Boeing Dreamliner Update" – Mike Walker, Boeing**
12:15-2:15	Business Meeting/Awards Luncheon
2:30-5:00	Voting for Board Members-Registration Area
2:30-3:00	**Call for Presentation Paper**
3:00-3:05	*Sponsor Spotlight*
3:05-4:30	**"PTSD Impact on AMTs in the Classroom"**
4:30-5:15	Transport to Tour/Dinner
5:15-8:00	Dinner/Tour
Tuesday, April 8	
7:30-8:15	Continental Breakfast-Exhibit Area
8:15-8:55	Annual Business Meeting/Committee Reports
8:55-9:00	*Sponsor Spotlight*
9:00-9:45	**The 'New' Corporate Aviation Maintenance Technician- NBAA Maintenance Committee**
9:45-10:30	Break with Exhibitors/Door Prizes
10:30-11:15	**Regional Airline Maintenance Trends – Regional Airline Association**
11:15-1:00	**Keynote -Debra Hersman, Chair- NTSB (invited)**

Tools of the trade.

ASA textbooks and reference materials for AMTs are written by award winning educators such as Dale Crane. Whether for personal study or to form the basis of a training curriculum, ASA publications are the foundation of a strong education.



> Textbooks

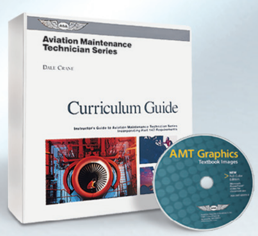
Dale Crane's AMT series provides the most complete, up-to-date textbooks for A&P students and educators in hardcover, full-color format. Meets 14 CFR Part 147 curriculum requirements and covers all the material in FAA Knowledge Exams for AMTs.

> Reference Resources

ASA's references provide mechanics with the essentials. These handbooks contain all the regulations, terms, definitions, encyclopedic information and data fundamental to every AMT toolbox.

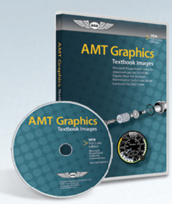
> Test Guides

ASA's test guides help applicants pass the FAA Knowledge Exams required for A&P certification. The "Fast-Track" Test Guides include all questions, answers and explanations along with a helpful guide to the Practical and Oral Tests.



> Instructor's Guide

Provides A&P instructors and educators with extensive course outlines, graphics, color transparencies, and sample tests to create an efficient and engaging training curriculum. Includes the AMT Prepware CD and the AMT Textbook Images CD-ROM with color illustrations, figures and tables in a PowerPoint® presentation.



> Textbook Images

Add professionalism, organization, and clarity to your classroom with these PowerPoint® slides. CD-ROM disk set includes all the charts, tables and illustrations found throughout ASA's AMTS textbooks. Graphics can be viewed as a slideshow presentation, or use individual slides in your own presentation. A must for AMT classroom instruction.

> Test Software

Questions, answers, and explanations included for the General, Airframe, and Powerplant FAA Knowledge Exams. An essential study tool that combines a powerful software program with the accurate test preparation material you expect from ASA.

Training Starts Here.

asa

AVIATION SUPPLIES & ACADEMICS, INC.
Quality & Service You Can Depend On

See our complete line of study aids, textbooks, pilot supplies and more at your local airport and in bookstores nationwide.
www.asa2fly.com | 1-800-ASA-2-FLY

Aircraft Technical Book Company

Scholarship Program

Beginning January 2014 Aircraft Technical Book Company will provide a student textbook assistance program to all US and Canadian A&P schools with the following criteria:

- ATB will provide for one recipient per year per campus for schools of less than 50 student starts per year and two recipients per year per campus for schools of over 50 starts per year.
- Each donated kit should match that school's standard book requirement and be composed of at least 80% of titles published by ATB. For a list of our titles, please see www.ACtechbooks.com/companies/6/
- If books are normally included with a students tuition, the school must agree to credit or refund the student's tuition by an amount equal to the wholesale value of the donation.
- Books will be delivered to the school with department personnel making the presentation. Schools who provide books with tuition will receive replacement books to refresh their stock.
- Recipients will be new enrollees selected by each school's admissions office. While ATBs preference is to award more on a basis of financial need than anticipated achievement, the final selection process may be determined by each school.
- Names of awarded students should be provided to ATB by the end of March so that each year's awards may be announced at the ATEC annual awards luncheon.

Schools wishing to participate in these scholarship awards should contact Nancy at Aircraft Technical Book Company at 970-726-5111. Nancy will review your standard required book list to help determine he contents of your school's awarded kits.

AIRCRAFT TECHNICAL Book Company

Composite Educational Services
CES Composites

For 27 years, CES has been training supplying materials and equipment to Aviation Maintenance Schools. Our ability to provide high quality tools and equipment is preceded by our reputation for providing high quality training and expertise to our customer base. Thank you to the 93 schools that have helped us reach the 27 year mark. We look forward to working with you in the next 27 years.

Contact us for more information on how you can expand your composite program in the future.
Composite Educational Services, Inc.

CES Composites

719-487-1795

www.cescomposites.com

1986-2013
27 years of Service

ATEC Update

GOVERNMENT RELATIONS

The Committee Chair sends encouragement to all, as you work with your FAA Principal Maintenance Inspector (PMI), Principal Avionics Instructor (PAI), other FSDO Airworthiness, Safety Inspectors (ASI), Supervisors and Managers to always stay positive, well-tempered and professional in every way possible.

Recently, there have been several situations where ATEC GRC has been included in ongoing dialogue after AMTs and FSDO personnel have not followed professional practices by adding challenging dynamics for schools to overcome. Fortunately, no enforcement actions have happened in cases we have provided help to date.

There seems to be more FAA inspectors interpreting Part 147 regulations, 8900.2 Handbook and AC 147-3A with greater variance than in recent years. Sometimes this happens due to new inspectors or reassignment of experienced inspectors.

Andrew Smith suspects, due to several key FAA positions shifting in Washington D.C. and Oklahoma City (AFS-300 & AFS-600) different mindsets are at play now. Plus, our national financial challenges relating to FAA funding are in play, too. A point of speculation – possible enforcement actions with civil penalties (fines) could be considered by FAA as a potential revenue stream. Recent example – EAA (AirVenture 2013) is in a challenge with FAA now about "fees for air space/airport waivers" which was never charged before but hundreds of thousands of dollars are in legal battle now. The best we all can do is be careful and make sure your school is running smoothly and in FAA compliance.

If during surveillance visits issues come up, remain calm, non-committal, stay in a questioning mode, be willing to assist only as requested, indicate you need time to do whatever is asked (copy documents, review records, etc.) Do not allow an inspector's directness to sway you, make hasty decisions or add pressure to you. And whatever you do, do not become combative.

If something is unclear, request the inspector to put his/her concern or issue in writing to you. When people lose their cool they tend to go to protection mode and say things they perhaps should not say or they regret later.

Here are recent issues told to AMTS directors by inspectors:

- Combined courses are not acceptable; there must be specific test scores for each of the 44 subject areas and documented accordingly.
- Only multiple choice tests are allowed in 147 curriculums.
- All students "missed time" must be made up; even when it is clear a specific FAA approved AMTS has a policy allowing missed time.
- There is no allowance for "progression of classes" to be interrupted.
- The approved AMTS time/grade sheet must have the same "page numbering" as the example in the operations document.
- You must have a lesson plan for the instructor that demonstrates the laboratory requirement expectation of the student.
- Students cannot pay the AMTS a fee for an Oral & Practical test; they must pay the fee directly to the Designated Mechanic Examiner (DME).

PMI standardization training with AMTS assignments will help stop much of these ongoing challenges and variations of surveillance and interpretation. ATEC continues to move forward with recommendation for the PMI course.

Currently, GRC is working with three schools with FAA/AMTS issues.

If you need assistance contact Andrew Smith atsmith@ksu.edu.

DID YOU UPDATE YOUR SCHOOL PROFILE IN 2013?

Has your contact person changed? Be sure your school's information is current on the ATEC website.

It's easy and all electronic.

Go to www.atec-amt.org. Click on "Schools/Members" on the top menu bar. Click on "Member Info Update" in blue. Fill in the information and click "Submit" at the bottom.

We will make the changes on the website once we receive your information.

STUDENT AND EDUCATOR OF THE YEAR AWARDS

Attached are the criteria for the Jim Rardon Student of the Year and Ivan Livi Educator of the Year awards.

Full application packets can be found at www.atec-amt.org. Click on "Scholarships/Awards."

The deadline for applications is **January 31, 2014**.

ATEC WEBSITE PASSWORD (Keep in a Safe Place)

A protected section of the website has been designed for members only. The password is "atecnew." It will be changed in FY 2014 and given to current members.

ATEC CONFERENCE AGENDA – *MARK YOUR CALENDAR!*

The April 6-8, 2014 preliminary conference agenda for the Menger Hotel-San Antonio Riverwalk is attached and can also be found at www.atec-amt.org as well as in the ATEC Journal.

A complete conference agenda packet will be uploaded to the Website and mailed to members prior to Thanksgiving.

ATEC BOARD NOMINATIONS

Attached is the Board nomination form which also appears on the website – www.atec-amt.org. Members interested in running for the Board should:

1. be sure they have full support from their Dean or department head to take on a Board role in ATEC
2. be able to attend one Board meeting in September in Washington, DC
3. be committed to bi-monthly conference calls
4. serve actively on at least two Board committees
5. complete the projects they have agreed to work on
6. attend the annual conference/Board meeting in April

CALL FOR PRESENTATIONS DEADLINE

Attached is the Call for Presentations flyer which also appears on the ATEC website. The deadline is **December 17, 2013**.

ATEC MEMBERSHIP STABILIZES AND STRENGTHENS

Since the start of the recession in 2008, ATEC memberships have been trending down. But in 2012, we saw the first positive up-tick. This has continued in 2013.

The following is the membership reports for 2011, 2012, and 2013:

2011		2012		2013	
Institutional	93	Institutional	103	Institutional	102
Individual	7	Individual	3	Individual	22
Industry	14	Industry	21	Industry	20
Life	9	Life	9	Life	9
TOTAL	123	TOTAL	136	TOTAL	153

NEW SCHOLARSHIP PROGRAM – AIRCRAFT TECHNICAL BOOK COMPANY

Beginning January 2014 Aircraft Technical Book Company (ATB) will provide a student textbook awards program to all US and Canadian A&P schools with the following criteria:

- ATB will provide for one recipient per year per campus for schools of less than 50 student starts per year and two recipients per year per campus for schools of over 50 starts per year.
- Each donated it should match that school's standard book requirement and be composed of at least 80% of titles published by ATB. For a list of our titles, please see www.ACtechbooks.com/companies/6/.
- If books are normally included with a student's tuition, the school must agree to credit or refund the student's tuition by an amount equal to the wholesale value of the donation.
- Books will be delivered to the school with department personnel making the presentation. Schools who provide books with tuition will receive replacement books to refresh their stock.
- Recipients will be new enrollees selected by each school's admissions office. While ATB's preference is to award more on a basis of financial need than anticipated achievement, the final selection process may be determined by each school.
- Names of awarded students should be provided to ATB by March 21 so that this year's awards may be announced at the ATEC Annual Awards Luncheon on April 7 in San Antonio, Texas.

Schools wishing to participate in these scholarship awards should contact Nancy at Aircraft Technical Book Company at 970-726-5111. Nancy will review your standard required book list to help determine the contents of your school's awarded kits.

INSTRUCTIONAL MATERIALS COMMITTEE

AMT Instructional DVDs – The entire (almost 200) ATEC instructional materials library is now fully converted to DVD format. They are available on the ATEC website, www.atec-amt.org (click on Instructional Materials) with a downloadable form.

The numbering system for ordering is still the same with a "check" qualifier after the number to signify the DVD format.

ON-LINE AD POSTINGS – NO COST TO MEMBERS

Don't forget to post your ads, position announcements, swaps and trades on www.atec-amt.org. Click on "Member Services."

NRF $CHOLARSHIP$ AND EQUIPMENT

Tens of thousands of dollars in scholarships and equipment are available for students, faculty and schools.

Click on "Scholarships" on the ATEC website.

ARE YOU RECEIVING ATEC BULLETINS?

If you have not been receiving ATEC alerts, announcements and webinar information, send your email to ccdq@aol.com. We'll get you on the email list.

AMTSOCIETY IA RENEWAL

April 5, 2014 Menger Riverwalk Hotel, San Antonio
(In conjunction with the ATEC Conference)

Some of the speakers & subjects include:

- Aeronautical Repair Station Association (ARSA) will present on topics such as maintenance regulations, major/minor, and maintenance recordkeeping (at each location)
- Lycoming Engines on service and operation tips
- Bell Helicopters on maintenance best practices
- NORDAM on thrust reverser maintenance best practices
- Aviation Training Academy on human factors in aircraft maintenance
- SMA compression ignition engines
- FAA representatives from FAASTeam, FSDO, or ACO

Each seminar in AMTSociety's IA Renewal Consortium meets the requirements contained in FAR 65.93(a)(4) for Inspection Authorization (IA) renewal training and is acceptable towards 8 hours of training for IA renewal and the FAA AMT Awards Program.

Register at www.amtsociety.org.

Call for Presentations

The Aviation Technician Education Council is seeking papers for presentation at ATEC 2014, in San Antonio, TX, April 6-8, 2014.

Papers for presentation with the general theme of:

"Successes in the Classroom"

are sought as they relate to the instruction and administration of FAR Part 147 programs.

Example Topics

Capstone Experiences
Increasing Student Engagement
Industry Partnerships/Advisory Boards
Development (fund raising/resource acquisition)
Distance Education/ Computer Based Education/Use of Multimedia
Innovative Laboratory Projects
Teaching New Technologies
Using Outcome Based & Program Assessment
Professional Development to Enhance Classroom Instruction
Recruitment & Retention Techniques
Curriculum Development & Planning

Note: All reasonable submissions related to the theme will be considered.

Submissions

- Abstracts must be electronically submitted in Microsoft Word.
- Abstracts will be reviewed and authors of accepted abstracts will be invited to submit a full paper.
- Authors must supply their own laptop computer or make other arrangements with ATEC prior to the convention.
- **Authors must register for and present their work in San Antonio, April 2013.**

Deadlines

- **December 17, 2013: Abstract Submission (400 words maximum)**
- **January 24, 2014: Notification of Acceptance/Rejection**
- **February 24, 2014: Submission of Draft Paper & Audio/Video needs**
- **March 17, 2014: Electronic Submission of Final Paper**

Please direct any questions and or submissions to:

Paul Herrick
University of Alaska Anchorage
907-786-7211
peherrick@uaa.alaska.edu

Aviation Technician Education Council
2090 Wexford Court
Harrisburg, PA 17112
Telephone: (717) 540-7121
www.atec-amt.org

ATEC BOARD OF DIRECTOR'S
NOMINATION FORM

At the Annual Conference, Menger Hotel, San Antonio, April 6-8, 2014, an election will be held to fill **three Board of Director positions for four-year terms**.

An elected Board member may serve up to two consecutive terms of office and then be eligible for further election to the Board after a waiting period of one year (the appointed members will be eligible for an additional two elected full terms).

All Institutional and International Institutional Members are eligible to be nominated for the above positions.

If you would like to have your name placed in nomination for the ATEC Board, please complete the form below by **February 1, 2014** and mail to:

ATEC
2090 Wexford Court
Harrisburg, PA 17112
FAX to: (717) 540-7121 or
Email to: ccdq@aol.com

Name: ____

Institution: ____

Address: ____

Phone: ________________ Fax: ________________ E-mail:__________________

NOTE: Your institution must be an institutional member in order for you to run for the Board.

For those who place their name in nomination, we will be asking you in February to send a picture and a brief write-up of your background and what you would like to accomplish on the Board. This will be shared with all conference attendees in San Antonio in April.

DEADLINE: February 1, 2014

Nida Corporation

AMT and AET Programs

Computer-based theoretical concepts
followed by hands-on experimentation and troubleshooting.

- **DC/AC/Analog/Digital Circuits, & Microprocessors**
- **RF Comms, Fiber Optics, Radar, & Microwave**
- **Soldering, Electromagnetism, & Filters**
- **Fundamentals of Aviation Technology**
- **Aircraft Electrical**
- **Aircraft Electrical Systems**
- **Aircraft Electronic Systems**
- **Avionics Data Communications**

Go to nida.com/products/programs for more lesson and objective information

Developed in cooperation with experts representing the aircraft industry and Part 147 academic institutions, the Nida AMT and AET programs are designed to teach operation, analysis, and troubleshooting of basic aircraft systems. Students begin with a performance-based electronics principles program and proceed to practical hands-on troubleshooting of generic aircraft systems. The Model 130E training console and circuit cards allow students to individually learn about aircraft systems and aircraft electronics, system troubleshooting, observe correct system operation, become familiar with various pieces of test equipment, and solve system discrepancies.

Nida Corporation
300 S. John Rodes Blvd.
Melbourne, Florida, 32904, USA
nida.com, 800-327-6432

ATEC

NCATT
RECOGNIZED TRAINING PROVIDER

Aviation Technician Education Council
2090 Wexford Court
Harrisburg, PA 17112
Telephone: (717) 540-7121
www.atec-amt.org

EDUCATOR OF THE YEAR AWARD

Dear Member:

The ATEC awards committee is pleased to solicit nominations for the annual Ivan D. Livi Aviation Maintenance Educator of the Year Award. You will find the criteria for eligibility and appropriate forms on the ATEC Website at www.atec-amt.org. Click on Livi (Educator) Award. Or, request a form from ATEC fax (717) 540-7121. I sincerely encourage each member institution to carefully review these forms and forward a nomination to the selection committee as specified in the instructions.

Through this award, we have potential to recognize some of our many outstanding instructors. It has become a regular part of ATEC's activities. In addition, the school of the winning educator will receive a framed picture of the "Flying Wing" donated by the Northrop Rice Foundation.

ATEC pays all the travel expenses "and a free conference registration" to the ATEC Conference for the winner. The annual award will be presented at the awards luncheon at the ATEC Annual Conference in April. Forward your nomination by **January 31** to the ATEC Business Office email: ccdq@aol.com.

Upon receipt of your application material, the ATEC Business Office will send you a confirmation of receipt. If you do not receive a confirmation within two weeks of sending your material, contact the ATEC Office immediately.

Sincerely,

The ATEC Awards Committee

AVIATION TECHNICIAN EDUCATION COUNCIL

IVAN D. LIVI AVIATION MAINTENANCE EDUCATOR OF THE YEAR AWARD

Purpose: This award recognizes the outstanding achievement of an aviation maintenance technology instructor. This achievement can be in the form of a single event or long term outstanding performance but must have had a direct impact on the Aviation Maintenance student. This award will be presented at the annual ATEC Conference. The winner will be contacted in late February.

CRITERIA FOR ELIGIBILITY

TO BE ELIGIBLE for the ATEC outstanding educator award, the nominee must:

1. Be employed by an institution and/or organization that is a member of the Aviation Technician Education Council.

2. Be an active instructor of Airframe and/or Powerplant Technicians. The applicant's workload must be of such a nature that they spend 80% of their workload time in contact with students teaching actual aviation maintenance technology classes.

3. Present a completed application with appropriate signatures by **January 31** to the ATEC Business Office email: ccdq@aol.com.

4. Nominations may be made for one particular outstanding achievement by a person. They may also be made for a person who has consistently contributed above average performance.

5. Nominees are not eligible if they are a current member of the Executive Board or, as regular members, they are serving on the Public Relations Committee.

CRITERIA USED FOR EVALUATION

1. Initiative/creativity: What did this person do, what new ideas or applications were used and what was the outcome?
   Total value in per cent..45%

2. Attitude/performance: What was the direct impact to the student(s)? How was the attitude and/or performance of the student effected by the event, ideas, or performance?
   Total value in per cent..25%

3. Education/training: What education and training does the nominee possess? How did this influence the event, idea, or performance?
   Total value in per cent..15%

4. Recommendation(s) and/or nomination statements from the benefit and effect of the event, idea or performance.
   Total value in per cent..15%

Aviation Technician Education Council
2090 Wexford Court
Harrisburg, PA 17112
Telephone: (717) 540-7121
www.atec-amt.org

STUDENT OF THE YEAR AWARD

Dear Member:

The ATEC awards committee is pleased to solicit nominations for the annual James Rardon Aviation Maintenance Technician Student of the Year. You will find the criteria for eligibility and appropriate forms on the ATEC Website at www.atec-amt.org. Click on Rardon (Student) Award. Or, request a form from ATEC fax (717) 540-7121. I sincerely encourage each member institution to review carefully these forms and forward a nomination to the selection committee as specified in the instructions.

Through this award, we have potential to recognize some of our outstanding students.

ATEC and Northrop Rice Foundation pays coach airfare, lodging for three nights, $75 stipend "and a free conference registration" to the ATEC Conference for the winner. The annual award will be presented at the awards luncheon at the ATEC Annual Conference in April. Forward your nomination by **January 31** to the ATEC Business Office email: ccdq@aol.com.

Upon receipt of your application material, the ATEC Business Office will send you a confirmation of receipt. If you do not receive a confirmation within two weeks of sending your material, contact the ATEC Office immediately.

Sincerely,

The ATEC Awards Committee

JAMES RARDON AVIATION MAINTENANCE TECHNICIAN STUDENT OF THE YEAR AWARD

Purpose: These awards recognize the outstanding achievement of Aviation Maintenance Technician students. These achievements must be demonstrated through academics as well as through involvement that makes a direct impact on the student's associates, school and/or community.

Eligibility: To be nominated, an individual must be a full-time AMT student at an institution that is a member of the Aviation Technician Education Council.

Nomination Process: Nominators must complete a Nomination Form with appropriate signatures by **January 31** and forward it to the ATEC Business Office email: ccdq@aol.com.

Review Process: Following receipt of the nominations, they will be reviewed by the ATEC Awards Committee and Northrop Rice Foundation Board of Directors to determine ten (10) finalists. The ATEC Awards Committee will then select the James Rardon AMT Student of the Year award winner from the finalists. The winner will be contacted in late February.

Selection Criteria:

1. **Leadership/Motivation:** What has the student done to encourage and lead his/her students to newer and higher levels of learning, or to promote aviation maintenance as a career?
   Total value in per cent. 35%

2. **Academics:** How has the student approached his/her own learning, and what grade level has the student achieved?
   Total value in per cent. 30%

3. **School/Community:** What has the student done to assist the school faculty develop new/better training methods, maintain necessary records and maintenance requirements, and/or promote the institution in the community?
   Total value in per cent. 25%

4. **Recommendation(s):** Additional (up to 3) recommendations or nomination statements will be considered to become as familiar as possible with the attributes, abilities and achievements of the nominated student.
   Total value in per cent. 10%

Awards: The James Rardon AMT Student of the Year award winner will receive transportation costs (airfare, hotel, meals, etc.) to attend the ATEC Annual Conference. The recipient will be honored during the Awards Luncheon and will receive the "James Rardon Aviation Maintenance Technician Student of the Year" plaque. The other nine (9) finalists will receive by mail a "James Rardon Outstanding AMT Student" certificate. These ATEC awards are sponsored and funded by the **Northrop Rice Foundation**. Registration at the ATEC Annual Conference for the James Rardon award winner is provided by ATEC.