

6" Mecanum HD

Overview and Evaluation



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1. 6" Mecanum Background and Development

- a. 2008-present: AndyMark created and sold the “6” Mecanum”, which is composed of two welded steel plates with rollers at 45 degrees.
- b. 2010-present: AndyMark created and sold the “Mecanum II”, which was done out of need because of unexpected sales of the GEN 2 Mecanum.
- c. 2010-present: AndyMark created the “6” Mecanum HD”, which is a heavier duty version of the normal Mecanum wheels designed for much higher load capacities.



GEN 1 Mecanum



GEN 2 Mecanum



Mecanum II



Mecanum HD

2. 6" Mecanum Specification

General Description: Metal wheel that can be direct or chain driven with rollers angled at 45 degrees from wheel center diameter.

Specifications	6" Mecanum HD	Mecanum
Weight:	1.66 pounds	1.30 pounds
Load Rating:	200 lbs	88 lbs
Mounting:	Hub or Sprocket	Hub or Sprocket
Body Material:	5052 Aluminum	Nickel Coated Steel
Roller Durometer:	70A	65A
Roller Design:	Sleeve Bushing w/ brass axle	Molded in brass axle
Roller Fastener:	10-32 SHCS & #10 Locknut	M3 SHCS & M3 Locknut

3. 6" Mecanum HD Bill of Material

Item	Component	Qty	Description
1	Right Plate HD	2	Right Wheel Plate Folded
2	Hub Shallow	2	Formed Wheel Hub
3	Roller HD	15	Urethane 70A
4	MBC Bushing MU04TH04	30	Sleeve Bushing
5	Axle Tube	15	Brass Tube
6	SHCS 10-32x2.25	15	Cap Screw
7	#10 Slim LockNut	15	Slim Nylock Nut

4. Testing Overview

Testing on the 6" Mecanum Wheels has been completed over the past 3 years. This testing has included load as well as impact testing and has been completed by AndyMark. Also, the market has tested these parts in numerous applications, especially within *FIRST* Robotics Competitions.

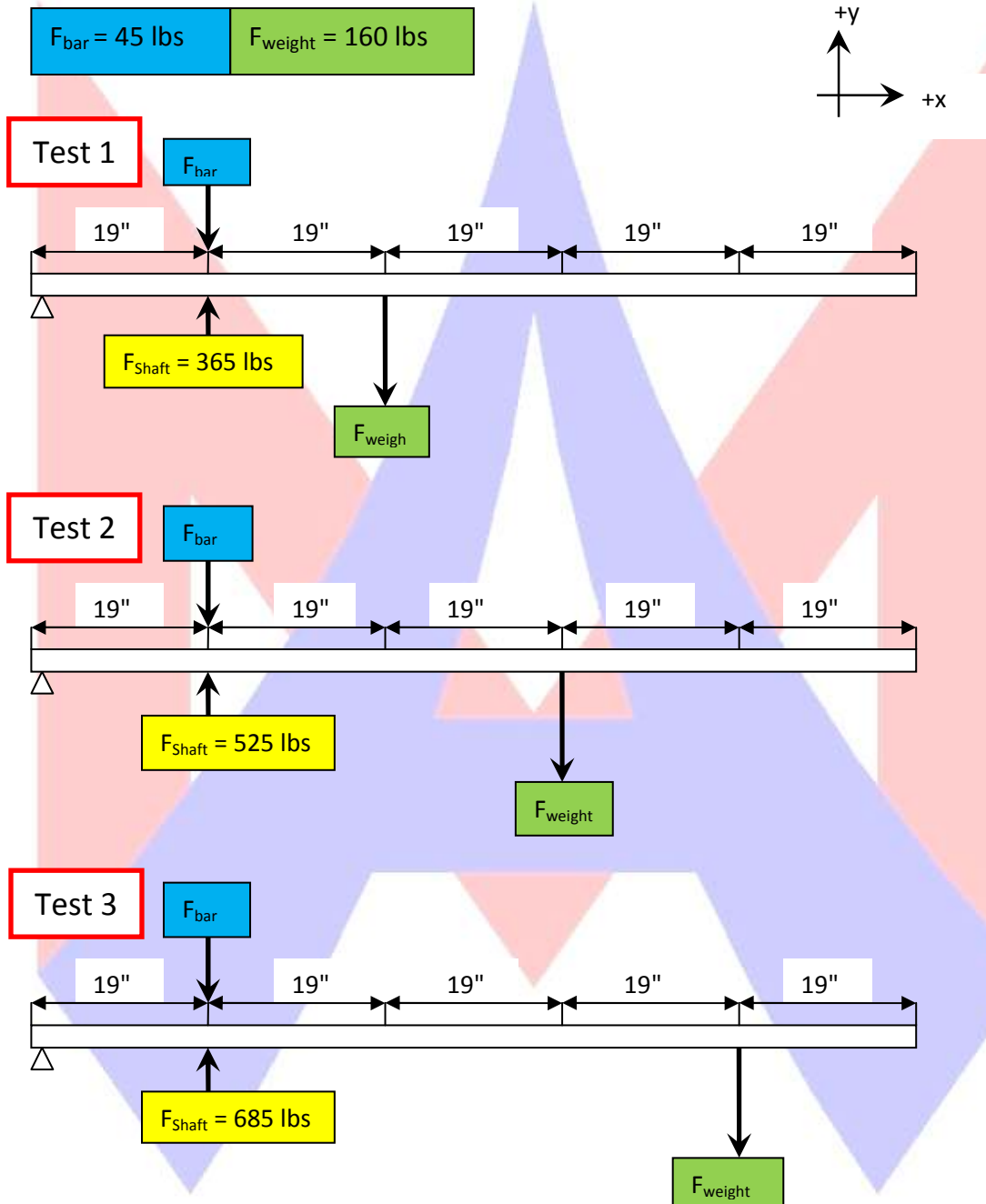
The results of these past tests have shown that the plates, hardware, and rollers can withstand most of the dynamic loading and various rigors seen within the *FIRST* Robotics Competition applications.

The new 6" Mecanum HD design does not use any of the existing hardware and its design is to give the end user a more robust wheel that will better meet their requirements for heavier loaded applications.

We have conducted two tests to evaluate the strength of this new 6" Mecanum HD wheel design.

- Shaft Load Test
- Loaded Maneuverability Test

5. Static Load Test Results



Static Load Test Pictorial Description



Setup 1: 6" Mecanum HD was mounted to the load bar. The loading bar is a 1"x2" steel tube. This bar is fastened to the table at the top of this picture.



Setup 2: We made sure plenty of clearance was below the steel beam and secured the wheel with the wood block.



Test 1: Load at shaft = 320 pounds (no effects)

All three tests were conducted the same on two different wheels with different manufacturing processes. One wheel was welded together and the other was glued, but both were riveted.



Test 1: Plates and rollers are unaffected with no signs of bending.



Test 3: Loaded at shaft = 685 pounds

Load bar is starting to show a slight curve, but nothing on the Mecanum wheel is starting to bend or break.



Test 3: This picture shows the 6" HD welded version with 685 lbs loaded on the shaft with no signs of deformation. As noticed the rollers are compressing the wood table below them, but still function.



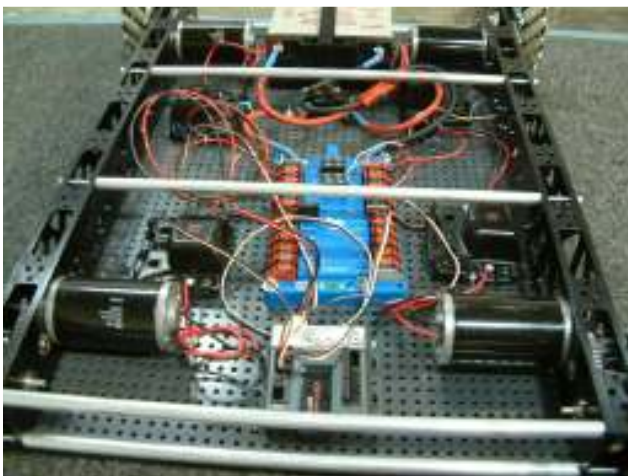
Test 3: With the same 685 pound load on the end of the shaft, but testing the glued version of the 6" HD Mecanum wheel instead.

After the conclusion of each weight test we would pull the wheel and test the rollers for function. After each test the rollers that were in contact with the table still were able to spin freely up to the 685lbs of the last test.

6. Loaded Maneuverability Test Results

The 6" Mecanum HD wheels were mounted to a test chassis shown below. The chassis consisted of our new Long Nano Tubes in a 4wd configuration with controls being accomplished by a VEX Cortex.

We ran two load configurations on two surface types to see what different effects they had on the wheels. We ran one test with a total weight of 300lbs and another with a weight of roughly 600lbs. The two test surfaces were a commercial grade carpet and smooth concrete.



Loaded Maneuverability Test: This is the test chassis we used for the loaded maneuverability test.



Dynamic Load Test: This was the setup we used to achieve roughly over 600lbs of test weight.

In conclusion to these tests the 6" Mecanum HD wheels did perform, but the power of the chassis became a limiting factor as we increased the weight. For the 600lbs test the chassis did not have enough power to strafe on carpet, but was able to slowly on the hard concrete surface.

Video showing these tests: [6HD.wmv](#)