Aviation Maintenance Technology AY20 Expedited Program Review

Submission date: January 31, 2020. Revised February 10, 2020

Programs in this review: Aviation Maintenance Technology AAS, Aviation Maintenance Technology: Airframe UC, Aviation Maintenance Technology: Powerplant UC

Specialized accrediting agency (if applicable): Federal Aviation Administration per 14 CFR Part 147

Campuses where the program is delivered: Anchorage

Members of the program review committee:

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1. Centrality of Program Mission and Supporting Role (700 words or less)

The Aviation Maintenance Technology (AMT) Program is a Federal Aviation Administration (FAA) approved and nationally recognized course of study that is designed to prepare graduates for entry into positions as maintenance technicians in any aviation sector including manufacturing. The curriculum emphasizes current aircraft systems, electronics, composite structures, automatic controls and turbine engines. Two Aviation Maintenance Undergraduate Certificates (UC) are offered, one in Airframe and the other in Powerplant maintenance. After earning either undergraduate certificate, a student may earn an Associate of Applied Science (AAS) degree.

As part of its mission to provide relevant, industry current instruction, the Program maintains close contact with its industry partners through faculty interaction, an advisory council, biannual industry career presentations and direct contact for employment of graduates. The Program has a long-standing agreement with the Anchorage School District to provide high school students from the King Technical High School (KT) with college credit toward a certificate or AAS program with a series of KT courses in aviation maintenance. Additionally, the Program has a MOU with Takushoku University (TU) in Japan for students in TU's Global Engineering Program to pursue aviation as a career specialization at UAA. The AMT program supports the BSAT program with Basic Aerodynamics a required course and with Reciprocating Engine Theory and Turbine Theory as electives.

In order to improve the quality/currency of equipment used for instruction the Program continually seeks both institutional and external sources of funding. The Program has had notable success with external funding/donation sources during the review period of approximately $1,000,000.

Based on Alaska Department of Labor (AKDOL) projections, the Program's relevancy to the State as a provider of a high-quality workforce for an industry identified as "high demand" is well established. AKDOL projections to 2026 indicate aviation maintenance positions will grow by 4.1% to 1447 positions over a 10-year period (approximately 113 positions a year)[1]. This exceeds the combined graduates from UAA, UAF, and the new school in Bethel. That is an opportunity for growth, should industry continue to hire graduates predominately from these programs. An indication of the success of the Program's alignment with University educational and State workforce development goals, at present, ***all*** graduates seeking employment secure jobs. Additionally, Program graduates are placed in positions with a majority of Alaskan aviation employers as well as national/international employers.

The Aviation Maintenance Technology Program primary function is expressed through its mission statement;

> *"The mission of the Aviation Maintenance Technology program is to meet the educational needs of individuals and the aviation maintenance needs of the State of Alaska, the nation and the world by preparing graduates to be highly qualified aviation maintenance professionals and employees."*

The Program's mission is aligned with that of the Community and Technical College (CTC);

> *"The UAA Community & Technical College builds Alaska's workforce and fosters student success through quality education and technical training."*

And UAA's;

> *"The mission of the University of Alaska Anchorage is to discover and disseminate knowledge through teaching…"*

The AMT Program is aligned with "Strategy 2" of the "Alaska Career and Technical Education Plan"[2] developed by the Alaska Department of Education and Early Development, Alaska Department of Labor and Workforce Development and the University of Alaska;

> *"Align curricula at all training institutions to meet current industry standards – including academic, professional, and technical skills - from elementary through secondary to postsecondary and professional development levels."*

The Program accomplishes this mission through the faculty's efforts to continuously review and update teaching methods and equipment to assure it aligns with current industry practices/expectations while maintaining a high degree of academic rigor. Through the in-depth knowledge, experience, teaching ability and professional involvement of the faculty, the curriculum is executed with unique instructional methods that emphasize knowledge and understanding, creating highly valued graduates. A comparison to similar schools nationwide reveals that the Program's quality and instructional methods position it as one of the top in the nation.

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[1] "Alaska Occupational Forecast to 2016 to 2026"; Alaska Department of Labor & Workforce Development. Online: http://live.laborstats.alaska.gov/occfcst/indexpdf.cfm

[2] "Alaska Career and Technical Education Plan"; Alaska Department of Education and Early Development, Alaska Department of Labor and Workforce Development and the University of Alaska (August 2010). Online: http://labor.alaska.gov/awib/ak_cte_plan_aug2010.pdf

2. Program Demand (including service to other programs), Efficiency, and Productivity (7 year trend; 1400 words or less)

General Institutional Research (IR) Data Discussion:

It should be noted that students can attain an AAS in Aviation Maintenance after the completion of the Airframe or Powerplant UC. The IR provided data does not differentiate between these emphasis areas and therefore is a composite of all AAS degrees earned.

AMT AAS Overall Discussion:

The data that specifically indicates AAS student performance are the "AAS Degree Awards" and "Average Credits Earned". As the remaining IR data is a composite of all Airframe and Powerplant courses, specific analysis of these emphasis areas can be found below in the UC program reviews. The data indicates that the Program is maintaining student success in regards to enrollment with a slight increase in degree awards. It should be noted that during the review period (and several years prior) the AMT Program was operating with only three full time faculty. This necessitated continuous overloads for the faculty and heavy dependence on adjuncts. Despite these challenges the Program maintained its productivity for the degree. In the fall of 2019 the Program hired a fourth faculty member. This is the first time the Program has had a full complement of faculty since AY 2006-07.

Specific Data Discussion:

Several of the data sets require context to explain the trends shown. Beginning with "AAS Enrollment Trend" it can be seen that, in the aggregate, majors have remained essentially constant over the review period. The Program, along with many industry partners, has been actively promoting the benefits of attaining the academic degree in addition to the UC as a credential for career advancement. While this has not increased enrollment significantly, data for "AAS Awards" indicates a slight upward trend, which indicates that more students are completing the degree.

"Internal Demand" data shows a 35% to 65% internal to external ratio. This ratio is qualitatively consistent with Program internal data. The reason for the apparent large "external" demand is that many AMT students fail to declare their major until the semester before graduation. The Program has launched an aggressive advising initiative to encourage students to declare earlier in their programs.

Data for "Average Credits Earned" yielded no usable data as the number of credits ranged from 72 to 130. While the AAS requires 75 credits to complete, many students enter the program with previous or transfer credit on their transcripts. This appears to be the cause of the high credits shown. When using this average a student would complete the certificate in 5-6 semesters, which is the design program length, however, due to outside commitments most students require more terms to complete. Many AMT students will begin working after completion of their UC and pursue the AAS part time which impacts the number of terms to completion.

Lastly, "Course Pass Rates" show a consistent trend with the overall pass rate being driven by the lower division courses. Additionally, as the lower division cohort enters the upper division courses approximately 3-4 semesters later, the upper division variation is consistent with and correlated to lower division cohort performance.

<u>Airframe and Powerplant UC Overall Discussion:</u>
The overall analysis of the data trends related to enrollment, awards, SCH, FTE ratios, average class size and % capacity all show an upward trend for the review period with either a level off or slight dip in FY 17 & 18. The change in trend was predicated on a low intake of students in the Fall semester. The reason for the one semester low enrollment has not been determined but AY 19-20 enrollments have returned to traditional numbers.

The data indicates that the Program is achieving student success in regards to increased intake, throughput and awards. It should be noted that during the review period (and several years prior) the AMT Program was operating with only three full time faculty. This necessitated continuous overloads for the faculty and heavy dependence on adjuncts. Despite these challenges the Program continuously increased the above-mentioned metrics. In Fall 2019, the Program hired a fourth faculty member which, it is hoped, will permit the Program to continue growth and quality improvement.

<u>Specific Data Discussion:</u>
Several of the data sets require context to explain the trends shown. Beginning with "Internal Demand" the data shows a 35% to 65% internal to external ratio. This ratio is qualitatively consistent with Program internal data but the proportion is being investigated. There are two reasons for the apparent large "external" demand. First, many AMT students fail to declare their major until the semester before graduation, although their educational goal has always been to complete the certificate. The Program has launched an aggressive advising initiative to encourage students to declare earlier in their programs. Second, is the piloting programs have incorporated AMT's Basic Aerodynamics course.

Data for "Average Credit Earned" is fairly stable where the number of credits ranged from 82 to 94.8. While the Airframe UC or the Powerplant UC requires 60 credits to complete, many students enter the program with previous or transfer credit on their transcripts. The average student would complete the one certificate in 4 semesters and then complete the next certificate in the 5th semester, which is the design program length, however, due to outside commitments most students require more terms to complete as the data shows. It should be noted that the FAA is in process of a curriculum change for all maintenance schools, which has the

potential to reduce credit loads. The changes may lead to greater throughput of students when the new curriculum is implemented.

"Course Pass Rates" show a consistent trend with the overall pass rate being driven by the lower division courses. Additionally, as the lower division cohort enters the upper division courses approximately 3-4 semesters later, the upper division variation is consistent with and correlated to lower division cohort performance.

All three of the aviation maintenance programs are funded by tuition and lab fees that cover the cost of consumables used by the students in the program. The IR reports data on the average revenue/SCH and costs/SCH data demonstrates the Program's diligence in operating within its budget. No other source of recurrent external funding is available to cover the costs of delivering these three programs.

3. Program Quality, Improvement and Student Success (1500 words or less)

Faculty Qualifications & External Engagement

The current AMT faculty brings a total of 117 years of aviation experience to the Program. The AMT faculty has first-hand experience with Air Force/Naval aviation, major aircraft/parts manufactures, plus the entire faculty has extensive experience in Alaskan aviation, from small bush aircraft to transport category. The AMT faculty is frequently sought out by the community for their expertise in aviation maintenance. Several of our faculty and laboratory technicians hold the Inspection Authorization (IA) which is an advanced authorization from the FAA to approve required inspections and major repairs/alterations on aircraft. Currently there a little over 700 mechanics in Alaska that holds this authorization. A member of the faculty and a technician are currently active FAA Designated Mechanic Examiners (DME). These DMEs conduct examinations and are authorized to issue mechanic certificates on behalf of the FAA. This designation is rare as there are only 198 approved examiners in the nation.

The Program's faculty has a strong connection to our veterans, which has been a positive influence for students transitioning from their military aviation career into Alaska's commercial and general aviation. Likewise, faculty have a daily connection to high school students through our articulation with KT high school, which provides us with an opportunity to help students interested in aviation transition to college life.

The AMT faculty engagement with the Alaska aviation community is extensive as they are frequently sought out as an expert resource on all matters related to aircraft maintenance and FAA compliance. Additionally, they are active in a number of associations and outreach roles such as; Aircraft Owners/Pilots, Alaska Airmen's, Experimental Aircraft Association, as well as; Alaska Aviation Museum, Commemorative Air Force, Civil Air Patrol, Girls in Aviation, and scholarship foundations. Their expertise and community connection benefits Alaska aviation and provides insights for improving the Program.

Currency of the Curriculum

The curriculum for the AMT AAS and UC programs is driven by FAA regulatory requirements and therefore changes can only occur with the approval of the agency. Currently, the FAA is revising the regulations governing maintenance programs nationwide and when these new regulations become effective, the AMT Program will initiate a curriculum rewrite as needed for compliance. Of note, one faculty member from the AMT Program has been actively involved with the proposed changes to these regulations through participation with the professional organization representing maintenance programs at the national level and was part of the team authoring the proposed change. This positions UAA's Program to readily incorporate these changes. While mandated curriculum has been static, the faculty have continuously improved delivery, teaching methods and instructional equipment to assure students are well prepared for the current employment market.

Student Engagement in High Impact Practices

The program has a long history of "high impact" student engagement as defined by AACU. Throughout the program, courses include but are not limited to:

- Writing intensive; most AMT courses include a significant writing component (reports, records and regulatory documents) simulating the writing required within the industry.
- Collaborative assignments & projects; all lab courses contain a group element. This requirement not only facilitates efficient completion of lab projects, it simulates the work environment.
- Internships & field placements; the Program does participate in internships where appropriate but most workplace experiences occur through student employment as paid maintenance helpers.
- Capstone courses; depending on emphasis area, the capstone courses are AMT 287/L, 289/L or 369/L. Students apply all previously gained knowledge in these final courses, which simulate the processes required of practitioners in the industry.

Student Support

The AMT faculty/staff, in addition to the Division student success advisor, actively counsel and support students throughout the program and with job placement.

Student Accomplishments:

- National Exams; as part of program assessment student performance data on FAA national certification exams is collected and analyzed. The data presented by the FAA is normed to national averages for all maintenance schools. UAA's AMT Program regularly exceeds the national average.
- Placement; for many years, the Program has placed 100% of all graduates that are seeking employment within the field. Additionally, a small percentage of graduates find excellent employment in technical positions outside aviation.

Distance Offerings:

Currently the AAS Program offers no courses via distance but is considering one FAA approved course as a pilot for online delivery. However, the Program is developing a Mechanic Helper Education Program in an online format. The instructional development is coordinated with the Alaska Air Carriers Association and funded through TVEP. A dedicated AMT faculty is developing online modules that are designed to provide working apprentice mechanics with the knowledge needed to successfully complete the FAA mechanic certification testing. The first modules are currently being "beta" tested by apprentice mechanics working for local airlines. Additionally, these modules can be used by certified mechanics to review, refresh or improve their knowledge in a particular maintenance subject.

Limitation: The FAA will only allow a few approved lecture courses to be offered in an "online" format.

Quality of Instruction

The Program actively uses data to evaluate the quality of its instruction. The Program uses a combination of internal data (test & projects) with external data (national test scores). This combination has been successful and useful in analyzing quality and the Program has confidence that it accurately identifies areas of concern which can then be addressed with corrective actions. Additionally, many outcomes use measures from both first and final semester students. The faculty understands that there may be a limit on the result as the outcome indicates improvement attained throughout the program. The faculty has determined that these outcomes are valid and continues to use this data to improve instructional quality.

Student Outcomes

The AMT programs monitor and evaluate five student learning outcomes:

- All programs
    - Demonstrate proficient, entry-level aviation maintenance skills.
    - Demonstrate proficiency in emphasis area skills: airframe or powerplant.
    - Demonstrate knowledge of aircraft engines, structures, and systems, as well as appropriate FAA regulations.
    - Demonstrate knowledge of industry information: current status, segments and opportunities.
- AAS
    - Demonstrate critical thinking, problem solving, and communication skills.

The programs use both internal and external data to measure and assess each outcome to include:

- Internal
    - Course exams
    - Course projects
- External
    - FAA knowledge exams
    - FAA skill exams

Internal data shows AMT students demonstrate a consistent high level of knowledge through exam data, projects, and papers reflecting industry norms, status, practices, and opportunities. Many internal measures use data distributed across the program and are more an indication of in-program improvement than raw performance. Historical data has shown continuous high achievement. The internal assessment data is used to identify low performing areas or low performing cohorts, which alerts full-time faculty and adjuncts to the need for improvement. The internal measures are verified by external FAA national knowledge/skill exams. This external FAA exam data is used to "look back" at internal data to identify broader areas for improvement. Where appropriate, changes to teaching methods, subject emphasis or counseling are applied. It should be noted that FAA pass rates for AMT students averages in the mid 90 percentiles.

4. Program Duplication/ Distinctiveness (300 words or less)

There are three FAA approved Part 147 aviation maintenance schools in Alaska. One, of course, is the UAA program, the second is UAF, and the third is a new (non-accredited) Yuut Elitnaurviat (YE) program located in Bethel, which is heavily supported by the Alaska Department of Labor.

The UAA program requires 5 semesters for both UC with no classes being offered in the summer. The program serves more non-traditional students, most work during the summer or year round. The Program is FAA approved for up to 200 students. With current staffing/equipment capacity is 96 students and remains steady around 90% of current capacity. The Program is open entry/exit, which allows students experience an interruption may continue their education the next semester.

The UAF program is designed to deliver the full curriculum in one calendar year (one of the few approved programs available) a student must commit 8 hours/day, M-F, 12 months of instruction. An interruption of attendance can take up to a year to continue in the program. UAF enrollments vary from 55% to 85% of their 30 student capacity in the past. *Note: the UAA and UAF programs serve very different demographics and do not compete for students; on the contrary, they complement one another by offering students flexibility.*

Success of the YE program is to be determined. They are training their first group of students and expect graduates in June 2020. The program is limited to 15 students in the 18 month curriculum. We commend the program for their efforts to certify local individuals interested in aviation maintenance.

Note: The total graduates from all three FAA approved programs falls short of the projected 113 openings/year.

5. Summary Analysis (500 words or less)

<u>AMT Program's Strengths</u>

The Program is committed to continuously improving in quantity and quality. The curriculum is highly rigorous and follows standards well above FAA and industry norms. Employers recognize the high quality of our students and are evidenced by excellent graduate placement rate in the industry. The Program is recognized for its knowledgeable faculty and staff. Faculty participation in setting policy, regulations, and student

achievement contribute to the Program's national recognition for quality. The Program is successful at receiving equipment donations and external funding.

AMT Program's Areas of Concern

The Program notes that limited faculty and staff time and resources (partially alleviated by the addition of new faculty in F19) has hindered pursuing opportunities and new directions in teaching, professional development and external engagement. Student recruitment also suffers from limited time and resources.

AMT Program's Opportunities

With administrative support the Program sees opportunities to focus on student recruitment and retention to increase student graduation rates. The Program can begin expanding teaching, professional development and external engagement. When the new faculty is fully integrated the workloads will return to normal levels which will permit expansion of all program parameters. The Program can pursue opportunities in delivery flexibility and increased student throughput when the pending FAA curriculum change is implemented. With increased resources national/international collaboration can expand as the Program has been approached by US/overseas schools but has not had the resources to participate.

AMT Program's Challenges

The Program has both internal and external challenges to UAA/CTC recognition and visibility. Among these are broadly communicating the Program's quality and successes. The Program needs to develop an action plan to address resource requirements. The focus of the plan ought to be increased enrollments and emphasizing academic degrees as career advancement. We will need industry support to demonstrate the how the degrees relate to career advancement. Traditionally aircraft mechanics have not always found a degree is necessary or beneficial to advancement. By utilizing adjuncts to increase capacity in early semesters to relieve program bottlenecks would increase enrollments throughout the program. Adjuncts could also relieve full-time faculty to develop curriculum and improve the program. This would allow faculty to focus on larger, targeted program improvement which are beyond current workloads.

Recommendation

Considering long term performance, the three Programs have a stable level of productivity and quality. Fluctuations in the data are often driven by student life factors such as work-school balance, family commitments and financial resources. These external factors are not within the Program's control but, long term aggregated data shows the strength and capacity for improvement of the Program. The Program can easily maintain its current and historical levels. However, further improvement and expansion the Program will need outside support, specifically from UAA, CTC, the Aviation Division, and the aviation industry.