

# User Requirements Specification

## FTC 2015/2016 Modular Drive Platform

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Project: Modular Drive Platform Design Excercise  
Date: 16SEP2015  
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Rev	Date	Author	Revision Summary
0	23JUL2015	CR/DR	Initial Release
1	16SEP2015	CR/DR	Post FTC 2015/2016 game release

### 1. Introduction

This URS describes the requirement for a drive platform to compete in the FTC 2015/2016 game. The project builds on previous work two years ago and will not include previous brainstorming and research. The previous work was based on a mecanum drive system, but could also accommodate regular 4 wheel tank-drive as well as omni-drive configuration. This game differs substantially from previous years as climbing a ladder like structure "mountain". Previous designs required only navigating flat surface with a maximum incline angle of 15 degrees, while the new game requires driving/climbing a ladder with a steep angle of 50 degrees. A total re-think of how the drive platform's requirements will be needed for this season.

### 2. Purpose of This Document

This document is intended to guide development of modular drive platform that meets the requirements and restriction of the FRC 2015/2016 season.

### 3. Scope of the Project

This URS will cover only the requirements for the drive mechanisms and controls. Specific game requirements, such as scoring with game elements, are not included.

### 4. Overview of the Requirements Document

The intent is to design and build a drive system with the following characteristics:

- Modular- each wheel/motor/gear box assembly will be self contained and the platform frame can easily change by bolting different structures to the wheel modules.
- Compact- our previous designs have taken up a lot of "real estate" in the chassis. This design intends to maximize the space inside the platform to allow room for the game mechanisms and capture of the game elements.
- Reliable- both mechanically and controls
- Controllable- teleop control smooth and predictable
- Agile- agility will be especially important for climbing the "mountain".
- Good efficiency
- Strong- wheel modules strong enough to withstand collisions and falls from climbing structures without damage
- Maintainable- designed for ease of disassembly and parts replacement

### 5 Requirements

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- 5.1 All materials. Components and controls must be legal per “[2015-2016 FIRST® Tech Challenge Game Manual Part I](#)” and “[2015-2016 FIRST® Tech Challenge Game Manual Part II](#)”
- 5.2 The control system will be based on the new Modern Robotics Inc. control modules. The legacy module will not be used.
- 5.3 The platform must be no larger than, or collapsible to 18 inches square.
- 5.4 The motors will be one of the allowed 12VDC gear-motors.
- 5.5 The platform, when loaded to a total weight of 35 lb, will be able to climb a 50 degree incline with ladder rung spacing per game manual and field design.
- 5.6 The platform should have a loaded (35 lb) full speed of 2 ft/sec on the level field.
- 5.7 The platform should have a pushing force of 20 lb.
- 5.8 The platform should be able perform with the field littered with “debris” game elements and still meet all user requirements.
- 5.9 The platform must be capable of supporting navigation systems for the autonomous period with driving through the “debris”.

## **6. Glossary**

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- Mecanum Wheel- is one design for a wheel which can move a vehicle in any direction.
- Omni Wheel-

## **7. References**

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- [2015-2016 FIRST® Tech Challenge Game Manual Part I](#)
- [2015-2016 FIRST® Tech Challenge Game Manual Part II](#)