UNC Charlotte – Lee College of Engineering Senior Design Program
Company Information

Company Name	MEES - Motorsports	Date Submitted	12/4/2020
Project Title	M-15 Tire Cornering Force Test Modifications **(UNCC_ME_TIRE)**	**Planned Starting Semester**	Spring 21

Funding:

What is the source of funds that will be used to cover all of the direct costs of this project?

The project will require only resources available in the supervising faculty member's lab as a result of prior and current ONR funded research, including hardware components and basic infrastructure.

Is this source of funds already secured?   Yes __x__   No _____

Technical Contact(s)*

	Technical Contact 1	Technical Contact 2	Grader
Name	Peter Tkacik		
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*We would like to have more than one technical contact, so there is a back-up in case of travel, sickness, job re-assignment, etc.

Personnel
Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	5	Electrical	1
Computer		Systems	
Other ( )			

Project Overview and Requirements:

M-15 Tire Cornering Force & Moment Testing

UNC Charlotte has the ability to do independent tire testing for Cornering Force and Moment

measurement on a reasonable cost 8.500m road wheel machine. The M-15 Machine was donated to UNC Charlotte and has been upgraded modern controls, completed a broad range of sensor calibrations. The M15 control program, test protocols and calibration equipment are in the process of being upgraded.

The M15 can be used to test force and moment on a wide variety of tires for a wide variety of applications.

Figure 1: M15 Tire testing machine

Requirements:

The senior team will be responsible the following tasks.

1. Develop standardized test protocols and test a range of high performance tires, (i.e., tires of lower than 40% profile and V speed rated and above).

2. Automate the tire test. The machine uses Labview for data acquisition and a programmable logic controller (PLC) for high power functions. The current LabView program uses ModBus commands to control the PLC for basic functions like load control.

3. Design, modify, and build test wheels. The wheel attach is a strange 6-18-205 with a 75mm positive offset, similar to the attach for a UPS truck but used for all test wheels. Total indicated runout (TIR) is a major concern and a wide range of sizes are needed.

4. Evaluate the machine sensitivity to environmental conditions. If necessary, design, build a test chamber to control the environment. Potentially, this may be around the entire machine.

5. Design, build several fixtures, frames, and attachments to mount tires, hold calibration fixtures, etc. as needed.

Expected Deliverables/Results:

Deliverables include:
- standardized test protocols and test a range of high performance tires.
- written code to automate tests
- CAD drawings/ files of test wheels
- Written report detailing the machine sensititvity to environmental conditions.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

    -Motorsports project. MET, ECE and ELET students are welcome to apply