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Force to Be Reckoned With

College-level mathematics and old-fashioned tinkering have fast-tracked this IMCA Hobby Stock driver from novice to multi-race winner in three years.

by Dan Anderson and Bill Anderson

Start with Smokey Yunick's talent for tinkering with race cars. Add Kenny Wallace's driving skills and energetic personality. Toss in a few genes from Albert Einstein. That's an apt description of Scott Lograsso, 28-year-old IMCA Hobby Stock driver from Nevada, Iowa. Lograsso has raced for only three years but has earned 21 heat race wins and six feature wins at Boone Speedway. He's also qualified in 2009 and 2010 for the IMCA Speedway Motors Super Nationals Hobby Stock championship race. He earned Hard Charger honors in the 2010 Super Nationals race, finishing seventh after starting 26th. All this with no previous racing experience.

"I'd always loved cars, any kind of car, any kind of racing, but only as a spectator," says Lograsso. "And I've always been a science geek. Both my parents have PhD's in metallurgy, so being a geek is in my genes."

After admittedly being "unfocused" in high school, Lograsso attended tech school, then worked at an auto repair shop to save enough money to fulfill his goal of becoming a race car driver. Once he started racing hobby stocks, something clicked. His genetic disposition for mathematics, physics, and the sciences suddenly had meaning. "Everywhere I looked on the car, every time I drove it, I could see where I could use math and physics to understand

Lograsso says the formulas displayed on his hobby stock are "representations of utilizing and directing energy to make the car go fast." He's always been curious about how things work; as a child he suffered damage to his right hand "being an inquisitive kid doing things an inquisitive kid shouldn't have been doing."

Left: Lograsso in action at Iowa's Boone Speedway, where he's picked up six feature wins.

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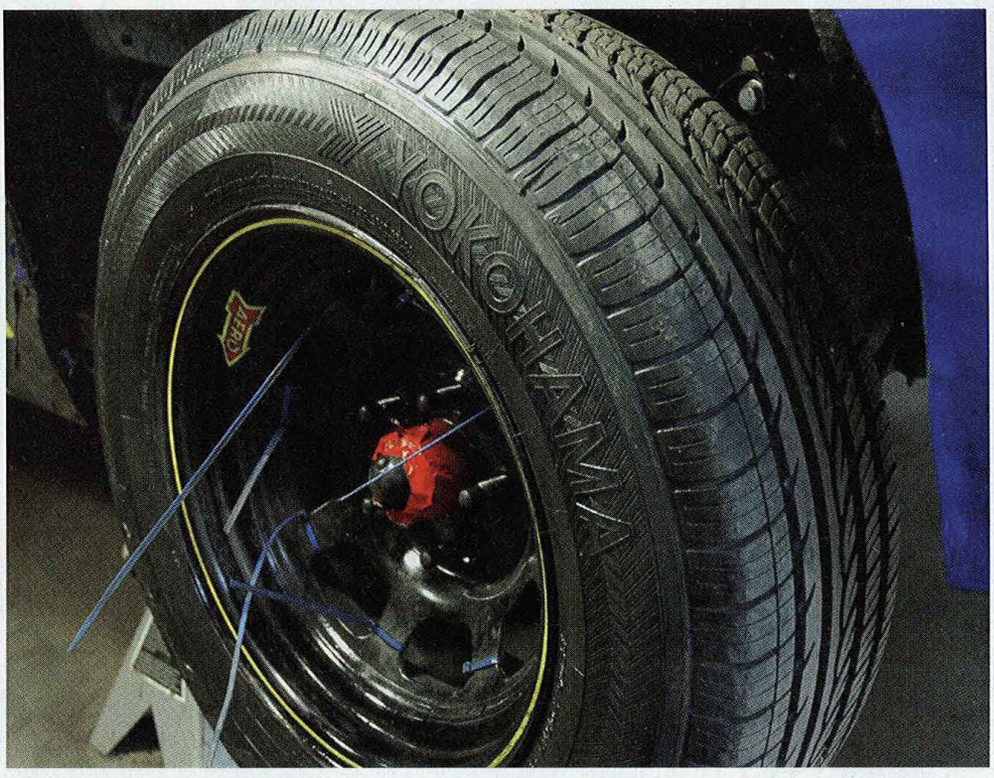
A full-containment seat not only increased safety, but also improved lap times by holding Lograsso's body and legs more firmly, allowing him more precise control of the steering wheel and pedals.



Right: In addition to mathematical analysis, Lograsso uses exhaustive Internet research for performance gains. One of his finds: Yokohama Avid TRZ passenger car tires with multi-purpose treads and high-performance sidewalls. The zip ties laced to the wheel openings "look dumb," Lograsso acknowledges, "but they break the mud clods into smaller pieces so there aren't big chunks that throw the wheel out of balance. You can't keep the mud out, but the zip ties help keep it evenly distributed around the wheel."

what was going on and make it better," Lograsso says.

The revelation spurred him to enroll at Iowa State University, where he's now in his third year, studying mechanical engineering—and eagerly applying what he learns on the racetrack. "From an engineering standpoint, oval track racing is so focused and pure—what's not to like about it?" he says. "I love the challenge of taking a car and maximizing every mechanical aspect to make it do nothing but turn left and go fast, as efficiently as possible."

Other drivers bolt on parts then cross their fingers. Lograsso uses trigonometry, calculus, physics, and other engineering tools to mathematically quantify not only what to do, but also how well it works—or not. For instance, mathematical analysis allowed him to quantify an old hobby stock axiom for determining optimum length of exhaust pipes. "The old racers told me to install a long pipe, run the motor, and cut it off where the finish stops burning off the pipe," says Lograsso. "I did the math, looked at research on pulse waves and sound waves—how they can scavenge the cylinders—and did some calculations using theoretical exhaust temperatures with different curves and lengths of pipe. I came up with an optimum length of 45 inches for my engine configuration. We had been running a 12- or 13-inch pipe. Running the longer pipe really improved the way the car came out of corners. I had more low-end torque, and we gained 300 rpm at the top end. Lap times were 0.2 to 0.5 seconds faster."

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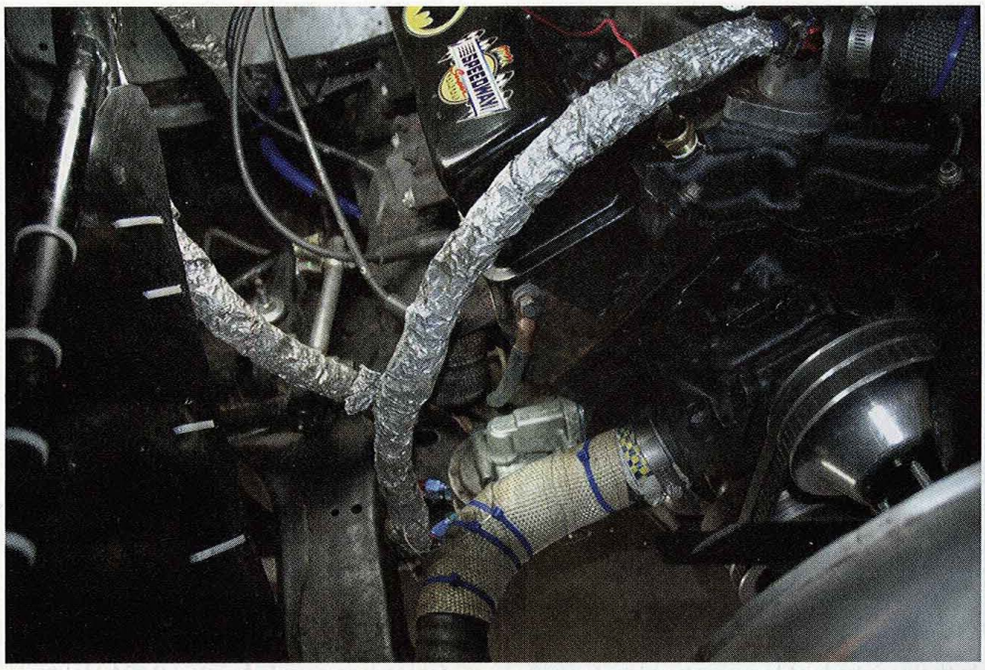

An experiment with under-hood heat management led Lograsso to insulate his lower radiator hose, and insulate and foil-wrap his fuel lines to keep fuel cooler on its way to the carburetor.

Lograsso concedes that his current exhaust pipe isn't optimized for length. "The longer pipe had to be in two pieces to make it easy to get in and out of the car as part of other experiments we were doing," he says. "The two-piece configuration kept getting knocked apart by mud from the track, so we're running a shorter pipe for now."

A GOOD GRASP

Scott Lograsso has had a fascination with mechanical things for as long as he can remember. "When I was one year old, shortly after I spoke my first word—car—I made my first attempt at being a mechanic," he says. "But it didn't work out so well because the motorized rock-crushing machine I thought needed fixing took my fingers off and crushed them beyond full repair."

Since then, he's treated the injury to his dominant hand as just another engineering problem. "Honestly," he says, "I think it is one of the greatest things that's happened to me.... It brought me many challenges that toughened me up for racing, from [dealing with] mean kids and teachers to [performing] basic simple functions. But I've always found a way to overcome, whether it was hiding in the dreams of being a race car driver or learning how to use my left hand."

But that could change again. "IMCA changed the rules in late 2011 to allow different diameter pipes," Lograsso says, "so I'm excited about running the numbers before next year to see if I can regain that power using a larger, shorter pipe."

When he can't use scientific analysis to quantify a decision, Lograsso does meticulous research. "I spent a week on the Internet, working with TireRack.com, looking at how they rate various brands of passenger car tires for snow, ice, and dry pavement," he says. "I figure snow is like a wet, sloppy track. Ice is like a dry-slick track, and dry pavement is similar to a heavy track with lots of traction. Yokohama Avid TRZ tires [size 205/70R15] rated well for all three conditions, and they also have sidewall construction from their high-performance tires. The week we started running those Yokohamas I won my first feature race."

Ask Lograsso if he's done any research or analysis of his suspension components and he smiles broadly and points to the rear deck of his car. Where other racers have flippant or obscene messages, Lograsso's car sports two high-order mathematical formulas: *Force=ma ∫½ mvv, and my"+ky'+by=force (external)*. "Those formulas deal with mass and acceleration and force," says Lograsso. "They relate to everything from valve train movement to the way springs and shock absorbers react to the car rolling over onto them in corners. You can't plug numbers directly into them and get shock or spring ratings, but they've helped me understand how

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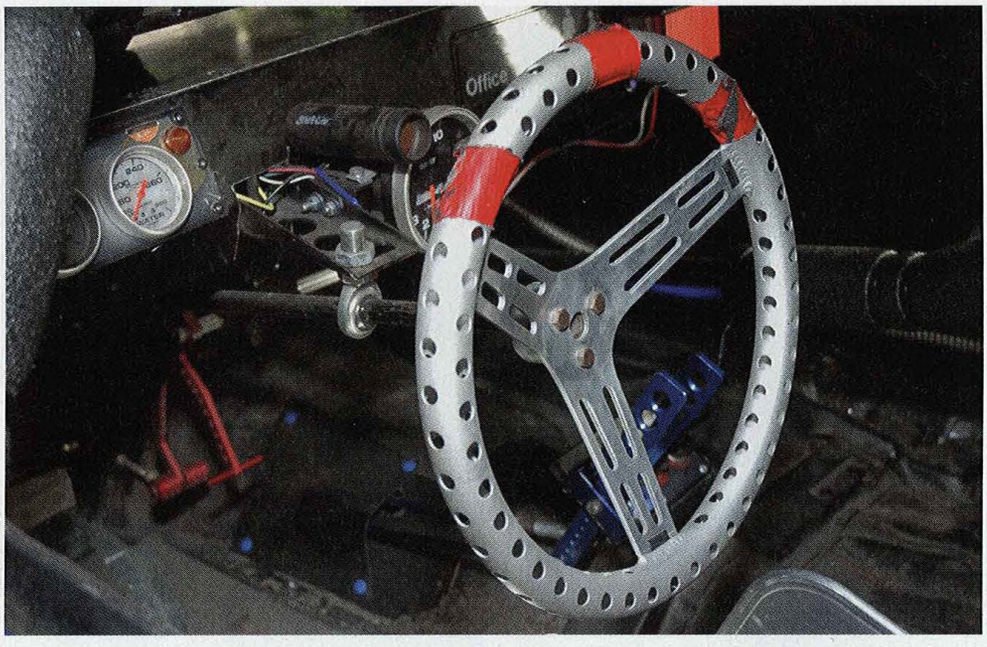

Three pieces of tape on the steering wheel, always in the periphery of Lograsso's vision, keep him aware of wheel position, especially on sloppy, greasy tracks where it's difficult to "feel" where the front tires are pointing.

components in the car or engine or rear end work and react. To me, they're representations of utilizing and directing energy to make the car go fast."

Lograsso used theory from those formulas to develop his spring and shock package. His springs are all 11 inches tall. During heat races he runs a 225-pound spring on the left rear and a 175-pound spring on the right rear. Before feature races he switches to a 200-pound spring on both right and left rear. "Using the heavier, unequal springs in heat races helps make the car tighter when it's muddy and slick," he says. "Installing lighter, equal [rear] springs before the feature loosens things up a bit for when it's more dry slick."

Shocks are Afco, with a 7/7 (compression/rebound) on the left front, a 7/4 on the right front, a 5/5 on the right rear, and a 5/3 on the left rear. The different compression and rebound valving on each corner of the car controls the speed of shock movement, which influences weight transfer on corner entry, and again on corner exit. Lograsso's goal is to distribute transferred weight evenly, for maximum traction on all four tires during both deceleration and acceleration. "We checked tire temperatures a lot," he says, "looking for even temperatures across the tread of each tire and for all four tires to be close to the same temperature right after they came off the track, to get this suspension package dialed in."

Jason Adams, technical support staffer with Afco Racing, says customized shock packages are now common even in hobby stock and street stock classes. "If guys aren't up on shock valving, we can recommend a shock package based on their car, their track, and other factors," he says. "If they understand valving we can customize shocks exactly to their needs."

Lograsso says that while shocks and springs play dominant roles in his car's handling, he has also engineered his brake system to help the car get into corners—and then turn tighter. He runs economy-grade BrakeBest brake shoes in the rear drum brake, mid-grade Wagner ceramic brake pads on the front right, and Hawk "Black" racing brake pads on the left front. "The cheaper rear shoes aren't as aggressive as the front pads so they only come into play when I get on the brakes fairly hard," he says. "The Hawk pad on the left front makes that brake so aggressive that if I tap the pedal the car pulls to the left. Not only does that help me steer into corners, but when I'm passing somebody on the inside of a corner, if I tap the brakes, maybe left-foot them a little while I stay on the throttle, it helps me turn tighter without extra steering input that might tend to wash out the front end."

Not all of Lograsso's experiments in race car engineering have been successes. At one point he noticed he was down on power. A crew member discovered the radiator had shifted, and the lower radiator hose was touching the fuel line just ahead of the fuel pump. Repositioning the fuel line so it didn't absorb heat from the radiator hose regained the missing power. That prompted Lograsso to conduct research on "under-hood heat manage-

OOPS!

What happens when the exactness of science meets the vagueness of the rulebook?

Rules interpretation is an inexact science. IMCA Hobby Stock racer and mechanical engineering student Scott Lograsso discovered that not long after he had run across Somender Singh's patented cylinder head design. The Singh design dramatically improves performance through small grooves precisely machined into the combustion chambers of cylinder heads to equalize pressures in the combustion chamber and improve flame fronts. Lograsso knew that IMCA Hobby Stock engine rules prohibit any modification to cylinder heads. But "flat top or dish pistons" are allowed, and Lograsso saw an opportunity to apply some of the Singh principles. "I interpreted that [rule] to mean I could dish my pistons a little bit," Lograsso says, "so I 'dished' them with a groove that ran from the quench area to the valve area, kind of mirroring Singh's grooves in cylinder heads. I ended up winning a feature race at Boone Speedway by a couple car lengths. When they said they were going to tech me, I was all for it because I was confident I was legal."

But IMCA's inspectors ruled the grooved pistons were illegal, and the embarrassed Lograsso was disqualified. "To me, there's no satisfaction in winning by cheating," he said. "The thing I love about racing is using engineering and knowledge to get maximum performance out of my car—within the rules. It's harder to win legally than if you cheat, and I like the challenge of winning the hard way. I wouldn't have done it if I didn't think it was legal—but it sure is an awesome concept, from an engineering standpoint!"

Efforts to incorporate Somender Singh's combustion chamber design led Lograsso to tinker with his piston tops—which led to a dq when IMCA disagreed with Lograsso's interpretation of their Hobby Stock rules.

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ment" to determine the affects of heat on fuel atomization. Which led him to install a "heat sink" on his fuel line just ahead of the fuel pump, in the air blast from the radiator fan. His theory was that the air from the cooling fan would cool the fuel in his homemade heat sink and give him extra power, since cool fuel offers more power. "Boy, that one didn't work," he laughs. "In reality, the copper line picked up engine heat from the radiator, and I ended up losing power. We went back to the conventional fuel line real quick."

Other changes and additions to Lograsso's car improved driver performance—sometimes accidentally, sometimes intentionally. "I upgraded to an UltraShield full-containment seat, strictly for safety, and we noticed something odd about my lap times," he says. "My lap times weren't necessarily faster, but they were more consistent, always within 0.1 or 0.2 seconds of each other. Having support so I wasn't flopping around in the seat let me be more precise with my pedals and steering."

Two bright red zip ties looped on the front corners of his car are another non-mechanical addition that Lograsso believes improves driving precision. "They give me perspective on exactly where the front corners of my car are," he says. "They're like the three pieces of red tape I've got on my steering wheel—they're reference points that help me be precise. The zip ties on the front corners help me make close passes. The pieces of tape on the steering wheel are always in the periphery of my vision, and help me know exactly how much turn I have in the steering wheel."

Is there any aspect of his car's performance that confounds Lograsso's analytical mind? Yes: carburetors. "I'm a child of the '80s," he says. "Carburetors intimidate me. I grew up with injected, computer-controlled fuel systems. They're simple to me. They make sense. I'd love to be able to run an injected fuel system. I could do a lot of neat things with it."

But until IMCA allows fuel injection in Hobby Stocks, Lograsso will continue to delve into other branches of engineering theory, using mathematical modeling to understand the intricacies of venturis, jets, and old-school carburetion systems.

Smokey and Albert would approve.

SOURCE
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