MOZEE MOTORSPORTS

SAE INTERNATIONAL

Made in Milwaukee

INFORMATION PACKET

MSOE UNIVERSITY

MOZEE Motorsports—A Winning Culture

Mozee MotorSports is the hybrid racing team from the Milwaukee School of Engineering. We are a student-run, multidisciplinary racing team that each year strives to innovate and improve upon previous years. Every year, teams from around the world travel to New Hampshire International Speedway to compete in a variety of static and dynamic tests. At the 2017 competition, Mozee Motorsports had a record setting year where they became the first team in the 11-year history of the competition to complete the 44-kilometer Endurance event. Mozee Motorsports also set the fastest track times for the autocross and unrestricted acceleration.

Despite having a record setting vehicle, the team has decided to continue pushing themselves and their limits. This year, Mozee Motorsports will be building a new car for competition featuring a new chassis, drivetrain, updated electrical systems, and new suspension. This car will be both lighter and faster, feature a full parallel hybrid driveline, and bring other innovations to competition.

The team is comprised of both underclassmen involved on an extracurricular basis and Senior Design sub-teams fulfilling Research and Development (R&D) roles. With the team coming off of a record breaking year, Mozee Motorsports looks forward to maintaining their first place position at the 2018 competition.

What is Formula Hybrid: *Each year the Society of Automotive Engineers (SAE International) hosts a variety of student design competitions for teams of engineering and other students from universities around the world. Among these competitions is Formula Hybrid, hosted in conjunction with the Institute of Electrical and Electronic Engineers (IEEE), and held annually at the New Hampshire Motor Speedway in Loudon, NH. Formula Hybrid builds upon the successful Formula SAE competitions by adding another level of complexity: hybrid and electric powertrains.*

Engineering a hybrid provides an unparalleled interdisciplinary hands-on experience that requires students to innovate across mechanical, electrical, and computer engineering disciplines. Hybrid drivetrains present great challenges. The best solutions often result when engineers work together across boundaries. Engineering companies and several of the world's major automotive manufacturers support Formula Hybrid due to the high quality of engineers who have learned to work outside of their chosen disciplines.

The Formula Hybrid competition is comprised of two categories: Static and Dynamic. The Static events consist of a Design presentation that focuses on the technical aspects of the car and a Project Management presentation that showcases the development of the team over the course of the vehicle's creation. The Dynamic events then test the car in action through an acceleration run, autocross, and an endurance race. The endurance race is a balance between speed and efficiency, requiring teams to complete a 44-kilometer race under restricted fuel and electric energy supply

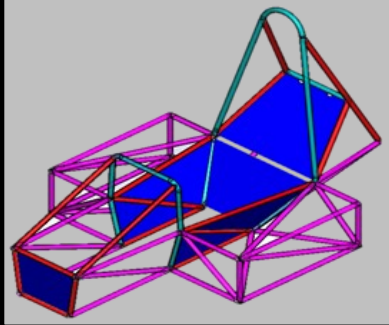
Competition Point Breakdown

MP4-New Features

Engine	Swiss Auto 250
Horsepower	40 HP
Torque	23 ft/lbs
Electric Motor	GMV 142
Horsepower	28 HP
Torque	49 ft/lbs
Transmission	Centrifugal Clutch

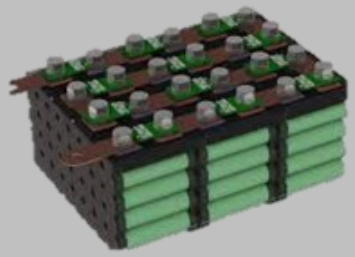
New Drive Train

This Years car will Feature a new Hybrid Drive Train consisting of a new Swiss auto 250 motor ran in parallel with a new Parker GMV 142 electric motor. They will be combined through the use of a student designed final drive gearbox.



New Chassis

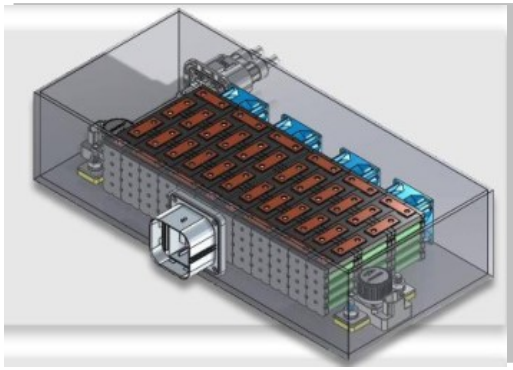
The Team will be constructing an all new student designed chassis that will be lighter and stiffer than the previous year. This years chassis also innovates by incorporating sides pods into the structure of the car.



Updated Electrical Systems

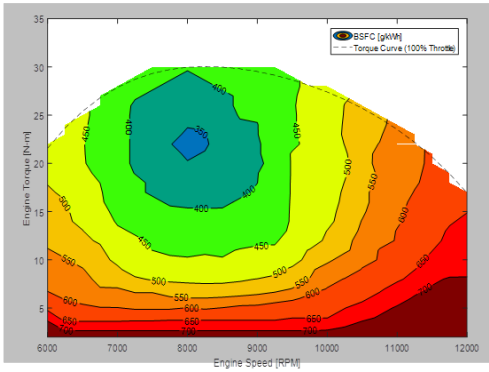
With New PCB's designed and built from last year, The team is ready to integrate them into the new car. The team will also be expanding the high voltage system to 108 volts from the 72 from last year.

The Future of Mozee Motorsports



Battery Cooling

The future cooling system for the Li-ion batteries will be designed to do two things: keep the batteries at a safe temperature and maintain the temperature at an optimal value for the specified driving mode. Essentially, the system will be variable enough to maximize the power output of the batteries for the Acceleration and Autocross runs and maximize the efficiency of the batteries for the Endurance run.



Hybrid Control Strategy

Currently, MSOE's Formula Hybrid vehicle employs a very simple, but inefficient strategy for controlling the interaction between the electric motor (E-motor) and internal combustion engine (IC engine). The 2017-18 Hybrid Control Strategy senior design project aims to create an optimized powertrain model that would allow the power output of the IC engine and E-motor to be individually adjusted during various different loading scenarios. This level of control will allow for decreased lap times while maximizing fuel efficiency

Engine Optimization

The engine is the heart of the Formula Hybrid vehicle and arguably one of the most critical components. The 2017-18 Engine Optimization team is working on improving the output and efficiency of the engine while maintaining it's fuel economy. To achieve this goal, the team is designing a variable geometry intake that is designed to improve the power band through the whole RPM range of the engine. Another aspect to this design project is implementing an electric dynamometer that will be used to calibrate the engine to its peak efficiency and can be used for future teams to come.

Preparation (September 2017– October 2017)

- Recruit New Members
- Set goals
- Reach out to potential sponsors

Design (October 2017– December 2017)

- Analyze new rule
- Begin Sub team work
- Construct Car in CAD

Build (January 2018– March 2018)

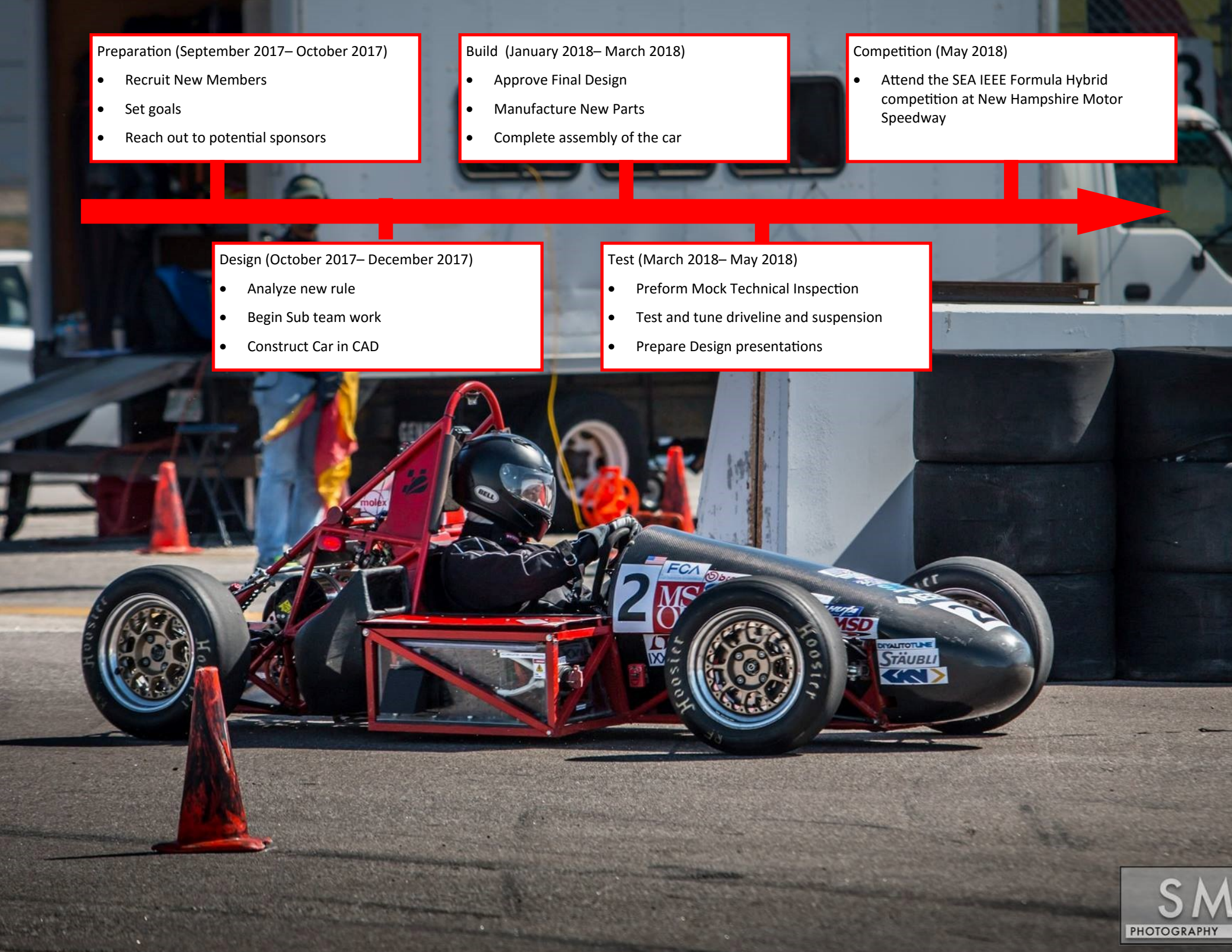
- Approve Final Design
- Manufacture New Parts
- Complete assembly of the car

Test (March 2018– May 2018)

- Preform Mock Technical Inspection
- Test and tune driveline and suspension
- Prepare Design presentations

Competition (May 2018)

- Attend the SEA IEEE Formula Hybrid competition at New Hampshire Motor Speedway



WHY SUPPORT MOZEE MOTORSPORTS ?

By supporting the MSOE Formula Hybrid project, you are supporting the future of the automotive and motorsports industries year after year, more major manufactures are joining the movement towards alternative energy sources on both the street and the track. This is the future of the automotive world forward.

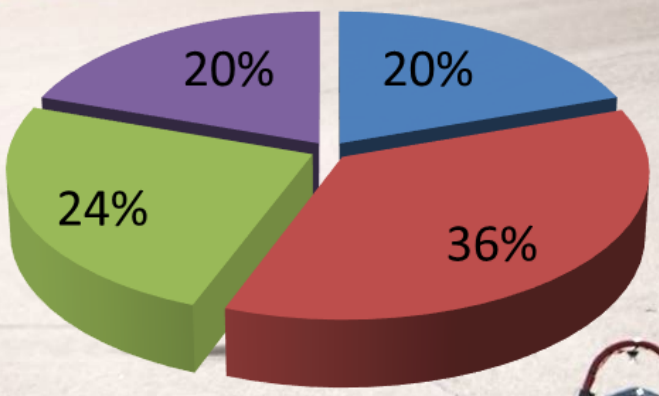
The cost of a Formula SAE car can add up quickly for 2017-2018 budget, we estimated $55,000. Funding is needed in order for MSOE to remain competitive, meet design goals, and participate in competitions.

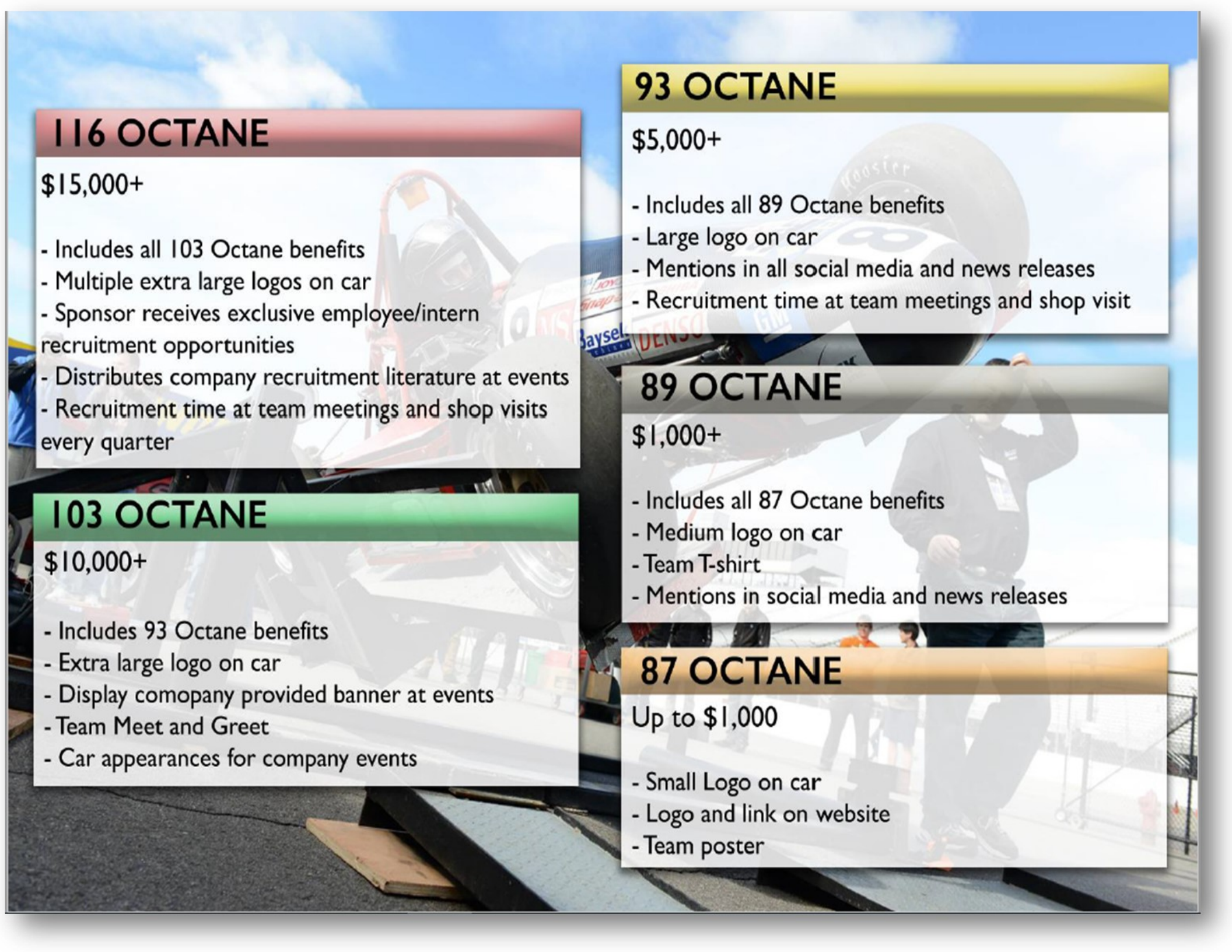
Sponsors who fund the MSOE formula team are also provided with the unique opportunity to get in touch with the current MSOE students. These students have learned skills from not just in the classroom but also from hands-on experiences in the automotive world. Such skills include time management, teamwork, punctuality, and problem solving. Some of our graduates from Mozee Motorsports have gone on to work for companies like Ford, GM, and Indy Car. These benefits are described in more detail in the breakdown of the sponsorship levels. The future of our team depends not only on the hard work and dedication of our members, but also from businesses, organizations, and people like you. We would not be able to compete in the SAE Formula Hybrid competition without the generosity you show us through materials, services, and donations to be able to compete in the SAE Hybrid competition.

"*For IRS tax purposes: Milwaukee School of Engineering is a recognized 501(c)3 charitable organization.*"

Budget 2017-2018

Electrical	
Electrical Subtotal	$6,000.00
Mechanical	
Chassis	$6,000.00
Ergonomics & Controls	$2,000.00
Side Pods	$1,000.00
Powertrain	$2,000.00
Subtotal	$11,000.00
Senior Design	
Hyrid Control Strategy	$4,000.00
Cooling System	$3,500.00
Subtotal	$7,500.00
Competition	
Registration	$3,000.00
Travel	$3,000.00
Subtotal	$6,000.00
Grand Total	$55,000.00





116 OCTANE

$15,000+

- Includes all 103 Octane benefits
- Multiple extra large logos on car
- Sponsor receives exclusive employee/intern recruitment opportunities
- Distributes company recruitment literature at events
- Recruitment time at team meetings and shop visits every quarter

103 OCTANE

$10,000+

- Includes 93 Octane benefits
- Extra large logo on car
- Display comopany provided banner at events
- Team Meet and Greet
- Car appearances for company events

93 OCTANE

$5,000+

- Includes all 89 Octane benefits
- Large logo on car
- Mentions in all social media and news releases
- Recruitment time at team meetings and shop visit

89 OCTANE

$1,000+

- Includes all 87 Octane benefits
- Medium logo on car
- Team T-shirt
- Mentions in social media and news releases

87 OCTANE

Up to $1,000

- Small Logo on car
- Logo and link on website
- Team poster