



### Observers, Participants, Project Based Learning



Innovation has always played a key role in land speed racing, which has given the sport countless examples of engineering dominance marked by time slips that translated into national and world speed records. Bonneville is the place where people are constantly finding new ways to do old tasks. Nowhere is ingenuity, flexibility and freedom of mechanical freedom more vibrant than at Bonneville where the willingness to question conventional wisdom and alter automaker set-ups can bring you to a spot on Bonneville's starting line.

With such a welcoming atmosphere it is no wonder that Granite Falls High Schoolteacher Michael Werner came

took flight and the ShopGirls Team was formed. Werner's learners built two competitive fuel-efficient vehicles in a seven-month period. "Philippe's Revenge" came from co-ed UrbanAutos team that won 1st place at the 2011 Shell Eco-marathon in Houston, Texas, by turning in a 186.5 mile-per-gallon performance. The ShopGirls operational gremlin sparked the "Iron Maiden" in second place for prototype diesels.

Yeah, yeah, yeah, I know, Bonneville is all about speed. The kids have got to start somewhere and I think it is marvelous that they designed, built and then proved their concept in front of a national field of competitors. Sound familiar?

Werner explains: "We turn very hard learning into relevant fun that helps students set themselves apart and prepare them for a working career." How could anyone in the LSR community not lend support?

For the salt, Werner combined the teams to foster a "rolling" career and technical education using a STEM laboratory run by a mixed team of girls and boys grades 9 through 12. The kids earn grades, credit towards graduation for the class.

STEM is an acronym for Science, Technology, Engineering and Math, subjects that require discipline, practice and intense focus. Not study habits eagerly embraced by teenagers, but give those hungry little minds a real world problem

ishing work ethic at any age.

Building on the student's drive to succeed and desire to teach the community about the future of fuel efficiency, Werner reorganized the project focus to land speed racing using GDiesel and B20 biodiesel. Recognizing that Speedweek might be too crowded, too fast for the team's modest goals, he opted for the Utah Salt Flats Racing Association's 130 (minus 100) MPH Club at the 2011 World of Speed in September.

The orange and black blunt-nosed coupe with a tapered tail sports Moon discs and is powered by a single cylinder diesel engine. The first part of the testing of the T2011 LSR-UC car included a wide-ranging modus operandi to sort out biodiesel fuel efficiency and acceleration at sea level in 60-70 Fahrenheit.

"The team used the oval track at PAC-CAR Technical Center in Mt. Vernon, Washington to conduct the 2/10 mile tests," explained Werner, "They achieved 142.1 mpg on the semi-truck test track.

The next tests were conducted on the salt during the World of Speed where the altitude is 4,300 (give or take a few feet for density) feet at 90 degrees Fahrenheit."

You might think the full review by USFRA technical inspectors would be the major hurdle. Not so. Transport was the big problem until the suave and crafty bon vivant LSR racer Marlo Treit stepped up. Treit not only volunteered his

I asked the team about their salt virgin experience and was delighted to find not one of them got bored. Terribly young to be role models, that is precisely what these teens have become - leaders in project-based learning through teamwork.

Hunter Theriult, crew: "It was very fun and with all the cars and super loud stuff, like the cars that you could not only hear the cars but you could feel them - that was super awesome! My favorite part was watching the cars go off the starting line and talking to all the people in the pits."

Jasmine Bates, Team website management, helped make carbon fiber panels for the doors and seats, weighed the car to make sure it fits the requirements, worked with Werner developing a "to do" list: "Every day on the Salt I felt like I learned more than I would've learned in a full day of school. I didn't know that running 10 meters at that altitude would make my lungs hurt until I tried it. Most of all, I didn't know anything about sprockets, but the next thing I knew I was changing one. So how was Bonneville?! It was flippin' fantastic. There were cars and wonderful people everywhere, and plenty of opportunities to learn."

Brooke Nicholson, new on the team so she helps with anything the team needs: "Bonneville was a great team-building experience, really fun and really eye opening."



away from the 2008 USFRA World of Speed with the inspiring idea for his Washington state students to design, craft, and race a vehicle on the salt as well as working to achieve extreme fuel efficiency.

When a grant became available for women in non-traditional roles, the idea

to solve in a spectacular setting like the Bonneville Salt Flats...

Werner, experienced with race cars, antique airplane restoration and manual arts education, inspired the teams to arrive before the regular school day for an extra class at 6:30 AM, spend countless hours after school and on weekends - for two years! If you ask me, that is an aston-



### 16 Cylinders

cobweb-collecting truck and trailer (waiting for its Target550 streamliner), but helped load up the team and drove the entire nervous pile of hopes and dreams to Utah.

Much as Treit may deny it publically, the guy has a soft spot and also volunteered use of his shop, racing wisdom and PR talents.

### Single Cylinder

Semira Kern, body building, public relations, drivetrain. She built the wheel covers, re-designed and built the mirrors, wrote blogs, helped update the website, scheduled and staffed team publicity events: "Amazing experience. It's really special that we were able to be the first high school team to participate at the

*Continued on page 204*

flats. It was fascinating to see the cars disappear over the horizon. Being from Washington and all those trees – makes it hard to believe that’s possible. I can’t wait to go back.”

Katie Jackson, responsible for developing, installing and testing the brakes and steering: “Some things I learned at the Bonneville Salt Flats will stick with me for the rest of my life. Being able to talk to some amazing racers and car builders was truly an honorable opportunity, I couldn’t be happier. Meeting people at the Salt Flats who teach you a lot about the history, what it’s like to live for that moment in time after you’ve spent years waiting for your car to leave the starting line and learning that even when something doesn’t work just right the first time, you go back and try again until you get it right. Success is not something to be taught, but to be earned. And that is the knowledge you get from people who know failure, who have fought the fight, yet succeeded through all of the challenges.”

Unlike a university team from Ohio who uses a professional driver, 11th-grader Tim Wilson was tapped for the driving chores, doubtless because he is the only student with a valid driver license.

Tim reflected: “My experience at Bonneville was one of the best I have ever had. I am very honored to be part of this program. The best part of the trip should probably be my experience behind the wheel of our car driving at full throttle on the one-mile course. Although we didn’t go very fast and I won’t be bragging about the speeds we attained, at least I can say that I drove a one-of-a-kind car

capable of 186 miles per gallon on the salt flats.

We learned exactly what the governor did and adjusted it to give us more power and efficiency, we discovered we need to make an intake for the engine because more cool air to the engine provides more power and efficiency, and our data logger data told us that our engine oil gets much too hot with our floor pan and that our exhaust doesn’t get hot enough which may affect our power and efficiency.

My favorite machine was the 228 MPH semi-truck that belched black smoke every time it passed creating a mile-long trail of unburned diesel that floated suspended in the air behind the truck. I had the once-in-a-life time chance to sit in the driver’s seat of this behemoth and talk to its crew.

I learned that a 1,472 cubic inch V16 Detroit diesel puts out 4,000 HP at 6,500 ft.lbs of torque! With four-valves-per-cylinder just for the exhaust! Its fuel injector pumps were in the heads of the engine operated by pushrods and rockers off the camshaft like the valves, two valves were operated by one rocker, and there were four separate heads despite the single block; but those facts may just be interesting to me.

One of the great parts about this trip has been hanging out with a group of people that through countless hours of tireless working I have learned to call friends. I’m quite happy to spend time working on the car when it’s time spent working with these characters I call team members, and friends.

I really hope that someday I can go back and learn much more... but maybe go a little bit faster.”


The team solved some critical issues in real time by making five runs and com-

pleting a lot of testing that proved the aerodynamic tail really did have benefits and gained new modification ideas for future competitions according to Tim. They eeked past their goal of 30MPH through the measured mile earning a 31.16668 mph time slip. They have already decided to return in 2012.

The Granite Falls race team are playing in the same energy park as the big cats. “Most folks believe there should be capability for about 90 billion gallons of renewable fuels by 2030 to meet a worldwide increase in demand for fuel,” said Dale Gardner, Associate Lab Director for the U.S. Department of Energy’s Renewable Fuels & Vehicle Systems at the National Renewable Energy Lab.

Corn-based ethanol is getting lots of criticism about its negative impacts on food availability, some cellulosic ethanol sources are being explored, especially grasses, but algae that can be grown in non-potable water and holds CO2 is getting a lot of attention because it can provide up to 10,000 gallons per acre, far outstripping the 48 gallons per acre of soybeans according to Gardner.

I am still waiting for hydrogen, which I believe, is the ultimate propulsion system and don’t give a crushed beer can if it has pistons or not.

Note: Photojournalist Louise Ann Noeth is the authoress of the award-winning book, “Bonneville: The Fastest Place on Earth,” a complete historical review of the first 50 years of land speed racing. After 11 years in print only a VERY limited number of the author’s special autographed edition remain. For more details and to order, go to: [www.land-speedproductions.biz](http://www.land-speedproductions.biz). 

GRANITE FALLS HIGH SCHOOL  
T2011 “PHILIPPE’S REVENGE” SPECS

Build Year: 2010

DIMENSIONS

LSR Long Tail Length 440 cm (14.5 Feet)  
Width: 124cm  
Height: 112cm  
Inside Cabin Height: 96cm  
Ground Clearance: 15cm  
Wheel Base: 182cm, Front Track: 114cm,  
Rear Track: 92cm  
LSR Weight approx: 485 LBS

ENGINE

Changfa 170 210cc 4.5hp diesel air-cooled single cylinder direct injection modified with electric fuel shut-off.

CHASSIS

Semi-Space Frame design, 1” square x .063 mild steel, all MIG welded + 3/4” balsa and foam core carbon fiber

BODY

Mix of 1/8” foam/fiberglass composite and .032” aluminum – Doors 3/8 foam core carbon fiber

WHEELS & TIRES

Kymco 16x2.5” mounted with Pirelli Diabolo 100/80mm-16 (P-rated for 93 mph)

BRAKES

Hydraulic Disk; 2 circuits (front/rear) foot operated (Kymco motorcycle)

SUSPENSION

Front: Mechanical Coil Spring shock absorber (Honda 250 front fork – repurposed).  
Rear: solid axle/ball bearings pillow blocks

STEERING

Rack and Pinion and sectional steering wheel with positive stop calculated for a 20 ft turning radius, LHD

