

Panoz wins with overhead valves

After Cadillac, the other "home" team for American Le Mans sports car racing fans is the Panoz team. Though its car's basic design dates to 1997, and its Elan Power Products engine is an overhead valve design, the team has been "the best of the rest," as non-Audi teams compete amongst themselves. In fact, Panoz was able to put together two wins over the course of the American Le Mans Series championship in North America, showing what continuous development, hard work, and good drivers can accomplish.

"Formula One runs four face dogs, and we run six," Mayer said. "You can shift quicker their way." But the durability of four-dog gears is suspect, and Panoz didn't feel like being the guinea pig, especially when the bigger-budget Cadillac team, which uses the same gearbox, was reported to be planning a test of four-dog gears. "Our guys figured, 'Let Cadillac test it and see what happens,'" Mayer said.

Panoz moved to the popular Bosch engine management system for 2002, proving the flexibility of a device that controls both the twin-turbo overhead cam engines in the Audi and Cadillac and the normally aspirated overhead valve engine in the Panoz.

The team found the Bosch system allowed for control of more variables than its old Zytek engine management computer. "There is a lot more you can change, a lot more you can adjust," said Mayer, such as "where you put fuel in, ignition timing, and ignition mapping."



With its front bodywork removed, the front underwing of the Panoz LMP-01 is plainly visible. The twin nostrils at the top of the tub are the air restrictors leading to the car's unconventional front-mounted engine.

"This car is the same chassis and the same tub as the [closed cockpit] GT car in '97," said Rick Mayer, Panoz race engineer. "You can still see where the door sill would be," he pointed out. "There is a glued-on piece now where the door would be. We had the same gearbox until this year, and the engine and crash structure are unchanged from the GT car."

For 2002, Panoz switched to the popular Xtrac six-speed sequential gearbox outfitted with the pneumatic paddle shift system. The air shifter is an improvement over a hand shifted sequential for the reasons mentioned by Dave Spitzer, Cadillac Le Mans Prototype Integration Manager. But it is still half as fast as a Formula One-style hydraulic shifter, according to Mayer.

Nevertheless, endurance racing teams prefer the failure mode of air shifters over hydraulic systems, he said. A hydraulic shifter will simply stop working in the event of a leak and the car will stick in gear. "If you get a leak in a pneumatic system, you can work around it," Mayer said. "The hydraulic system is quicker, but if you get a hydraulic leak, you are hosed," he said.

Another reason F1 gearboxes are faster-shifting is that they have fewer gear face "dogs"—the protruding nubs on the sides of racing gears that allow gearsets to be selected and engaged to the output shaft. Fewer dogs mean more open space, so when a gear is chosen, there is a reduced chance of the dog ring striking one of the dogs on the gear and delaying its engagement until the gear rotates into alignment.



The LMP-01's massive six-piston AP brake caliper clamping the 15.0-in (380-mm) carbon-fiber disc is clearly visible through the spokes of the 18-in BBS wheel.

Combined with the Bosch fuel injection system, the computer lets the team control which fuel injectors are used under different conditions. The injection system has 16 injectors for the eight cylinders, with one in the intake trumpet and the other in the intake port spraying fuel onto the intake valve. The system is programmed to lean out the upper injectors at full throttle to cut fuel consumption. The car has proved easier to start with the Bosch system, which the crew and drivers appreciate.

The team also likes the built-in pit lane speed limiter, which is more flexible than the system used previously. The computer manages the engine map to maintain the correct speed according to the wheel speed sensors. As a result, "You can change throttle position and not affect the speed of the car," Mayer said.

With the departure of the leading factory teams, 2003 could be the year when the steady determination and constant improvement of the Panoz team will pay off. But observers hoping to spot innovative new technology should mark their calendar for 2004. **aei**