FUEL FOR THOUGHT

BY LANDSPEED LOUISE

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Cadets Reporting For Speed

For great ideas to become worthwhile realities enormous effort is required from everyone involved. A couple of years ago I had the chance to pitch the big brains at the United States Air Force Academy about an idea to get land speed racers some cutting edge technical assistance to be safer while going faster.

In exchange for access to its mechanical engineering lab and collective brain trust, the racing community could provide challenging problems for the cadets to solve. It's one thing to read a text book chapter then answer quiz questions, while quite another order of magnitude of comprehension is demanded to figure out how to stop a vehicle from becoming unstable while running in excess of 200MPH.

No one can argue that having fun while finding solutions makes better students overall. Solving an "ill-defined problem," one where the answer is not already known, shows the teacher that the cadet is able to analyze, calculate and determine options forward.

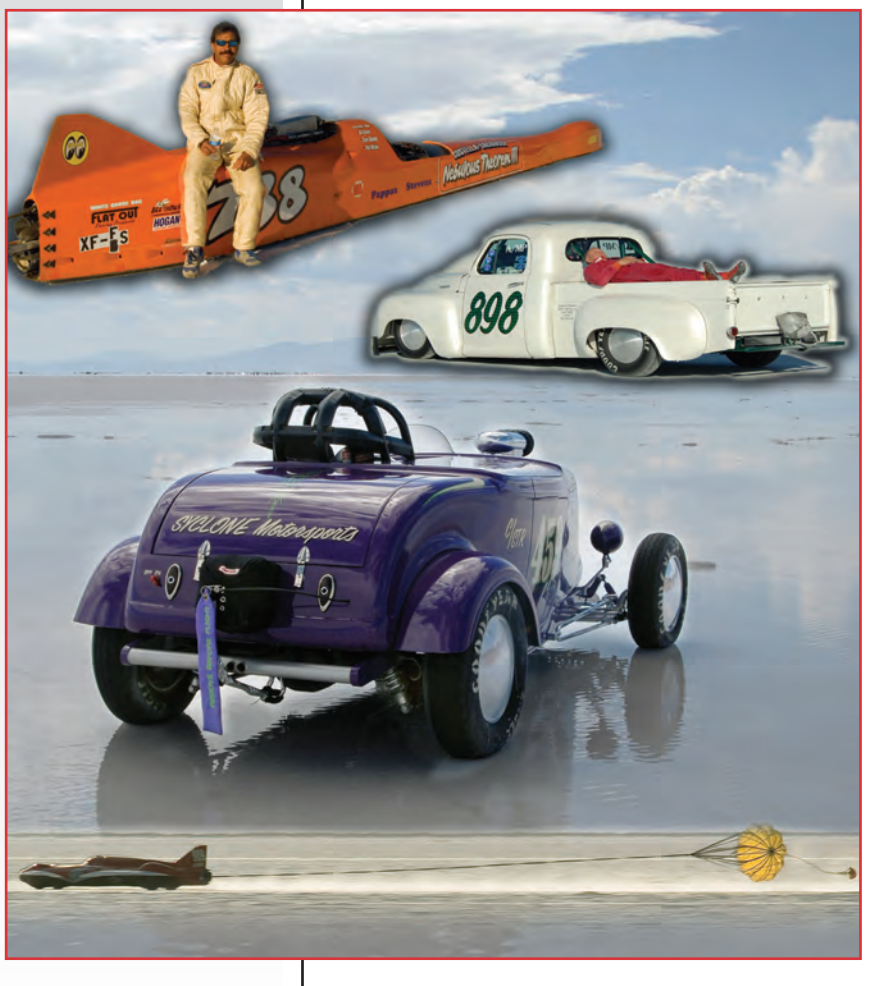
As many of the cadets will someday fly fighter jets, or get tapped to be joystick drone jockeys, it is essential they have a multi-systems mindset, to understand how multiple, complex systems work in concert with each other. If something goes "tango uniform" whilst on a mission, fast thinking and actions will get you out of a jam – same as a speed run at Bonneville. Cadets are told to treat land speed vehicles as "zero altitude aircraft."

Director of the Applied Mechanics Laboratory Lt. Col. Richard Buckley and I operate under a CRADA, a Cooperative Research and Development Agreement that allows the Academy to solicit the racing community for projects.

During the 2012 racing season Buckley and his "Academy Crew" were on the salt for Speedweek with flyers distributed at the USFRA World of Speed and the BUB meet asking racers if they might somehow be of assistance improving a safety item or finding more speed in those all-important timed miles.

More projects came in than Buckley had cadets to assign so the program rolled out with a backlog: 21 from 14 teams. We hope the LSR community will please bear with us – each semester brings a different mix of cadets studying various topics at their required level, which may not match with what the racer is asking help with.

In the first semester nine projects have been completed, five are on going and we have identified areas where process improvements are required. Communication was the weakest link on both sides. In the future Cadets have to "outbrief" the racer through a standardized reporting process and be required to make a formal presentation to the racer.



Here's a recap of 2012:

Chip Gerber, of Springfield, Illinois wanted a "cheat sheet" for his carburetor set-up. Cadets went to work and soon realized that they needed Gerber's engine to create a useful matrix and the tune-up had to happen at Bonneville's altitude. No problem, Gerber has invited the cadets to be "hands on" at the 2013 Speedweek. Stand by, this oughta be good.

"Everyone has bent over backwards to help," Gerber observed, "The cadets ask the right questions. I gave them a pretty much impossible task and still they are trying to solve the problem."

The cadets learned that without physical testing no useful answers could be found because their theoretical analysis gave them unreasonable numbers. They now know they must get the engine to full-speed to get more data that will provide real-world answers (or more questions) that will put Gerber's roadster on a faster path.

Buckley has probably rubbed off on the cadets; this guy loves figuring out the tough stuff like some women love trying on shoes, the more the merrier.

"I get personally pumped up," remarked the Lieutenant Colonel with a distinct glee, "It keeps me up at night dreaming of how to make something better, solve the problem…, and make it go faster - safer - quicker."

Not some pat public relations quip, Buckley's on-campus lab has stringent operational procedures that brings it repeated safety awards. But get this - it is open 24/7, cadets can use the shop in the middle of the night if they choose.

"There are more ways to kill yourself in my shop than anywhere else on base," he admitted candidly, "So I have think about safety all the time, it bleeds into everything I do."

Cadets provided a viable alternative to Tom Hanley, aka "cupcake," who needed a better front air dam design for the White Goose Bar Racing Team's 1980 VW pickup. "The front end is staying planted now," said Hanley, "It was an elegant, simple solution that worked."

Joe Casanova, who tends to Dennis Varni's Speed Nymph streamliner asked the cadets to analyze the underbody shape and to figure out why the driver's canopy is lifting at speed. It was determined that the body was subjected to high and low pressure oscillations, but the jury is still out on the underbelly configuration.

Casanova summarized, "The cadets get an 'A+' they have the interest and the facilities are more than I could ever hope to have, it's a phenomenal way to connect the engineer and the racer."

Cadet Matthew Milliken is performing records run analysis and graphical interpretation of the entire 2012 racing season to share with the LSR community. Another cadet is cranking out a weather cheat sheet that will yield useful look up tables in a spreadsheet format.

Rick Yacoucci wanted a shaft analysis performed, but communication fumbles stalled his project, although cadets have so far discovered that smoother power delivery wears out engines faster and not-so-smooth power delivery helps engines live longer.

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411 streamliner hot shoe and big thinker Tom Burkland believes a master thesis on stability, structural integrity, crash dynamics, power application, or safe stopping would be very helpful. A stab at in-depth parachute analysis has proven to be a lot more complicated than originally envisioned.

"The problem gets slightly more complicated when there is a ground plane and turbulent flow field trailing behind the vehicle to conduct the deployment in," Tom told me, "I would like to see a good technical presentation of aerodynamic speed brakes in generic form for use on all land speed vehicles to obsolete the parachute, but that might get a little controversial."

With land speed racer Norris Anderson's permission, next month I will share in greater detail, the work of cadet Matt Major and Tucker Tipton who completed a double analysis for Anderson who runs a 1949 Studebaker that snagged a 219MPH record in AA/Modified pickup truck.

The cadets figured out why he was spinning out by identifying the center of gravity, center of pressure, tractive force and predicted steering responses using different weight distributions.

"I will implement most all of the suggestions," Anderson told me, "Weight will be shifted, and fuel tanks, batteries and ballast will be shifted around. The cadets handled most every problem I posed."

Anderson sent 10 rule books to the Academy, which doubtless helped the second project request: provide a recommendation of the best model of production pickup truck for a 300MPH race truck. Four cadets analyzed 16 models from seven manufacturers and presented Anderson with a tasty big speed bone to chew on.

Note: Photojournalist Louise Ann Noeth is the authoress of the critically acclaimed, "Bonneville: The Fastest Place on Earth," a complete historical review from 1896 to 1997. For high-speed details: www.landspeedproductions.biz. GG