

FIVE CLANS ROCKET TEAM

Presents:

“Gray Wolf II”

2007-2008 USLI PDR Report

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Changes:

1. Experiment design change from air filtration to night vision technology.
 - a. Reason for change.
 - i. The need for a rocket with night vision capabilities became a priority, when one of the tribal governments expressed a need for better border protection between their Indian Reservation and Canada.
 - ii. In most of the lower 48 states wolves are protected under the Endangered Species Act (ESA). Wolves are being threatened by human population encroachment into their territory; reducing their prey species. The greatest threat to wolves is people who kill them in retaliation for livestock losses.
2. Launch Vehicle design change
 - a. Reason for change.
 - i. The areas where experimental data will be taken are very rugged and dangerous, such as mountainous areas, deep ravines, cliffs, and exposed rocks, often with jagged edges.
 1. The entire rocket has a special armor coating made of Dogskin™. It is a special mix of DuPont™ Kevlar® resin and dog mesh.
 2. To prevent a single seem of dog mesh, the mesh was cut in a pumpkin tooth design.
3. Engine Change from Aerotech K550 to K1275
 - a. Reason for motor change.
 - i. The armor adds weight, therefore a larger motor is needed.
4. Activity Plan Changes.
 - a. Trademark Dogskin™.
 - b. Obtain Kevlar® resin needed to coat the entire rocket.
 - c. A special cut of the wing is planned to achieve a controlled propelled twist.

Team Summary:

1. The College of Menominee Nation is a two-year community college located in the state of Wisconsin.
2. The Five Clans Rocket Team (FCRT) has two mentors
 - a. Erin Thomas (math teacher)
 - b. Green Bay Campus Administrator, Norbert Hill Jr.

Launch Vehicle Summary:

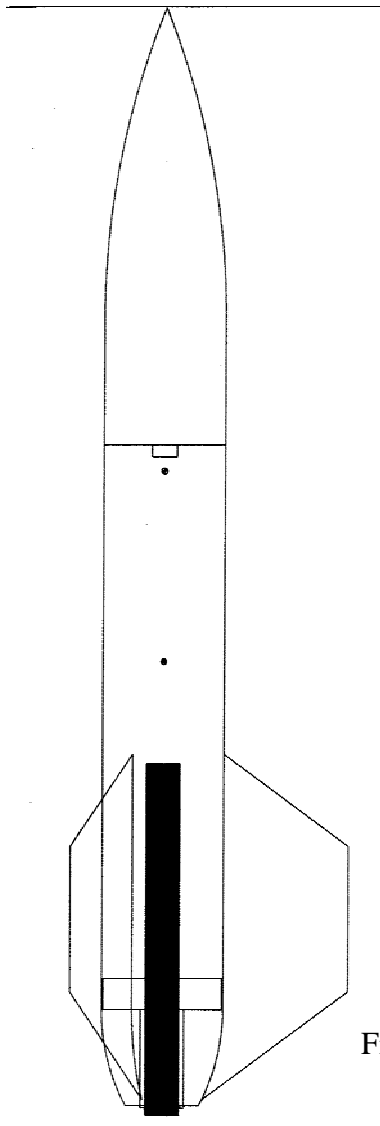


Figure 1

GRAY WOLF II

LENGTH: 74"

DIAMETER: 7.67"

SPAN DIA.: 23.4"

MASS: 311.4 Oz.

CG: 29.4"

CP: 41.6"

MARGIN: 1.59

ENGINE: K1275

FINS: 3

ARMOR: DOGSKIN™

PARACHUTE: 30KCM²

- **DEPLOYS @ APOGEE**
- **HAND SEWN**

Payload Summary:

1. The payload is not yet fully designed. The approximate weight of the payload bay will be four pounds. The payload bay will house one or two altimeters, 3-D GPS, homing device, Infrared camera, thermal imager, and laser rangefinder. Gray Wolf II is designed to fly at night. The night vision equipment is designed to detect wolf packs, for the prediction of accurate wolf population counts. Photo 1 below shows an example of wolf pack activity.



(Reference:

<http://action.defenders.org/site/PhotoAlbumUser?view=UserPhotoDetail&PhotoID=21369&position=3&AlbumID=12715>)

Mission Success Criteria:

FCRT has already encased the entire airframe in dog mesh. Eighty percent of the airframe is coated with Dogskin™. The nose cone form is ready to be cut from Plexiglas®, and most of the form material is already prepared, and prepped to be placed into the form. New peg board material will be obtained so that a precise cut can be made on each sheet, to provide for the proper bend, for the flight twist. We have some material now, but we can not guarantee a precise twist-effect.

FCRT is planning a December 23, 2007 practice launch on the Oneida Indian Reservation. We will have several rockets scheduled for launch; Gray Wolf II is one of those rockets. Gray Wolf II will be flight-tested with Aerotech J350W; a sub motor. FCRT will perform parachute deployment checks, using black powder charges. FCRT is preparing to obtain a ProRail guide for our own rocket launcher, the base is made from an old riding lawn more deck, and features 360 degree rotation with spring loaded brake.

Dan Hawk and Shane Skenandore will be actively pursuing NAR Certification Level II over Christmas break. FCRT will continue with rocket preparation even during holidays and holiday vacation periods, such as Christmas.

FCRT currently builds rockets on Wednesday's from noon-3pm, and on Saturday's from 1pm to 4pm. FCRT will be starting a Kids Rocket Program on Saturday's from 1:30pm to 3:30pm. We have purchased several model rockets of various skill levels. We are offering a graduated skill level model rocket program for kids, where they progress to designing and making their own rocket from scratch.

All safety precautions will be discussed with the Oneida Tribe before test launch.

Budget Plan:

Gray Wolf II
PDR Budget
Estimated Cost to Completion

<u>Item</u>	<u>Quantity</u>	<u>Cost</u>	<u>Amount</u>
<i>Rocket</i>			
Pegboard	3	\$ 4.00	\$ 12.00
Kevlar Epoxy	85	\$ 2.15	\$ 182.75
Epoxy 30 Minute	18	\$ 1.98	\$ 35.64
Epoxy 5 Minute	5	\$ 2.15	\$ 10.75
Rail Guide	1	\$ 4.95	\$ 4.95
Shock Cord	5	\$ 2.00	\$ 10.00
Motor Retainer	1	\$ 1.00	\$ 1.00
Nose Cone Recovery Bolt	1	\$ 1.00	\$ 1.00
Basswood 1/32	4	\$ 2.20	\$ 8.80
<i>Avionics Bay</i>			
Altimeter 1	1	\$ 100.00	\$ 100.00
Altimeter 2	1	\$ 150.00	\$ 150.00
3D-GPS	1	\$ 2,000.00	\$ 2,000.00
Homing Device	1	\$ 100.00	\$ 100.00
<i>Payload Experiment</i>			
IR Camera	1	\$ 1,600.00	\$ 1,600.00
Thermal Imager	1	\$ 2,500.00	\$ 2,500.00
Laser Range Finder	1	\$ 450.00	\$ 450.00
<i>Motors</i>			
J350W	2	\$ 52.95	\$ 105.90
K1275W	2	\$ 159.95	\$ 319.90
<i>Shipping/ Taxes</i>			
	1	\$ 250.00	\$ 250.00
<i>Travel Expenses</i>			
	7	\$ 250.00	\$ 1,750.00
<i>Miscellaneous</i>			
	1	\$ 400.00	\$ 400.00
Total Projected Remaining Budget			\$ 9,992.69

Outreach Summary:

1. FCRT has attended their first Family Math and Science Night at Bowler Elementary School in Wisconsin. The high school principal, Barry Wolff was participating and said that 50% of the kids are on reduced or free lunch programs. And 40% of the kids are Native American. Bowler lies just off the Stockbridge-Munsee Community Indian Reservation.
2. On December 4, 2007 FCRT will be showcasing their projects at a high school fair held at Shopko Hall in Green Bay; thousands of high school kids will be in attendance. FCRT will have a laptop with RockSim8 available so we can help kids interested in aeronautic STEM design their own rocket, and simulate a launch.
3. Because of 1 above Bowler High School is interested in becoming a NASA Explorer School. FCRT is dedicated to helping the Bowler school district apply for the Explorer School 3-year partnership.

Conclusion:

The FCRT is ahead of schedule for building, testing, and pre-launch for the 2007-2008 USLI. FCRT is satisfied with the current and future outreach activities. FCRT is actively pursuing sponsorship in regards to the high-costs of experimental equipment for Gray Wolf II. We are confident that lesser quality experiment equipment will work, but perhaps will not get us the resolution or the accuracy we are looking for. We will try to balance our equipment capabilities; versatility and user friendly attributes to deploy a needed, yet very useful high-quality reusable rocket.