



UNT College of **ENGINEERING**

Senior Design Day 2018



Department of
ENGINEERING
TECHNOLOGY



MECHANICAL ENGINEERING TECHNOLOGY

The Assisted Attic Lift

Team Members:

- Ian Wylie
- Samuel Shelton
- Chris Goodman
- Abdulla Aljabr
- Chris Hollingsworth
- Jordan Robertson

External Sponsors/Mentors:

- UNT Department of Engineering Technology (ETEC)

Internal Sponsors/Mentors:

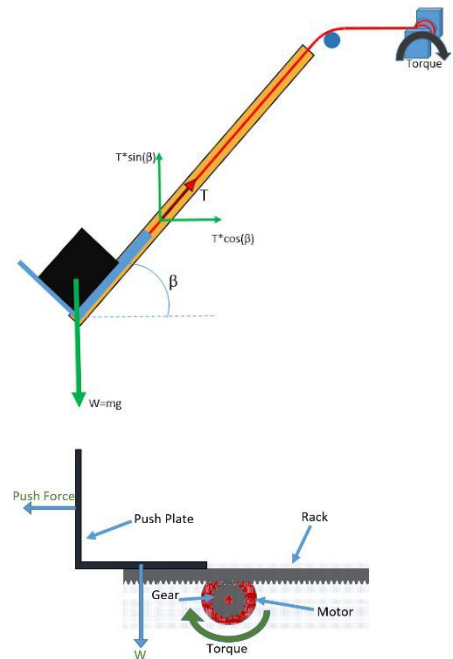
- Professor Ali Nouri
- Professor Leticia Anaya

Abstract:

The Assisted Attic Lift is an attachable system that eases the process of raising heavy items into the attic space of any house. Using an existing attic ladder, the lift system bolts straight on to this ladder, and the push arm is assembled at the attic entrance.

The way this system works starts with an object being placed on the lift cart at the base of the attic ladder. With the push of a button, a winch pulls the cart up the ladder on a track using a steel cable. When the cart has fully ascended into the attic, a push arm pushes the object off the cart into an empty space into the attic with rack and pinion technology. One more push of a button will return the cart to the base of the ladder at its starting position.

Through the funding of the University and the effort given by the students, the Assisted Attic Lift became possible. We hope to see this product be deemed useful and important by contractors, and have it implemented as a common household appliance to ease the lives of homeowners.



Project Turbo

Team Members:

- Benjamin Vettors
- Tyler Luce
- Sulaiman Aljurbua
- Jose Valentino
- Peter Caparelli

External Sponsors/Mentors:

- American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

Internal Sponsors/Mentors:

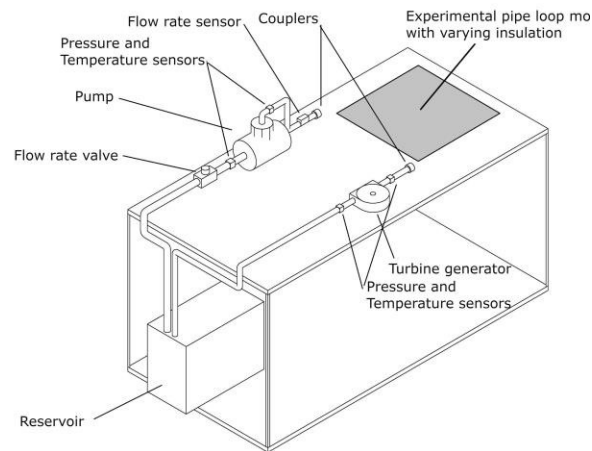
- Dr. Huseyin Bostanci
- Dr. Leticia Anaya

Abstract:

Project Turbo is a mobile lab test bench that will be used at the University of North Texas to assist students in understanding fluid mechanics and heat transfer principles. The proposed project is sponsored by the ASHRAE national organization and will consist of four hands-on labs for students to perform.

The test bench is a closed system that includes pressure gauges, thermocouple temperature sensors, a turbine generator, a pump, a control valve, a flowmeter, interchangeable tubing, and pipe insulation. Students will be using Bernoulli's, Darcy's, and other power equations to determine power added to the fluid by the pump, pump efficiency, energy losses due to a temperature differences, frictional energy losses, power removed by the turbine/generator, and turbine/generator efficiency.

The main objective of Project Turbo is to help students understand hydropower concepts through a user-friendly, hands-on experience workbench.



Adaptive Kayak Lift

Team Members:

- Ara Amen
- Brandon Ricky
- Jackson Russo
- Ryan Schwend
- Ricky Villalobos

External Sponsors/Mentors:

- Turning Point Nation

Internal Sponsors/Mentors:

- Professor Ali Nouri

Abstract:

Jabbr industries' goal is to help people with limited mobility enjoy outdoor recreational activities. We have partnered with Turning Point Nation which is an organization who assists disabled veterans enjoy outdoor activities. Together we can help everyone live life without obstacles.

The Adaptive Kayak Lift is a lift that is easily accessible for someone in a wheelchair to both load and unload the kayaks onto any level of the trailer. Eliminating this difficulty will allow for Turning Point Nation to achieve their inspiring goal of teaching those living with mobility impairments how to indulge in exciting outdoor activities without any obstacles



Ozone Relief Systems

Team Members:

- Omar Aguirre
- Meshal Aldulaijan
- Andrew Bryant
- Aaron Wilson
- Jerry Young

External Sponsors/Mentors:

- UNT Department of Engineering Technology (ETEC)

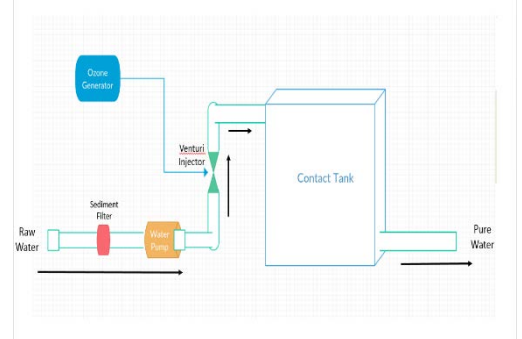
Internal Sponsors/Mentors:

- Dr. Seifollah Nasrazadani

Abstract:

This project presents the design of a disaster relief water purification system. The design was developed with careful consideration of the operational problems experienced with most ozone generators available worldwide.

By keeping track of the water input, the ozone generator is able to cleanse and disinfect using an electrical discharge. In doing so, many special features have been incorporated which are reflected in the equipment's proven performance and reliability. This design has several potential applications, including mobile water treatment systems which provide supplemental water to handle short-term water shortages or meet peak demand.



UNT Tolerance Analysis

Team Members:

- Terrance English
- Nathan Peitzer
- Nathan Schami
- Justin Hollingsworth

External Sponsors/Mentors:

- Raytheon

Internal Sponsors/Mentors:

- Dr. Leticia H. Anaya

Abstract:

3D Tolerance Analysis of a mechanical assembly benefits manufacturers and engineers in every phase in the design process. The tolerance analysis of a product can predict a design's functionality. However, a design cannot often determine its tolerances. Advances in technology have brought software that can perform these tasks so products with design defects can be tested before sending the final assembled product to be manufactured. Our team will gather various information about different tolerance analysis software, such as its strengths and weaknesses. The information will be used to create a matrix of product features to rank the functions of a product.

The team will also perform comparative analysis between the tolerance performance of a software designed robotics arms prototype and the tolerance performance of an actual physically developed robotics arms prototype. A two level six factorial (2^6) testing plan will be used to analyze certain gap distances created by the assembled prototype. In the 2^6 layout, a six bar assembly will be tested with each bar at two levels (maximum and minimum tolerance values) to determine the impact of accumulated variation on certain gap distances (or the response values) of the prototype.

The goal is to determine the discrepancies between the actual software results and the actual physical implementation. Variables such as (atmospheric heat, pressure, material, part lengths, etc.) that potentially affect the gaps will be not considered. It is expected that the location of the parts in the assembly will have an impact on certain gap distances



The Outdoor Lift System

Team Members:

- Owen Griffin
- Christian Veliz
- Edwardo Chavez
- Charles Priest II

External Sponsors/Mentors:

- Turning Point Nation

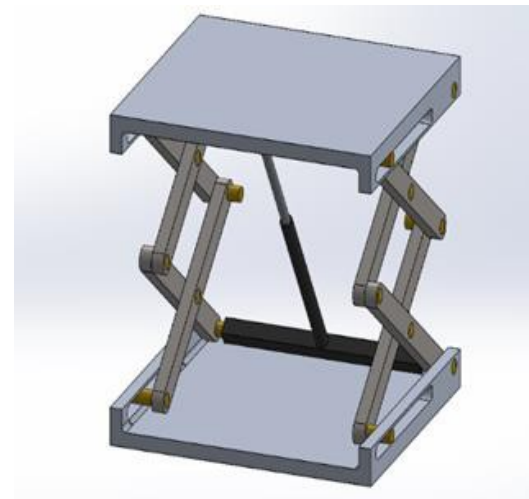
Internal Sponsors/Mentors:

- Dr. Hector Siller

Abstract:

Uplift Engineers is a group of Senior Mechanical Technology engineering students working together to create the Outdoor Lift system. The Outdoor Lift System is a hydraulic lift device that is used in outdoor environments to lift mobility impaired persons in wheelchairs in order to give them the ability to easily transfer from the ground to a vertically elevated surface or location while engaged in outdoor activities. The sponsor for this project is the Turning Point Nation organization.

Turning Point's mission is to encourage and teach mobility impaired persons the skills to engage in outdoor activities through the use of organized outdoor events hosted by the company. To this extent we were asked to build this device to help facilitate some of the activities engaged in these outdoor events. Because one of our members' wife engages with mobility impaired people on a regular basis and another one of our members was in a severe accident. We as a group have a vested interest in this project and the positive effect that this project can have on mobility impaired people who are trying to engage in outdoor activities. As well as the opportunity it gives newer mobility impaired people who want to learn and engage in these outdoor activities.



Infrared Chip Engraving Laser

Team Members:

- James Burg
- Andrew Guidry
- Rojelio Cavazos
- Andrew Murgia
- Brian Glass

External Sponsors/Mentors:

- L-3 Technologies

Internal Sponsors/Mentors:

- Dr. Maurizio Manzo

Abstract:

The proposed project from L-3 Technologies is to change the current process of labeling infrared chips from placing stickers with barcodes to using an automated laser system to engrave the barcode. A laser engraved barcode is more permanent, cheaper, and reduces human error. The laser system will be used to engrave a 2D barcode that must be verifiable via an integrated reader after engraving by repurposing a soldering table.

The system must insure the integrity of the barcode, be as automated as possible, perform an automated process shutdown if read back verification fails, and allow for manual intervention in case of verification failure or safety issues. The barcode cannot damage the product, degrade the performance of the sensor, damage the focal plane array, block any infrared energy, or show as a blemish in the final imaging system. The system must adhere to all local, state, and federal safety requirements for low energy laser operation.



UNT Formula SAE – Power Integration

Team Members:

- Nick Kalil
- Seung Cheon

External Sponsors/Mentors:

- Altus Well Experts
- SolidWorks
- College of Engineering

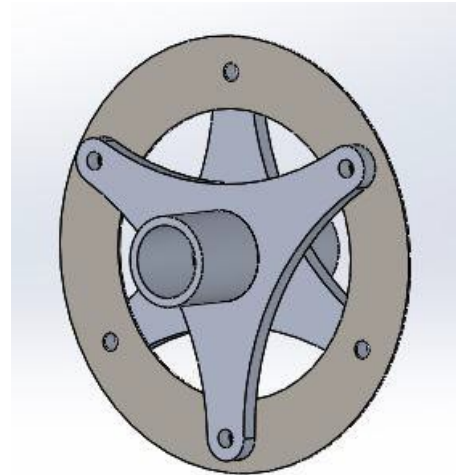
Internal Sponsors/Mentors:

- Dr. Hector Siller

Abstract:

The newly formed sub-group of UNT SAE, Power Integration, has been given the responsibility of being UNT SAE's first ever research and development project for future active members. Power Integration's first project is to find an applicable way to replace, or redesign, existing continuous velocity (CV) joints located on the rear axle of the racecar.

This team's goal for their current Flex Plate and Coupler design is to create a cost and weight savings for the SAE team and provide any important limits of the prototype. SolidWorks, a type of computer-aided design (CAD) software, is used to precisely design the flex plates and coupler components to meet design specifications provided by other UNT SAE sub-groups. Extensive finite element analysis (FEA), and hand calculations are then used to test how the design responds to loads and torques and any other physical effects. This team was able to work with many sub-groups from UNT SAE's Formula team to provide a strong foundation for future members to build off and implement on future UNT SAE Formula racecars.



Eagle Solutions-Proposal Stage

Team Members:

- Abdulsalam Alanazi
- Yazeed Alanazi
- Justin Brown
- Leta McCabe
- Christian Nelson

External Sponsors/Mentors:

- ATE Technologies Inc

Internal Sponsors/Mentors:

- Dr. Leticia Anaya

Abstract:

ATE Technologies processes semiconductor wafers. Currently, their laminator machine takes too much time and wastes too much materials during this process. Additionally, the location of the control panel and gauges can result in back strain and missed readouts.

Our team will be overhauling the cutting steps of this machine. Presently, stage one cuts the tape in a set diameter regardless of the size of the wafer. Stage two uses a spring-tension current wire to cut the tape to exact dimensions of the wafer. The new design will remove both stages and replace with a single, free-floating, cutter mounted to linear tracks. This will allow the tape to be cut to precise measurements on the first pass. Finally, we will be relocating the control panel and gauges to a more ergonomic position instead of below waist height.

