SENIOR Design Day

Department of Mechanical & Energy Engineering
University of North Texas

April 28
2017

EST. 1890

COLLEGE OF ENGINEERING UNT

PROGRAM

View Projects in Main Hallway
9:00 AM to 11:00 AM - Discovery Park Foyer

Lunch Break
11:00 AM to 12:00 PM - MEE Main Office F101

Design Presentations
12:00 PM to 4:00 PM

	B142	B155	B185
12:00 PM	PolyFoam	AMI	GE - ASME
12:30 PM	Furious 5	Bench Warmers	GE - Aux
1:00 PM	Zyvex	Designers	Hoist Away
1:30 PM	Smith	Kill A Watts	Rockets
2:00 PM	PDQ Printing	FSW	Torch Squad
2:30 PM	Carrier	5 Star	Mayday
3:00 PM	MEEN Green	Top Gear	Triumph
3:30 PM	Board Engineers	Water Cycle	

FSW - Electronically Assisted Bicycle System

Team Members: Colton Kadlecek and Shuai Zhang

The bicycle is a popular choice for commuters around the world. However, many may experience terrain that makes pedaling difficult or weather that leaves them in need of showering once they reach their destination. The team has designed a product that can make the commute easier and quicker without drastically changing the bicycle or requiring the commuter to buy a new bicycle.

By using a motor rack that easily clamps to the seat post and a battery rack bolted to the frame, this design supplies power to the rear wheel via a chain connected to the motor and a modified rear sprocket. The system is powered by two LiFePO4 12v batteries connected in series.

Not only does this ease a commuter's workload, it will also appeal to newcomers to the bicycling world that have been reluctant to begin biking because of the sometimes strenuous nature of the activity.

5 Star

Team Members: Chris Miles, Eric Gilstrap II, Alina Meakin, Gerald Onyekonwu, and Collins Chukwuka

Our project is a redesign of a former senior design project that failed due to deformation. It is a drum resin mixer for Dr. Sheldon Shi and to be a permanent fixture in his UNT lab. The purpose of the drum is to tumble wood chips or particles along with resin, which will be added by an atomizer that puts air into the resin and sprays it inside the drum. Resin is a glue like, sticky, flammable, and organic substance that when used with other materials can make compound; such as particleboard and fiberglass.

Our team is made up of five students and with a much smaller budget and reusing of materials we hope to have our project operable by design day. The motor is to be a variable control speed motor and we will use an inverter to convert the voltage. The atomizer has a regulator to control the flow and speed of the resin going into the drum. The front of the drum will have a plexi-glass window/door that will allow the user to see the mixing done. The blades have been cut special for better mixing of the material with cut outs inside the actual blade. All in all we believe we have a better design than our predecessors.

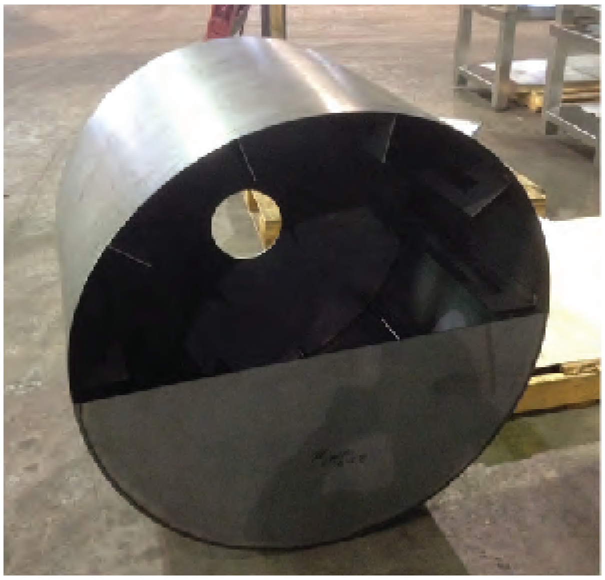

Figure 1 Finished drum with blades attached

Figure 2 Rear view of the drum with the hole for the atomizer

Figure 3 Base before adjustments with 7.5 HP motor at the back

Special Appreciation: Dr. Shi (Faculty Advisor), Rick Pierson (Fabrication), and Dean Peters (Fabrication)

Mayday Engineering

Team Members: Tyler Chidester, Ian Morrow, Clark Limbaugh, Daniel Whitaker, and Jamie Wood

Mayday Manufacturing is a global leader in the production of high-quality bushings, sleeves, pins, and spacers to the aerospace, defense and homeland security industries. Many parts manufactured at Mayday require the use of custom fixturing for measuring, assembly, and machining. Custom tools and fixtures are often designed in house to aid in the manufacturing processes. Conventional methods of making custom workholding and fixturing components are often time consuming and costly. 3D printing provides a great solution to the diverse fixturing and prototyping needs of Mayday Manufacturing. Fused deposition modeling is an inexpensive way to make strong, functional, accurate, and intricate plastic parts.

Special thanks to Josh Lacko at Mayday Manufacturing and Mark Wasikowski for working so diligently with us throughout the entire process. In addition, support from Weihuan Zhao has been greatly appreciated.

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Killa-Watts - Hydroelectric Test Stand & Turbine Design

Team Members: Xavier Castelazo, Dakota Bower, Sarah Minette, Garrett Inkster, Cody Tilghman

The goal of the project is to create a hydroelectric turbine test-stand with a mount for interchangeable student designed turbine wheels. The stand would allow students to compare theoretical potential energy of a suspended water column to the actual output of a turbine, and be able to calculate efficiency and theorize ways to improve the system. Using working principles of hydroelectric power plants, Pelton wheels, Francis Turbines, and other common turbines, this project will be created for long term use in the Mechanical and Energy Department. It will be durable, functional, and as a MEEN Lab, or a hands-on demonstration for Alternative Energy Sources. The project will be used to educate the UNT Mechanical and Energy Engineering undergraduates in hydroelectric principles and applications and give any future student the opportunity to create and test their own turbine. Each turbine wheel will be designed/tested in a CAD/Solid Modeling software. Once the wheels have been designed, they will be 3-D printed in ABS plastic can then be tested in the stand. The test stand will run water over the wheels at up to 4 meters/second and generate power from translating the kinetic energy of the water into a shaft which turns an electric motor.

The project idea is modeled after the basic principles hydroelectric power generation, and design multiple turbine wheels that may be suited for different applications. From the research, Pelton wheels were found to be exceedingly effective at catching the kinetic energy of the water thus generating power. The Pelton wheel is essentially composed of 2 cups that split the jet stream in half and shed the water to the side. The cup design allows for the water jet to transfer almost all its kinetic energy into the wheel, which results in high efficiency of energy transfer from the water. This basic principle is the primary inspiration for the project's turbine wheel designs.

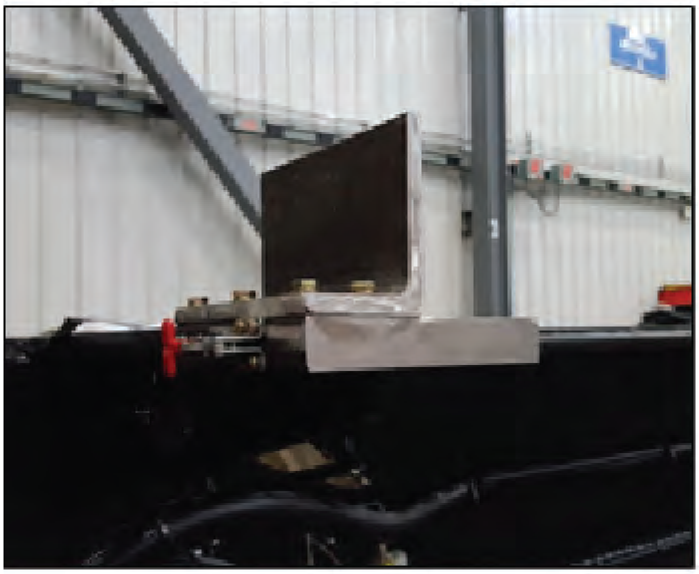
The test stand was designed to produce a high velocity jet stream with low volumetric flow rate to optimize our limited pressure head. Calculations began with Torricelli's law of flow out of a vessel. Subsequently, equations for time rates of change for velocity and height of water in the tank were derived. With these equations, sizing specifications for the tank and subsequently the wheels were determined.

GE Aux

Team Members: Mohaned Dewaidi, Christopher Dobbs, Stephen Ellis, Corey Rockefeller, and Joseph Wyman

This project is in partnership with General Electric (GE) Transportation, Incorporated. The major goal for this project is to increase the efficiency of the assembly process of locomotives at the GE Transportation plant in Fort Worth, Texas. The task given to our senior design team was to study the current assembly processes and use a new perspective to come up with a data-driven solution that allows quick, easy, and repeatable cab sets during locomotive assemblies. Our team has come up with a solution to create a jig or alignment fixture that will attach to the needle beams where the front side, which is referred to as side one, of the auxiliary cab will sit, and this jig will help guide the auxiliary cab to achieve consistent and potentially perfect centerline measurements on both sides according to the blue prints and engineering drawings for the assembly process of the auxiliary cab.

Decreasing the amount of time required to set auxiliary cabs would become the narrowed scope of our project. This goal of quicker cab sets would need to be accomplished by enacting a process change only. Changes to the actual design of the main cab, auxiliary cab, or platform were undesired and would defeat the purpose of the project. We chose to create a fixture to overcome the alignment issues of the auxiliary cab because the creation of a jig satisfies the need for a cost effective, repeatable, data-driven, and effective solution to increase the total number of locomotives produced per week at the GE Transportation Fort Worth facilities.

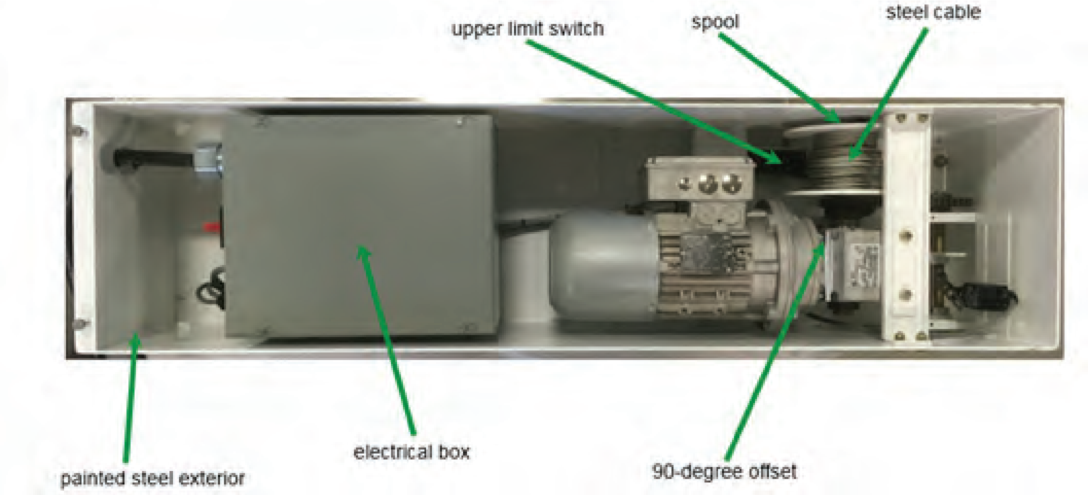


We would like to express our gratitude to Tim Mullett, Michael Neuenswander, Mark Tatum, James Mowdy, Mark Wasikowski, AFISCO Industrial, Inc., Earl R. Waddell & Sons, Inc, and GE Transportation, Inc. and all GE team members who helped in the success of our this senior design project.

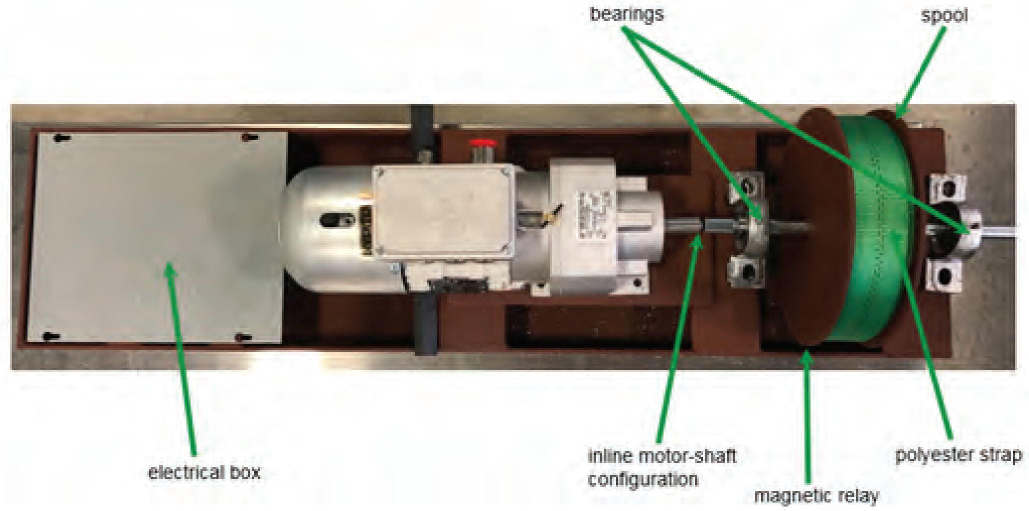
Hoist Away

Team Members: Jacob Behning, Jonathan Garcia, Zachary Garner, Brian Hardy, and Hannah Wilcox

The goal of this project is to re-engineer and improve the reliability of the cable hoist designed by CCC Power, while also minimizing the hoist's overall cost. The function of the cable hoist is to raise and lower aircraft service cables from boarding bridges and maintenance hangars. This is done to ensure that cables are protected from harmful conditions, environmental hazards, and from being run over by the airport ground crew.



The original 90-degree offset configuration between the motor and spool causes inconsistent spooling of the steel cable, increased friction in the gears, and lowers the efficiency of the entire hoist. The new design incorporates an inline orientation between the motor and spool, which allows for more consistent spooling, improved load distribution, and increased reliability throughout the system. The steel cable, which must be replaced annually, is replaced with a polyester strap. The original enclosure of the cable hoist is made of steel, which provides sufficient structural support for the hoist, but its cost to manufacture is too high. The new design features a steel angle iron frame, which provides an increase in structural support. The new design also features a fiberglass exterior, which offers corrosion resistance to the hoist.



Thanks to Jim Knight, Jay Chenault, and Robbie Chenault at CCC Power for sponsoring this project and being attentive and helpful when we had questions.

Special thanks Wilson's Transmissions for allowing us to use their facilities for fabrication.

CCC Power

Board Engineers

Team Members: David Bracewell, Yichun Cai, Dylan St. John, Aubrey Kingman, and Mohammed Al Marzooq

The Board Engineers set out to design a motorized longboard that could be easily switched from motorized to manual, and back again, as the given situation required. To this end we chose a system of gears over belts because, even though it was more complicated, it would allow for better torque, and be more easily disengaged. We also chose to use an Arduino microcontroller to control the interaction between the motor, ESC, and battery, and would provide Bluetooth capability for use with phone control applications.

David Bracewell, Yichun Cai, Dylan St. John, Aubrey Kingman, and Mohammed Al Marzooq

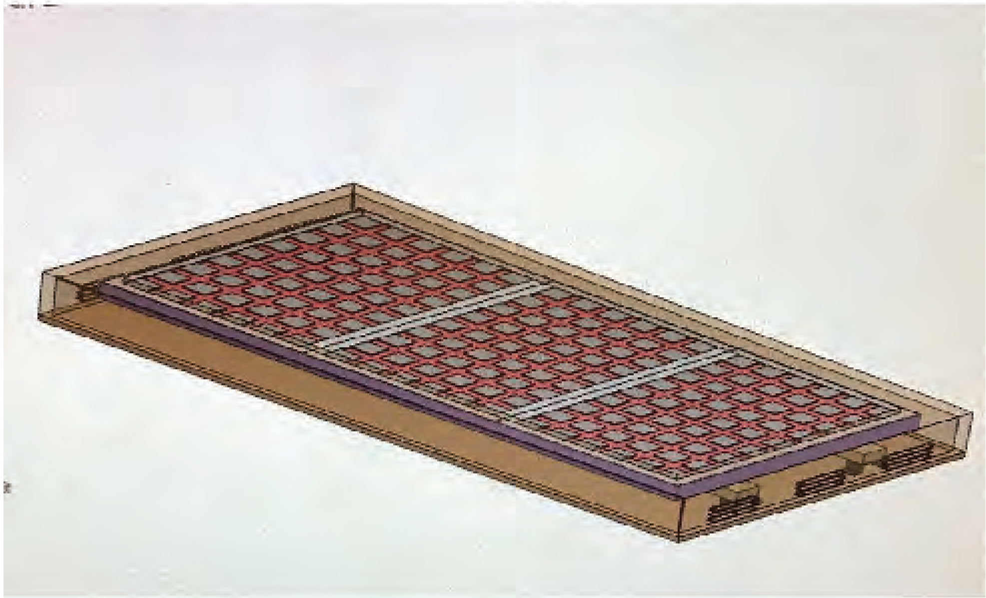
Special thanks to Dr. Sheila Williams our Faculty Advisor

AMI - Golf Cart Powered by Solar Energy

Team Members: Ahmed Almandhari, Ibrahim Alduways, Mansoor Al-busaidi

The concept of the Golf Cart Powered by Solar Energy Design is the use of solar panels that have the ability to produce electrical energy, which can be used to charge the batteries in the back of the golf cart. The process of charging the batteries is that the sunlight would hit the solar panels. Therefore, the charge controller will work to convert the sun's radiation into electrical energy that being delivered to the battery bank through covered wires. The main aspects of this golf cart are that, it will lower the cost of charging the batteries, so customers would save money on their electricity bills. Moreover, it would result in increasing driving range. The use of solar energy would benefit to increase batteries life. It is environmentally and friendly golf cart. This design would represent the University of North Texas as a university with green efforts.

The goal of our project is to design and build an affordable, reliable, and safe golf cart that can be a substitution of the regular electrical golf carts in the market. When the objective of this project is focusing on how this project would help the society to live in a clean environment as we use an alternative secure to charge the golf cart rather than using the traditional method of charging the cart. Our team has assigned a statement of work that would identify the form and functionality of the design



Triumph

Team Members: Sarah Bundy, Brandon Leney, Ryne Spears, Preston Stalter, Blake Stewart, and Phai Thach

Fastening the aluminum skin of a Boeing 747 and the Boeing 767 (Military) to its frame requires over one million rivets. Before any rivets can be bucked, holes must be drilled to precise tolerances. Dull drill bits can cause holes to be undersized. Drilling at even the slightest angle can cause holes to become oblong in shape. To minimize bad holes, team Triumph has built a proof of concept robot that can move across a flat piece of sheet metal and drill perfectly circular true holes.

Our automated drilling machine can drill any pattern programmed via C++ computing language. A raspberry pi is used to process the code and drive the 3 motors that control x, y, and, z axis motion as well as the spindle motor which turns the drill bit. Consistent holes can be drilled by the robot for as long as the bit keeps its edge.

Triumph Group
Aerospace Structures

Sponsored by: Triumph Aerospace Structures – Marshall Street
Don Surratt, Senior Manufacturing Engineer

Carrier

Team Members: Ange Aluku, Samantha Brophy, William Edwards, Nathan Groover, and Scott Howell

We've designed a heating and cooling device to help control the temperature of a children's car carrier. We all know that children cannot regulate their body temperature on their own, our device will help regulate a child's body temperature so parents can safely enjoy outdoor activities with their children. By living in Texas, everyone knows how sweltering hot it can get in the summer. For parents who want to enjoy a day at the park, or an afternoon walk, these things can seem impossible with the heat, when their child gets too hot they become fussy and could suffer from heat exhaustion fast. Our product is supposed to help them stay cool in the hot summer sun, so everyone can safely enjoy a day out.

We used thermoelectric cooling devices (TEC's) as the heating/cooling source in our design. TEC's create a temperature difference between two ceramic plates when a current is passed through them. Our design uses a box separating the cool side and the hot side of the TEC. Each side has a fan pushing air either out to the environment or into the carrier. We decided to use TEC's because they were overall the safest option that we found because they don't use any sort of refrigerants to cool the system, and they have no moving parts. Our main goal when coming up with this design was to keep children safe and comfortable. Hopefully our product will help reduce the number of heat related deaths in children annually.

The group would like to thank our faculty advisor Dr. Choi for all the knowledge and input he's given us to improve our original design, and also Dr. Wasikowski for challenging the group to find more efficient way in completing our final design. As well as Marlow Industries for donating the TEC's and a few other parts needed to complete the design as well as helping us with our initial design and information.

II-VI MARLOW

Benchwarmers

Team Members: Robert Myers, Alejandro Rivas, Raul Salvador, Riley Walberg, and Grant Wuensch

Every day cities report water loss with no idea where it is going. This doesn't just effect the city's water supply but also has a negative effect in our environment. That is where Capstone comes in, they are focused in providing their users their flagship product which is the IntelliH2O® intelligent water meter. It is a self-reliant, communication platform designed for a remote, which incorporates electro-mechanical meter and valve that is centrally controlled by an analytical management software. With the company's impending move to an ultra-sonic metering system, they need test equipment to calibrate their meters across the range of temperatures expected in water service.

To provide an accurate calibration for Capstone's new generation of water meters, there required a test bench to simulate the conditions the meters will be exposed to in service. To accomplish this, we were tasked with providing water to the meter at a flow rate of 20gpm and at a modifiable set temperature within ±2°F. Meeting these requirements, in conjunction with a meter of known calibration will allow Capstone to build a dataset of calibrations for their new meters at all the water densities that the expect to encounter in the field. To meet our design goals, we have used a closed loop of water pumped through the meter to be calibrated, heating elements, and a vapor compression refrigeration system. The temperature control is handled by a custom LabVIEW application through a National Instruments DAQ.

Thank you to all the individuals and companies that enabled us to do this project and further our education as future engineers: Jim Williamson, Capstone Metering, Dr. Tae-Youl Choi, and Dr. Mark Wasikowski

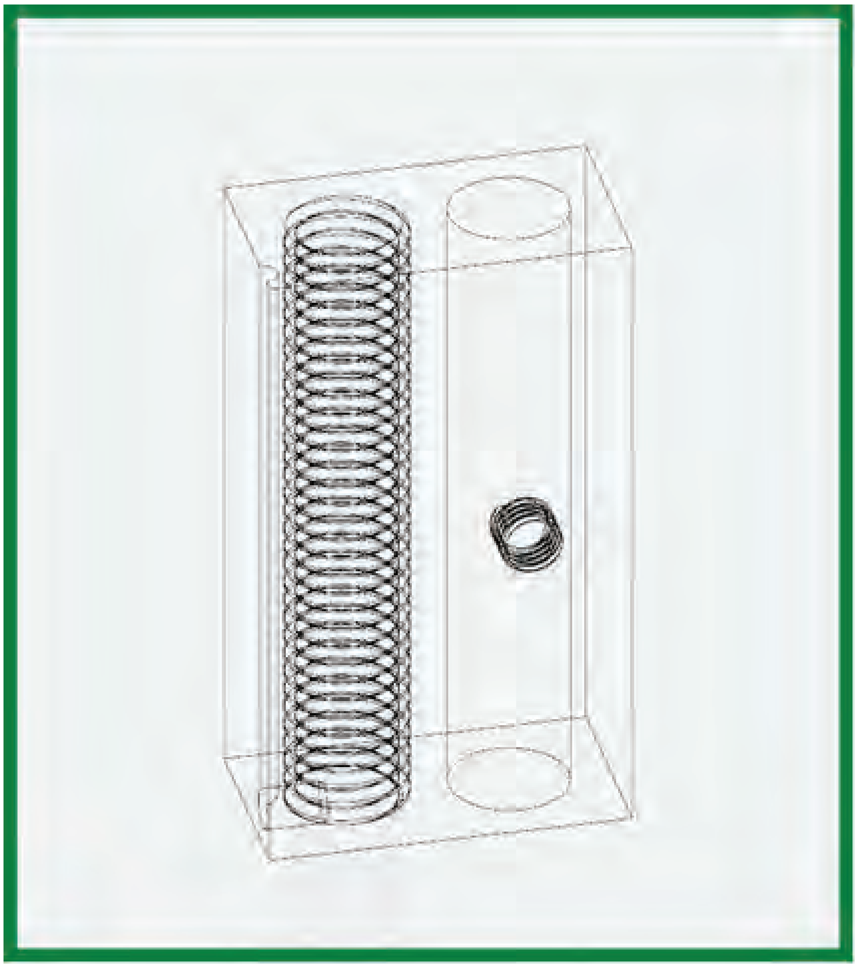
CAPSTONE METERING

PDQ Printing

Team Members: Robert Cline, Caleb Tallakson, Jacob Long and Brian McConnell

PDQ printing is comprised of four Mechanical and Energy Engineering students with a passion for 3D printing. We worked closely with our sponsor PolyPrinter, to improve the extrusion rate of their line of 3D printers. We were asked to develop a hot end capable of extruding a 0.25mmx0.35mm path of ABS at 500 mm/s while not exceeding a 30% weight increase.

The exact cause of speed limitations of FDM 3D printing nozzles is still debated. For the sake of this project we focused primarily on the heat transfer capabilities of the various hot end components. We identified two limiting factors: the use of stainless steel to transfer the plastic from the extruder to the nozzle and the brief dwell time of ABS inside the extruder. We decided to extend the overall length of the extruder and to limit the use of stainless steel to increase the overall heat transfer to the plastic.



Special thanks to our advisor Dr. Zhao and our sponsor Polyprinter.

Smith

Team Members: Leroy Ahwinahwi, Hamad Alomani, Jeremy Riggs, and Robert P Smith

Global appetite for energy grows at an alarming rate. Efficient alternative energy sources are necessary for sustainably feeding the need. Thermoelectrics capitalize on the relationship between temperature gradient and potential difference. The team has designed and fabricated a test stand for investigating the performance of a hybrid photovoltaic (PV) panel with refrigerated assembly housing thermoelectric modules. Temperature, voltage, current, and incident solar radiation data will be logged across 42 channels to generate temperature profiles and power output gains or losses.

The project has also been designed to be modular. It is capable of collecting photovoltaic and thermoelectric data independently of one another. A lab manual is being drafted to leave working experiments utilizing the stand for future MEE Lab I and Alternative Energy undergraduate students.

Special thanks to Aztec Renewable Energy and our Faculty Advisor Dr. Xiaohua Li

Zyvex

Team Members: Ryan Tharp, Nathaniel Goode, Eric Goode, Joseph Andrew Grimm, and Gerson Perez-Rios

Zyvex Laboratories is a nanotechnology company founded in 1997, and their primary objective is to commercialize Atomically Precise Manufacturing (APM). APM allows Zyvex to take advantage of the quantized nature of matter and essentially "arrange the atoms" the way they want them to be arranged. For 20 years, Zyvex Corporations has been developing tools to create ultra-miniaturized systems with atomic precision and superb capabilities. Zyvex Labs continues researching and developing tools that are essential in the construction of quantum computers and transformational systems which require atomic precision. The problem lab technicians are facing is they have to manually move samples from the end of the manufacturing chamber, also known as the Ultra-High Vacuum system (UHV), to the transportation container. This exposes the sample to ambient air which is full of pollutants such as dust and pollen. Due to the scale of the nanotechnology, any airborne pollutants will render the samples as inoperable. Therefore, this is problem because ruined samples cost Zyvex time and money.

We helped to fix this issue by creating an air-free satellite that attaches to Zyvex's UHV system and allows the technicians to extract the nanochips. The satellite will then attach to a glovebox where the chip will be placed in a transportation vessel. The satellite itself is composed of two chambers, a telescoping device, and a gate valve. Each chamber is created from acrylic pieces that have been bonded together and are separated by the gate valve. The larger chamber has a glove attachment at one end and allows the technician to use the telescoping device. The smaller chamber clamps onto the exit port of the UHV system and creates an airtight seal. The telescoping device will extract the nanochip from the UHV system.

Group members left to right: Ryan Tharp, Nathaniel Goode, Eric Goode, Joseph Andrew Grimm, and Gerson Perez-Rios.

We would like to acknowledge our advisor Dr. Sheila Williams and our sponsor, Zyvex Laboratories and Dr. James Owen, for guiding us through this great project and for providing financial support. We would also like to thank the UNT Library for 3-D printing specialized parts and Rick Pierson for providing us with the intricate cuts.

zyvex™ LABS

Rocket

Team Members: Luis Gonzalez, Jessica Hampton, Lindsey Smith, and Joel Thompson

Team Rocket is an aerospace focused senior design group with Jessica Hampton, Joel Thompson, Karen Lindsey Smith, and Luis Gonzalez as the members. The team joined the NASA University Student Launch Initiative (USLI) because they wanted to go through the design phases of a NASA engineer while learning about rocketry. Throughout the competition, the team focused on documenting their design process for both NASA and UNT Senior Design class. During the project timeline, the team completed a Preliminary Design Review, Critical Design Review, and the Flight Readiness Review. Coinciding with the documentation, the team has built three rockets in total. One is their competition rocket which was launched in Huntsville, AL on April 8,2017 at the NASA Student Launch competition. The other two rockets were an 80% scale and 50% scale of the full-scale rocket. Besides the competition, the team has also done research on innovations that could be used in the rocketry community. These innovations are research into the gimballed nozzle and a fin testing mechanism to cut costs on rebuilding the lower section of the rocket.

While the team recently competed in the actual competition, they would have been unable to do this without the assistance of their sponsors, mentors, and the MEEN Department. The team was sponsored by Lockheed Martin, Anida Technologies, the UNT Engineering Department, and SolidWorks. As for mentors, many of the Dallas Area Rocket Society helped the team learn the basics of rocketry so they would have a basis for their knowledge. DARS has also been the group who has allowed the team to launch their three rockets at various launches.

anida technologies

We would like to acknowledge our sponsors Anida Technologies, Lockheed Martin, Solidworks, NASA, and George, Jack, and Suzy Sprague from DARS

NASA

SOLIDWORKS

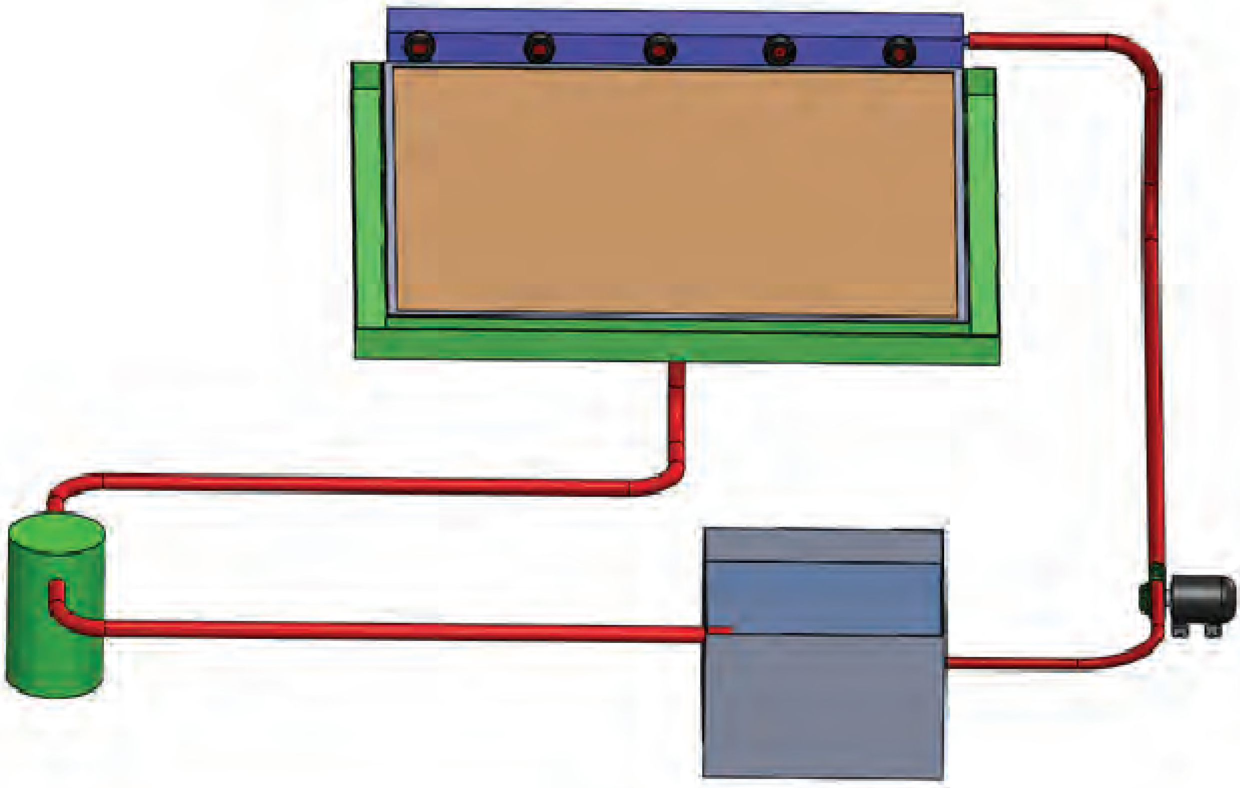
LOCKHEED MARTIN

Designers - PV Cooling System

Team Members: Ahmed Alghamdi, Abdulaziz Rasheed, Hesham Gazany, Nasser Alsaeed

The efficacy of a solar panel hinges on the necessary principle to keep the solar panel durable and maximally efficient. The Designers team's goal is to incorporate a green friendly cost-efficient PV cooling system that can be attached to past solar panel models and easily conformed to fit current designs. Our cooling system will eradicate current solar panels' inability to provide maximum output while keeping the solar panel at a safe operating temperature.

Our efficient cooling system will allow the solar panel to increase output 20% as it will keep the solar panel running at a maximum power while keeping it at an optimum operating temperature. The PV cooling systems design is a misted pipe attachment that will be installed all around the solar panel setup. The pipe will be connected to a water pump that will provide the necessary mist. The mist will be pumped only when the thermometer gauge, a separate device connected directly to the solar panel, reads levels above a certain temperature range. This automatic system is environmentally friendly as it designed with green friendly materials and doesn't require an outside device that would waste energy needlessly. Overall, our PV cooling system will increase the durability of the panel while keeping it running at maximum efficiency all while running green friendly.



CAT Drawing of the designed PV Colling System

Team Designers would like to acknowledge the following for their guidance: Dr. Xiaohua Li, Dr. Mark Wasikowski, Dr. James Brauer, Richard Roberts, Erin Allice, and Natarsha Joseph-Hall

The Water Cycle

Team Members: Sam Abraham, Roy Aguh, Kyle Croft, Cassidi Mercereau, and John Merkaje

The goal of this project is to construct a mechanically powered water sanitation system that fits onto a bicycle. This design is aimed at providing clean water solutions in settings where access to clean water is not readily available. Constructing a water filtration system on the bicycle will help give its users a means for transportation and filtration.

The process begins after water is collected into a container where the dirty water is stored. While the bike is stationary, the user will pedal the bike to power the peristaltic pump. The mechanical power will be transferred from the pedal to drive a shaft which will power the peristaltic pump. The peristaltic pump will then draw the dirty water, which will then be run through a set of filters, and stored in the water bags.

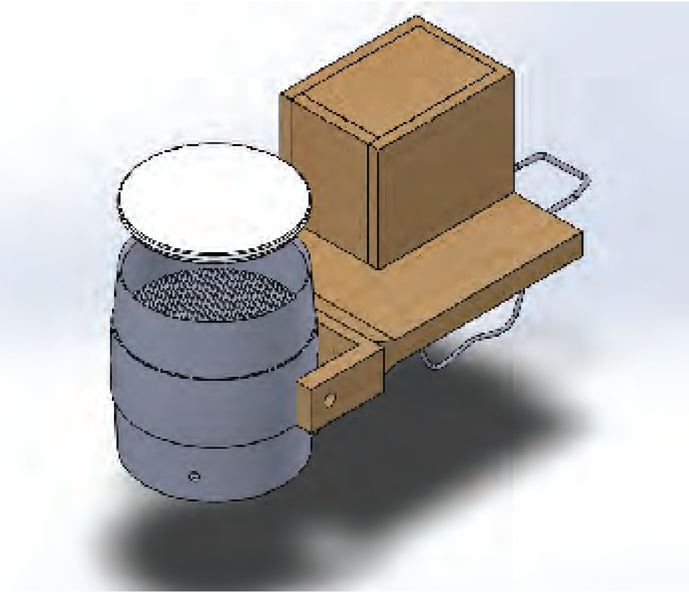


Figure 1 depicts the bike rack with the corresponding pump and dirty tank set up.

Figure 2 shows the finished peristaltic pump, designed and built by the team.

Figure 3 shows the bike stand which was built to hold the rear wheel and bike rack off the ground, allowing for stationary use.

MEEN Green

Team Members: Christian Stephens, Luis Ramirez, Juan Espinosa, Roque Rivas, and Tyrone Thompson

With increasing energy demands and environmental restrictions, renewable energy is becoming increasingly more popular. It is well known that solar panels overheat during use but how could that unwanted, unused heat be harvested for better home and commercial energy? Our system is designed to take that heat from the solar panel and transfer it into a reusable and reliable energy source in a way that has not been done before.

The inefficiency of solar panels is due to the heat generated during operation causing it to overheat. The excess heat goes unused making it lost energy. For our project, we are designing a system that will show the potential there is in capturing the heat from the solar panel and productively applying it somewhere else.
The application we're considering is applying the heat to heat water for domestic use. To accomplish this, we are designing a heat pump system using the solar panel with a cold plate as the evaporator and using a coil running through the water as the condenser. The temperature change in the water we produce will be representative of how effectively we're able to remove heat from the panel and apply it to the water. We will consider the heat output for the typical parameters of the 12 months of the year.

We would like to acknowledge our sponsor CertainTeed

CertainTeed

ASME

Team Members: Jonathan Thibodeaux, Adam Bonilla, Calum Fletcher, Sonja Sorbye, and Mohammed Abualraha

GE Transportation has tasked our student group to reduce variation in their manufacturing process and increase productivity. The project is made up of a series of observations to identify potential drivers of waste, and implement sustainable countermeasures (designing tools, process changes, etc.) to eliminate waste from the process.

In order to function at a level that would allow us to complete these goals, our team had to become masters of their process through data collection, engaging with GE's manufacturing team members, and subscribe to having an open mind. After much trial and error, the team has developed multiple fixtures that aim to improve safety, quality, and delivery within their process. The goal for each is different, but together they aim to reduce variation of the process and increase productivity.

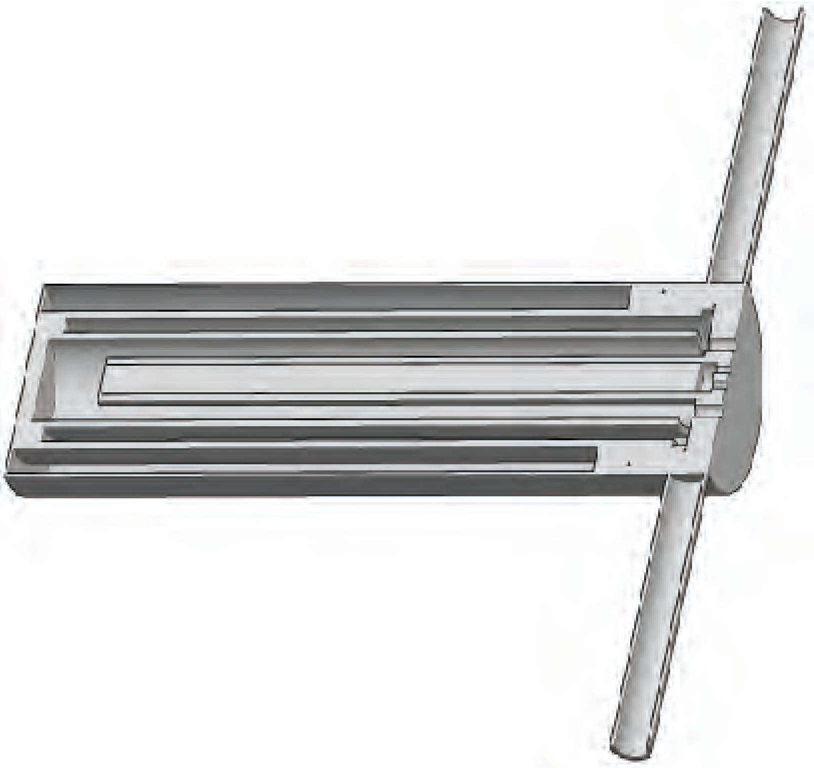
We would like to acknowledge our sponsor GE Transportation, Industrial Advisor Tim Mullett, and our Faculty Advisor Dr. Mark Wasikowski

PolyFoam

Team Members: Mariela Alvarez, Hans Roehrig, Lex Schindler, and Aaron Sundquist

The PolyFoam Chamber foams strands of polymer fibers. It was designed for the use of compressed CO2 as the foaming agent. To do this, temperature and pressure must be closely monitored. A cartridge heater element sits in the chamber, and a cooling sleeve wraps around. Temperature is controlled by an internal thermocouple and a voltage controller on the heater. Pressure in the chamber has a safety factor of 3.5, and is rated for 1000psi. Under these conditions, PLA (polylactic acid) can reach optimum foamed pore size in 10 minutes, with a post-operation cooling time of 16 minutes.

The PolyFoam Chamber accelerates the foaming of PLA strands by 72 times. The next best batch foaming process uses supercritical CO2, which requires a soak time of nearly two days. The product of the PolyFoam Chamber, foamed PLA strands, can be used as biodegradable sutures capable of being infused with medication.



We would like to acknowledge our Faculty Mentor Dr. Nandika D'Souza

Furious 5 - Human Powered Vehicle

Team Members: Ifeanyi Agolua, Majid Alatowi, Jerrell Cook, Obinna Nwaobia, and Unwana Iwot

Our project was to create a human powered vehicle to enter the ASME Human Powered Vehicle Challenge. Our goal was to create a vehicle that met the ASME qualifications while staying within a strict budget. Our design is a three-wheel recumbent style bike with two front wheels for steering and one rear wheel to drive the bike forward. The frame was created to hold a max rider weight of 300 pounds while also protecting the rider from a rollover accident. The designed roll bar meets ASME requirements for the Rollover Protection System (RPS). The roll bar can protect the rider from top impact load of 2670 Newtons, and a side impact load of 1330 Newtons.

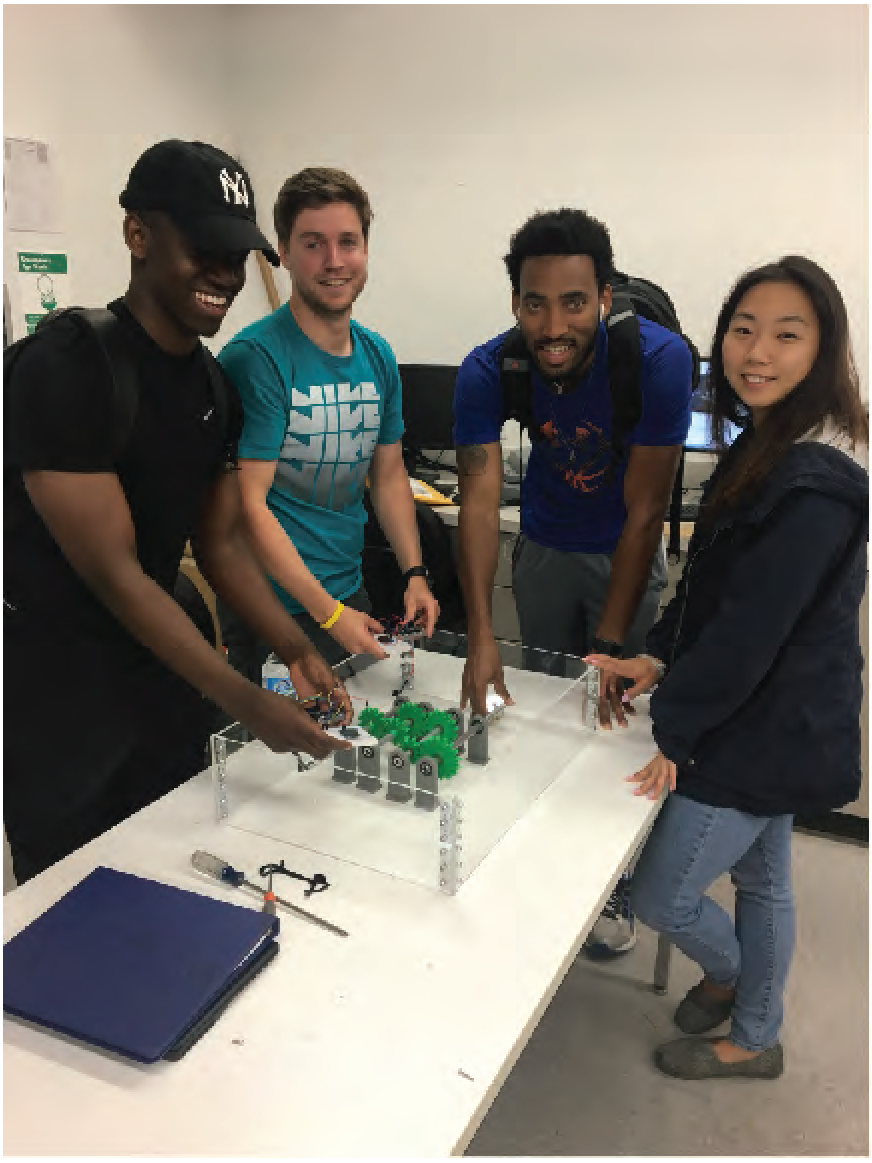
We would like to acknowledge Dr. Cherish Qualls, Dr. Ruth Pierson Rick Pierson, Nartarsha Joseph-Hall, and Affordable Welding Services

Top Gear

Team Members: Tafadzwa Nigel Chimwaza, Emily Seo, Landon Stinnett, and Connor Wright

The Top Gear Team's mission was to create a lab for Machine Element for students who will be learning about gears. Through the project, we were able to learn about how gears work and to demonstrate and apply our knowledge on engineering software. We believed that this project will definitely help them understand gears better. We also created a lab for students to calculate the velocity and torque by analyzing how different sizes and types of gears effect the calculation. For the purpose of the lab, we have installed the speedometer and Aldiuno software to our gearboxes. The gears are used to increase speed, increase forces or change the direction of the motors.

Throughout the senior design, we didn't just learn about the gears. We were able to become an engineer and fabricate the design that we have designed. We hope our senior design project can be helpful instrument for students to learn about gears in their classes.

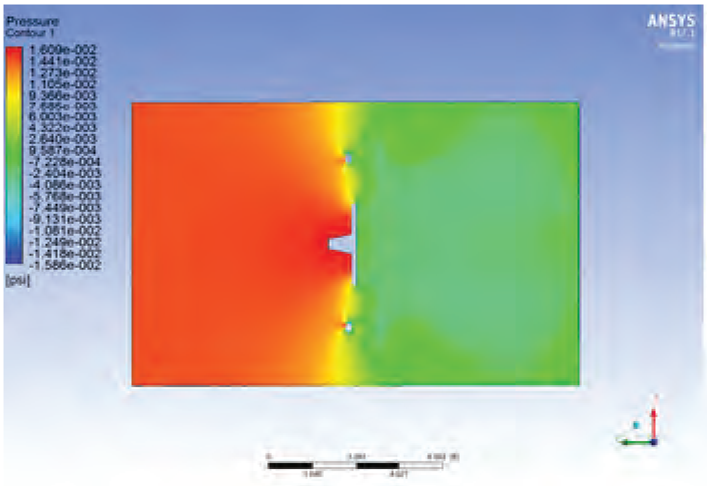


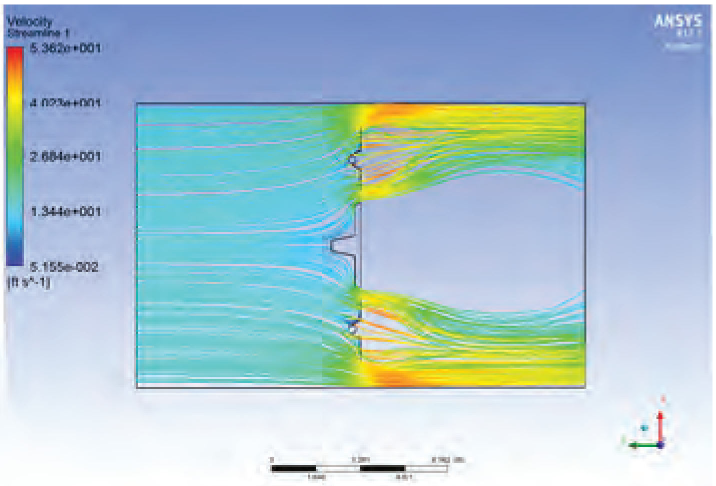
Special Thanks To: Richard Roberts, Rick Pierson, and Robin Shull

UNT Torch Squad

Team Members: Jordan Hollingsworth, Shannon Smith, Eric Tien, and Sofia Weir

A Forney Corporation sponsored project in which a natural gas turbine emits gas to an integrated burner duct system where the duct burner will ignite the exhaust gas. The team was instructed to design a baffle that increases the velocity from 900 ft/min to 4000 ft/min without increasing back pressure by 0.5” water column. The increase in velocity will create more turbulent mixing which will create a more efficient burn. The team designed multiple baffles in SolidWorks and imported the designs into ANSYS for velocity and pressure profile analysis. After close examination, the team proceeded to build and test selected prototypes in a wind tunnel.





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