# UNL engineers shift gears while designing contest car

By Mike Sweeney

A group of UNL mechanical engineers is grappling with a General-Motors-sized problem: how to build a car small on the outside but big on the inside.

The problem, shared by students from UNL and 14 other universities, is part of a University of Houston contest geared to giving college mechanical engineers practical experience designing cars, according to senior engineering major John Bishop.

Bishop said contest participants start with the same equipment: a five-horsepower Briggs-Stratton engine. The students then design a small version of an Indianapolis racing car to be powered by the engine.

In May, the students from the 15 schools will gather in Houston to compare the durability, maneuverability, acceleration, and gas mileage of their cars.

The UNL group's entry fits the size requirement. The car is about 7 feet long, and when Bishop lowers his small frame into it, his shoulders rest a few inches in front of the engine and his feet are even with the front wheels.

**Make room**

"I have no problem fitting in," Bishop said. "The problem is we have to design it so a 6-foot-3, 250-lb. man can drive it."

Bishop said they may have to redesign the car to make enough room for a tall person's big feet.

Bishop said about 14 engineering students started building the car in January. Because they didn't have much time, they decided to build the car body according to a Popular Mechanics magazine design. The rest of the car they designed on their own, Bishop said.

Bishop said as the group built the car, they ran into some problems they couldn't foresee when they designed it.

For example, Bishop said, according to the original plans, the steering mechanism passed through the car about where the driver's knees would be.

However, the steering problem was solved when the group tentatively decided to build gocart steering.

**Gear ratio**

Another problem is getting the gear ratio to optimize the car's performance in all phases of the competition, Bishop said.

A high gear ratio would help in the acceleration contest, he said, but a low ratio would be best for the gas mileage contest. He said he would like the best of both ratios.

A one-to-one gear ratio would ensure good gas mileage, "but we'd have to push the car off the starting line," Bishop said.

Helping solve the problem is what Bishop called "an infinitely variable transmission," donated by the Goodyear Tire and Rubber Co.

He said the transmission works well in snowmobiles, but he didn't know how it would work in a car.

The car designers have had many other parts donated from local companies, Bishop said. Companies donated wood for the car's body, the car's drive shaft, and the tires.

Bishop said the car would have cost $300 without the donations.

**$600 car**

Contest rules dictate that designers can spend no more than $600 building the car, and require the designers to justify their expenses as if they were building 4,000 cars.

Bishop said after the car is finished in the next two weeks, the group will begin testing it. If something isn't working right, they'll redesign the car, he said.

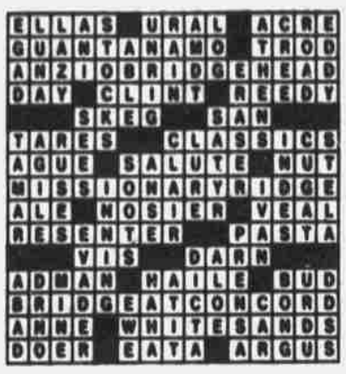
As the car now exists, it can theoretically go 65 mph, Bishop said.

"But it won't hit the top end in the 100-yard acceleration contest," Bishop said. "It would probably reach 65 in a couple of days."

The car will be on display during Engineering Week, April 5-6. Then, the designers will prepare for the competition in Houston, May 17-18.

Bishop said he didn't expect to win the competition because it is Nebraska's first year in the contest.

"What we'll do this year is go down and see how we fare," Bishop said. "Next year, we might say, 'Hey, let's win it.' "

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