Power Technology
University of Alaska Southeast
2022-2023 Annual Program Assessment Report

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Program Overview

The Power Technology Program at UAS provides students with the skills they need to find good paying jobs. The Power Technology programs are dedicated to providing quality learning opportunities in a supportive environment where power technology students can learn new skills or advance existing skill levels. The Power Technology department provides the knowledge, tools and experiences that enable students to develop professionally and experience personal growth and enrichment.

Program Learning Outcomes for AAS Power Technology Degrees

1. Program graduates will have demonstrated a broad based proficiency in the skills required to obtain and succeed in an entry-level position in the diesel industry or other closely related field. The UAS Diesel Department mission statement and department competencies will be the benchmarks use to ensure student success.

    a. Graduating students will be able to safely perform the hands-on mechanical tasks needed to troubleshoot, repair, adjust, and service heavy-duty diesel type equipment and related auxiliary systems.

    b. Graduating students will have shown they can differentiate between systems and concepts found in various marine, vehicular, earth moving, and power generation systems.

    c. Graduates will have demonstrated the necessary reading and comprehension skills in order to read, process and follow complex disassembly and reassembly procedures.

2. Program graduates will have demonstrated broad based proficiency in the six UAS competencies to the level needed to accomplish goal #1. The UAS and UA mission statements, the UAS 10 year strategic plan, and the UAS core values will be the benchmarks used to ensure student success.

    a. Graduates will have demonstrated the, communication, social, ethical and moral skills needed to successfully function in today's work environment.

    b. Graduates will have mastered the computational and critical thinking skills necessary to analyze, adjust, and troubleshoot complex computerized systems.

    c. Graduates will have demonstrated they can successfully use the various information systems, reference materials, information hardware and software needed for operating, troubleshooting, and maintaining newer complex systems.

Data Collection and Analysis

- In some Power Technology (PT) class's students take pre-course test. All PT classes end with a written final exam, some finals have a hands on activity or identification of parts and/or components included. Some classes have a final project. These methods assess learning outcomes. Analyses of outcomes are used to determine material that needs additional and or different coverage.
- Project work and lab assignments show tangible evidence of student understanding of lectures and demonstrations.
- Results of on-line course evaluations are reviewed and used to assess course strength and weaknesses.
- Professional advisory committees are consulted regularly for industry trends and work place skills expected of graduates of the programs.
- All PT courses are structured with a lecture and lab element. The time for each class session is divided approximately in half. So the average class meets twice a week for four hours for a total of 13 class sessions.
- **Lecture:**
  - Involves a PowerPoint or discussion with a training aid
  - Reading is assigned with homework based on the lecture
  - Parodic quizzes based on homework
  - Midterm based on quizzes
  - Final based on midterm and quizzes and homework and lab assignments

- **Lab:**
  - Lab assignments and or projects are based on the lecture of that day
  - The homework then reinforces the hands on portion that was done in the lab.

Lecture Grade Rubric for All DESL Classes

A	B	C	D	F
Student has no unexcused absences or tardies. Demonstrates an excellent understanding of written and presented material.	Student has no unexcused absences up to 1 tardy. Demonstrates a good understanding of written and presented material	Student has up to 1 unexcused absence, up to 2 tardies. Demonstrates an average understanding of written and presented material	Student has up to 2 unexcused absences, up to 3 tardies, Demonstrates a poor understanding of written and presented material	Student has more than 2 unexcused absences, more than 3 tardies, Demonstrates no understanding of written and presented material Usually drops course

Lab Rubric for DESL S110 (and most diesel classes)

What it takes to get a good lab grade. Ten (10) points possible

1-3 points

- Little or no advance preparation
- Lets others set and pursue the agenda
- Observes passively and says little or nothing
- Responds to questions if specifically asked
- Will do something if told exactly what to do

- On phone or taking breaks too often
- Stands around chatting (not about the project at hand)

4-7 points

- Moderately prepared in advance
- Takes some part in setting group goals and agendas
- Participates in discussions, letting others provide the direction
- Occasionally introduces information or asks questions
- Is willing to find resources that provide additional information (manuals, online)
- Capable and willing to do minimal reading in order to follow a procedure

8-10 points

- Well prepared in advance
- Takes a large part in setting group goals and agendas
- Actively participates in discussion and asks questions
- Listens actively and shows understanding
- Volunteers willingly and carries own share of groups responsibilities
- Willing to read and reread a manual to gain enough understanding to do procedure.
- Will help another group if has enough understanding to do so

Classes studied in this report to determine if Program Learning Outcomes (PLO) are being met

1. **DESL S110 Diesel Engines**

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1. DESL S110 Diesel Engines

Engine Component Identification Pretest

Entering course skill level	Very Little Knowledge	Some Knowledge	Advanced Knowledge	Total Students
Number of students	4	6	3	13

Completely Dissembled Engines

The lab portion of this class involves a complete tear down of a diesel engine, identifying and measuring all parts for wear, then reassembly and starting the engine. Successful assembly of an engine directly relates to the students understanding of the various systems that make up a diesel engine (lecture) and how well the student can apply the information in the service manual to hands on procedures in order to reassemble the engine.

Lab Project Posttest Grade Rubric

Engine run (posttest)	Engine ran after initial assembly with no instructor intervention	Engine needed minor troubleshooting to run Such as: injectors needed adjustment, fuel pump needed retimed	Engine needed instructor troubleshooting to run. Such as: cam timing was wrong, wrong sequence was used for adjusting valves and injectors. Internal components assembled wrong	Engine did not run
Number of engines	3	3	1	0
Student letter grade	A	B	C	D
Number of students	5	6	1	1

The charts above show that at the start of Diesel Engines class the majority of the students have little to limited knowledge of the inner workings of an engine. The last charts shows that the majority of the engines started with little to no instructor intervention proves that the students learned not only how to resemble the engine but how all the individual internal parts work together. There is a direct correlation between a student's letter grade in lecture and how well they did on their lab project. In engines class the lab project lasts the entire semester.

Recommendation for DESL S110: This is 2023 and electronic engines (computer controlled) almost completely dominate the roads, job sites and mines. Out of the 20 or so engines Power Technology has only 5 are electronic. We need to upgrade. The problem is electronic engines that come on a stand and ready to run cost in access of 60K.

Donations of electronic engines can be had but then the problem is in order to run an electronic engine a controller has to be built, this takes 20 to 30 hours of hi-tech electrical/electronic wiring. I personally have built two controllers and will continue, but they cannot be put into service (functional lab props) fast enough.

Improvements and future plans for tracking program learning outcomes:

- Class sizes were almost back to pre-covid. Classes run 8 to12 students caps are at 16 students, we are lacking from what we are capable of doing. We need more recruitment.
  The high school is no longer offering any shop classes so we no longer get the few from there. We need more recruitment into the Diesel Programs, we need to expand that to state wide.

- The mechanical knowledge of the entry level student seems to be less and less. This has been prevalent for the last 4 years or so. Last year in Preventive Maintenance and Inspections class (first term class for new students) I wrote and extensive "component identification assignment" this is a very large assignment that is mostly completed by the student outside of normal class hours. This new approach seems to work well, it helps the student with little or no knowledge catch up to the students that come in with some knowledge without having to compromise the existing curriculum.

- This year we wrote a "tool identification quiz" this is another "before" entry level type assignment. It is also quite extensive and covers almost all the tools we use in our classes. It will be introduced in Diesel Engines class (also a first term class) in Fall of 2023.

- It is a tough battle to keep up with the demands of industry and to educate the student that enters the program with a diminished skill level. But as long as we can keep the innovative ideas flowing the student will prevail.