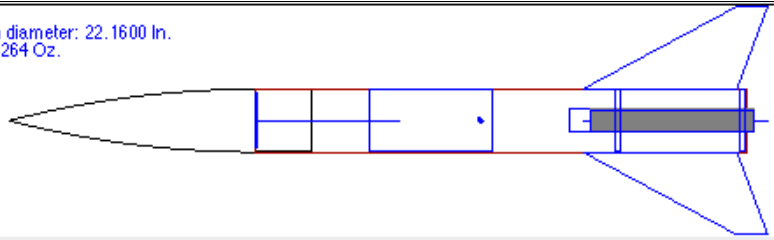


## Fond du Lac Tribal and Community College Thunder Rocketry team Regional design report for April 26, 2014 launch

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Length: 74.0000 In., Diameter: 6.1600 In., Span diameter: 22.1600 In.  
Mass: 208.8264 Oz., Selected stage mass: 208.8264 Oz.  
CG: 45.9585 In., CP: 57.3930 In., Margin: 1.87  
Engines: [K530-SS-None,]



Our Tribal Competition team in Milwaukee dubbed our rocket "A Wing and a Prayer," based on our bad habit of last-minute construction and changes in plans.

We ordered parts very early on and basically designed around what we had on hand. The basic design is a 6 inch four foot pre glassed body tube with four plywood fins through the wall to a 54mm motor mount tube and a plastic 24 inch long nose cone.

The original plan was based on an idea to have rear-ejection "pods" made from pvc pipe between the fins that would deploy two drogue chutes at some appropriate distance below 3000 feet to try to stop the rocket at that altitude.

But we found in our Rocksim simulations that the weight of the pods in the back were making the rocket nearly unstable, and it was not going much over 3000 feet even without them. Without the pods the rocket weighs between 16 and 17 pounds.

Cheryl and Gordon went with Steve to the First Nations Tribal Competition in Milwaukee a week ago and used that as a test flight opportunity. We abandoned that pod idea and flew on a K400 motor. (The K530 we had planned to fly with was wanted by another team, so we switched.) Recovery with a 7 ft chute deployed at apogee worked well.

Remarkably, we hit 3027 feet according to our Adept altimeter. If we can get that lucky again it looks like we'll fly the rocket as is. We hope to fly on both K400 and K530 motors.

The landing damaged two of our fins but Gordon is repairing them. We were in a hurry with our last-minute construction and Steve used cheap 3-ply 1/4-inch Home Depot plywood with some Bondo and fiberglass mat stuck to one side and coated with epoxy. The most damage happened to a fin that was uncoated on one side where the plys split and separated. We will try to improve the reinforcement somehow.

The team will be adding more electronics and sensors for the Regional launch. Anthony has experience with Pitot tubes in his work, so the team plans to add an eagletree systems Pitot tube and data logger inside the nose cone.

Perhaps testing can be done with a car on the freeway if it gets assembled in time.

Austin hopes to add an accelerometer/gyro and an Arduino to the electronics package but the design is up in the air at the moment.

The new electronics and competition altimeter should fit inside the wooden electronics box that Gordon designed and built on the fly in his shop. It can hold three ten inch long sheets of acrylic that the components are mounted on. It screws in place through the body tube but provides openings that allow the shock cord to pass alongside it to the anchor on the front motor mount centering ring.

The attached Rocksim file shows pretty accurate geometry but the masses of components still need adjustment. Rocksim predicts altitudes of 3800 ft with a K400 motor and 3200 ft with a K530. Our test flight shows these are on the high side.

-for the Fond du lac Tribal and Community College Thunder Rocketry team,

Steve Highland, advisor  
Cheryl Foss  
Gordon Loree  
Austin Fuller  
Anthony Truman  
Robert Beavers  
Angel Helgemoe