Track Tension Testing

2/17/2016

Testing

Summary and Methods

The two test variables for this test were the deflection of the belt and the current draw of the CIM motor.

Deflection was determined by placing a 2.5 lb load at the location vertical to the Pulley # 2 as shown in this diagram:

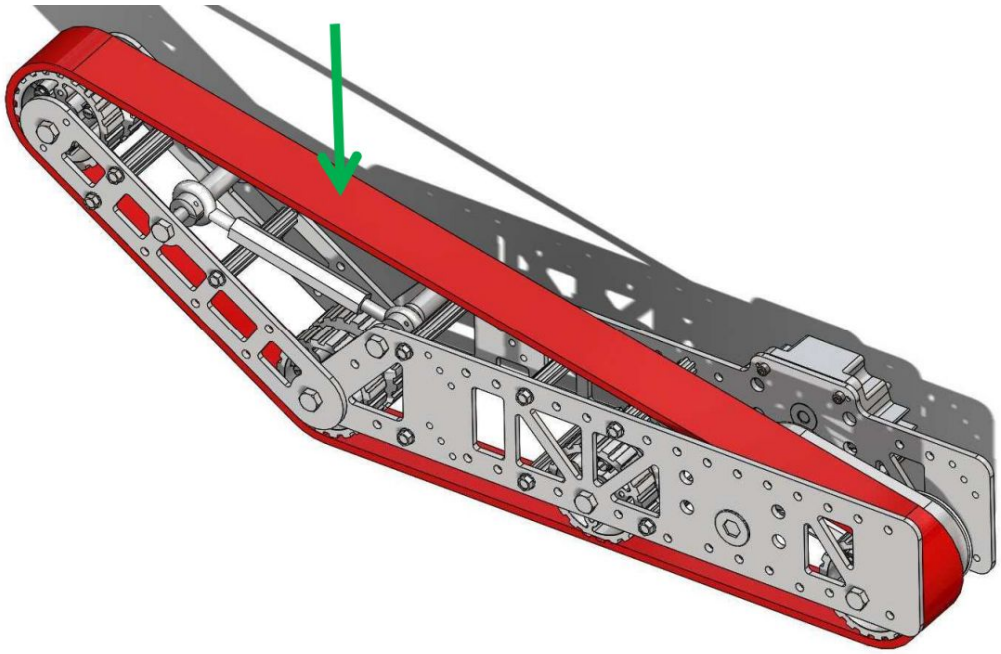

Figure 1.1

Deflection was measured at the location of the load by using the difference between the measured height of the line between the blue nitrile material and the white tread interior. The deflection was measured at a right angle to the ground surface (the same direction as the green arrow in Figure 1.1)

Optimal belt tension was determined by measuring the current draw of the CIM motor during free spin of the track drive. The Chassis was placed on blocks and was run for 3 seconds at full speed before the current draw was measured. The current draw average was based off of a 5 second sample of the free spinning belt. The current was measured using a Current Sensor Assembly for Motor Meter (am-2709) and a Sensor Screen (am-3212). More information about those two products can be found at www.andymark.com.

Results

Two trials were conducted on two different belts on two different drive-train modules. For the best results, Users should test the current draw from their specific modules.

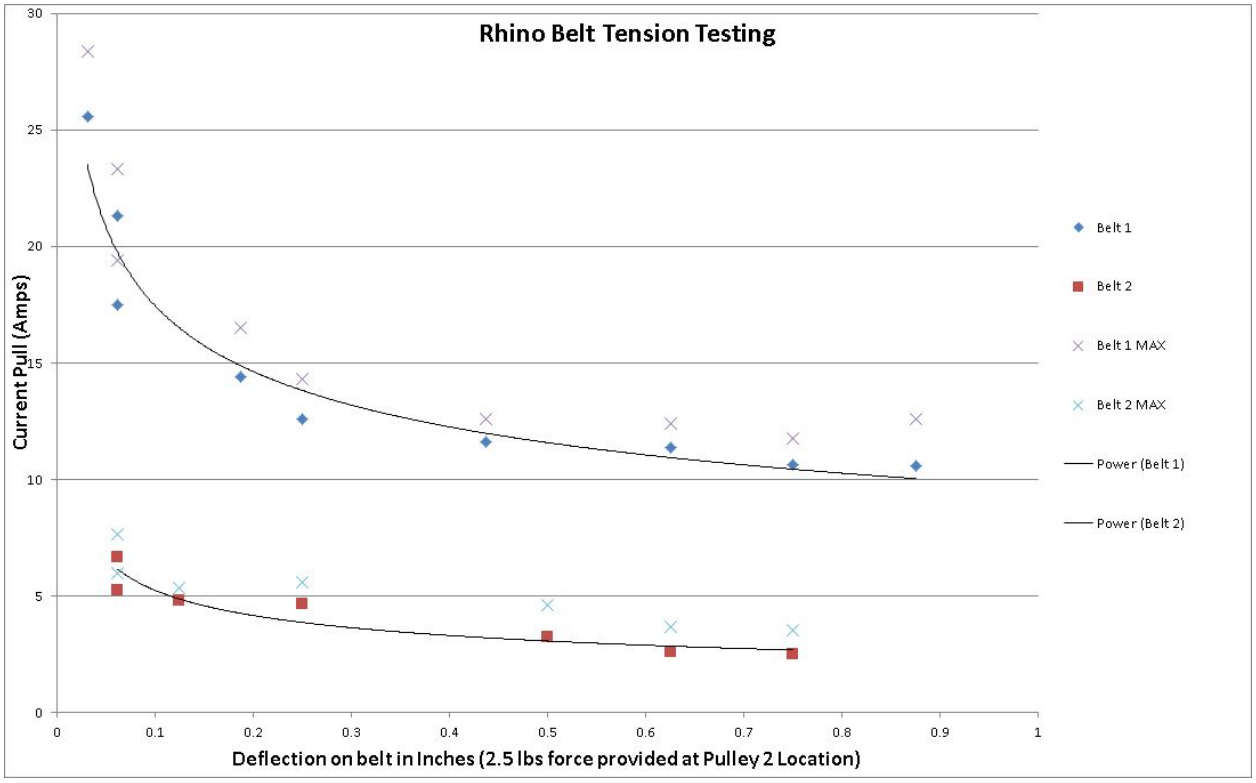

Figure 1.2

As seen in the figure above, The Rhino Track drive sees a steep increase in current draw at around an ⅛ of an inch of deflection. Users can always choose to tighten their belts more, but an increase in resistance should be expected. The Rhino Track Drive Module at higher tensions is noticeably slower.

Even though the current draw is lesser when the deflection is greater than ½ inch, the belts are looser and will be more susceptible to being pulled off or the pulley slipping.

The recommended tension for the Rhino Track Drive is a deflection of around ⅛ to ¼ inches. In this range, the Rhino Track Drive belts will not skip a pulley rotation and also provide a low amount of mechanical resistance. There are no noticeable maneuvering differences found between the different belt tensions within this range, except for the loss of velocity as the tension is increased (No loss in turning response).

Information for Users

Notes

Tension Range: ⅛ to ¼ inch deflection when 2.5 lb load or CIM Motor is placed at pulley #2

For the best information and accuracy on what tension to keep your track drive, users should test their individual Rhino Track Drive Module. Belts have various properties that depend on many factors. Given that information, the belt tests do all seem to follow the same curve and have a “sweet spot” around the ⅛ to ¼ inch zone. For all intents and purposes, the belts can be kept inside this range during driving with no problem and the accuracy of having a more precise belt tension is not needed.

Belt tension can be increased. The resistance of the belt will increase and therefore potentially have negative effect. At a certain point, the belts will be subject to stress forces so large that it will break when the module turns left or right. If the belt does not deflect with a 2 lb weight placed on it, the user is putting the belt under risk of snapping.

Belt tension can be decreased, but as the track belt becomes looser and looser, the pulley will skip rotations and possibly lose its track belt.

USERS SHOULD STORE THEIR BELTS UNTENSIONED!

The change in how the belt is stored WILL affect its tension. Users should never have their belts at different tensions and should always leave the belts loose at the end of the day. It only takes a few minutes to loosen the turnbuckles to ensure that your track drive belts will have a longer lifespan.

User Tensioning

A uniform way to apply around a 2.5 lb load is to put a zip tie around a CIM motor (to stop it from rolling down the track belt) and place it at the location specified in Figure 1.1.

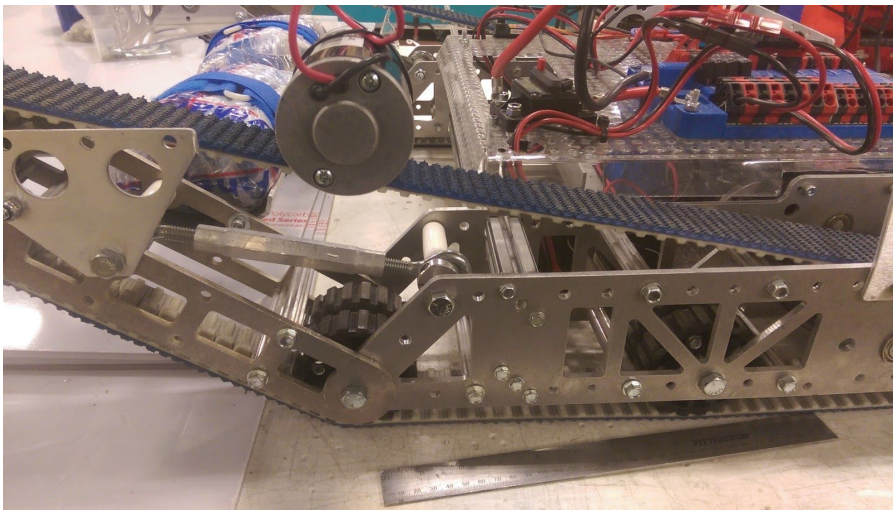

Figure 2.1

An easy and quick way to get in the range between ⅛ and ¼ inches of deflection is to place the 2.5 lb load or the CIM motor on the belt and tighten the track belt until the underside of the belt is no longer touching the rearmost churro. (Behind pulley #3 but still below the track belt)

The track belt should only just break contact with the churro.

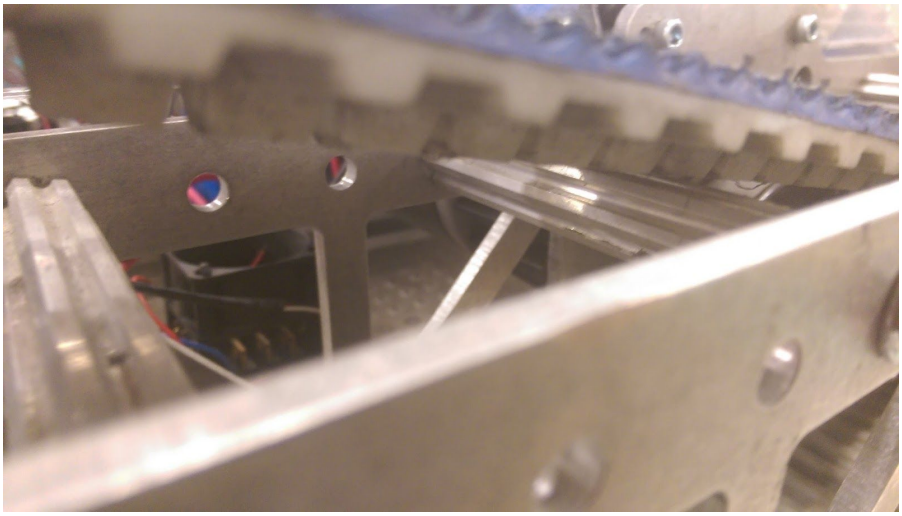

Figure 2.2

This method can be done in any setting with relative ease to ensure that the tension of the belt is ready when you need the Rhino Track Drive most.

Additional information about the Rhino Track Drive Module (am-3322) can be found on our website. (http://www.andymark.com/Rhino-p/am-3322.htm)