VOLUME 37, NUMBER 3 MARCH 2022

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ROAD RUNNERS

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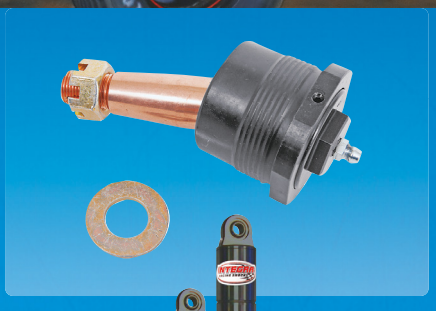

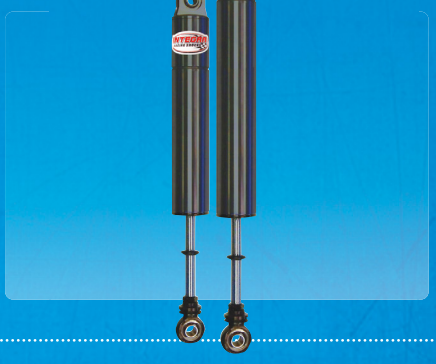

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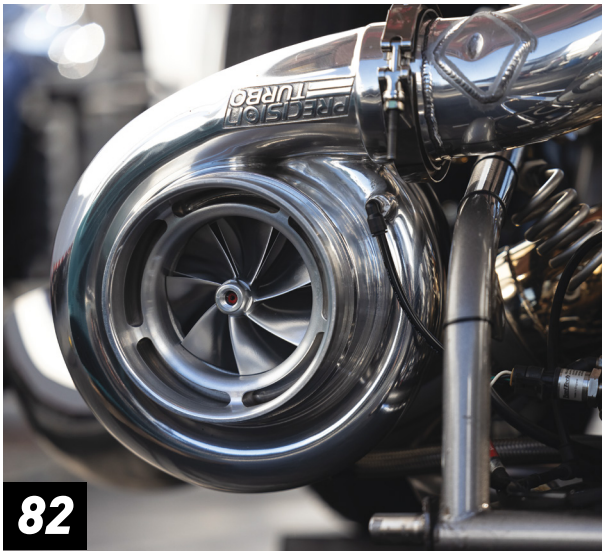

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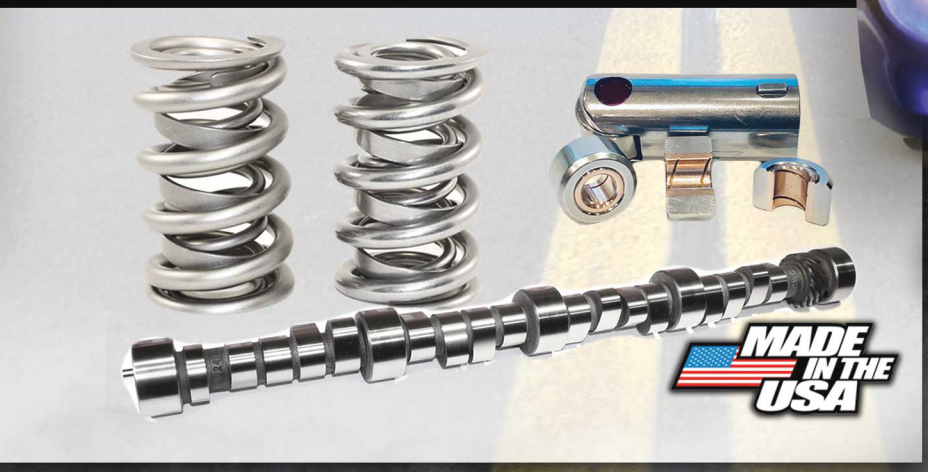

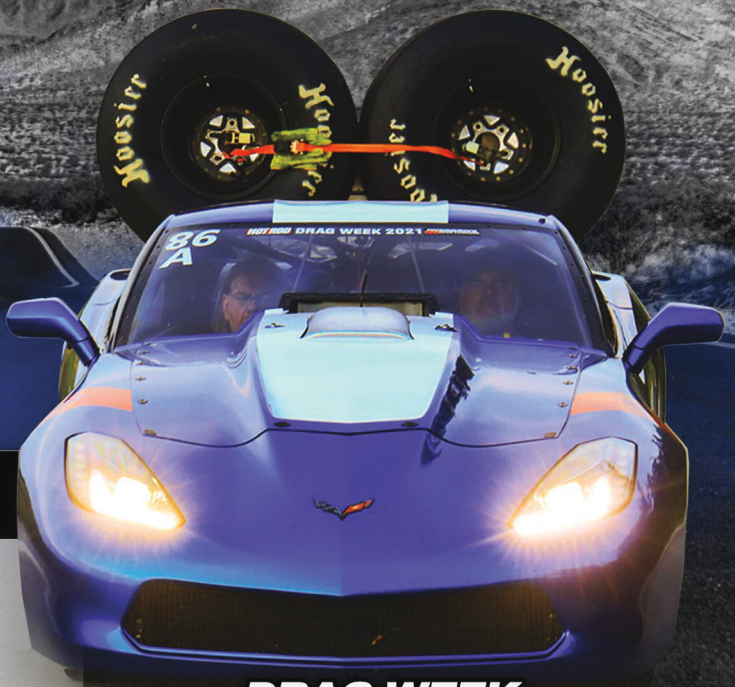

DRAG WEEK
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FROM THE PRESIDENT

DR. JAMIE MEYER
jamiem@performanceracing.com

THE FIGHT AHEAD

Just like that, it is already mid-season… both for the racing industry as well as the mid-term elections. In my last editorial, I detailed how your PRI/SEMA Government Affairs office is working hard for you, trying to position the critical RPM Act in Congress for consideration and eventually to be voted into law. This is hard work. It's not easy to "move the ball down the field," and it is even harder to measure how much progress has been made. Changes in attitude and public focus can move the attention of your lawmakers enough to provide us momentum. And, with thousands of bills being introduced (backed by thousands of well-funded advocacy groups), it is critical that we stay focused on ensuring the future of our industry.

In 2021, the racing industry and performance car enthusiasts did more to advance your RPM Act than ever before. You sent over 1.5 million letters to Congress, and that has resulted in over 140 cosponsors of the RPM Act, giving us momentum and influence. If you are new to this program, please head over to www.SaveOurRaceCars.com to get information, get motivated, and get involved.

"IN 2021, THE RACING INDUSTRY AND PERFORMANCE CAR ENTHUSIASTS DID MORE TO ADVANCE YOUR RPM ACT THAN EVER BEFORE."

We have several big additions to the RPM Act team in 2022. First, we have never had so many racing industry companies getting involved in politics. More than ever, freedom is on the line, and we all know that freedom isn't free. Thankfully, your fellow industry members are answering the call. My friend Heath Norton and his business, Callies Performance Products, has been one of those companies that's stepped up big time, hosting their U.S. Representative, calling elected officials, and making sure that the racing industry has a presence.

Second, our movement is more public than ever. Thanks to the PRI Ambassador program and the PRI Road Tour, the RPM Act is out there. We've partnered with tracks and sanctioning bodies to produce events as the presenting sponsor. Look for many more events this summer that bring you, the politicians, and PRI together.

Without question, we are also getting attention from big donors, and this may be the key to tipping the RPM Act over to the win column. Private donors who have been politically active for years are taking on the RPM Act as something they want to get involved with. These folks have been making donations to key policymakers for years, working to advance their businesses or other interests. They already have a relationship with their local, state, and federal reps. We have enjoyed interest from a handful of these influential members of our community, but we need more. If you are talking to your state or federally elected officials, we'd love to hear from you, or at least get you the talking points on why the RPM Act is so critical for this industry.

Finally, you have the PRI Membership. Started in 2021, we are already reaching those racing industry members closest to us. In 2022, we will expand those efforts to regional and national activation. Having members that are active and involved in our industry will show DC just how serious you are. More members mean we will have more voters. More voters aligned to the goals of the racing industry will help us succeed as a community, and help you succeed as an individual. So, please, if you haven't already, join the PRI Membership as a business or individual member.

The reality of any membership is being able to answer for the individual the very simple question of "What's in it for me?" PRI is rapidly assembling racer-specific benefits that will mean an improved racing experience for individual racers and significant competitive advantage to our PRI business members. Reach out to a PRI Membership representative to get more information on how we can help you while you help the racing industry.

The future of PRI is larger, much larger, than a monthly magazine and a trade show in December. PRI, working through the PRI Membership program and our Performance Racing PAC corporate structure, is the voice for the racing industry—at the federal level, at the state level, and at your favorite race track. The time is now for you to make the personal decision to get involved. Join the PRI Membership, as more than 40,000 individuals have already done, and get involved in the fight to protect the future of racing. Find your PRI Membership options at www.PerformanceRacing.com/membership.

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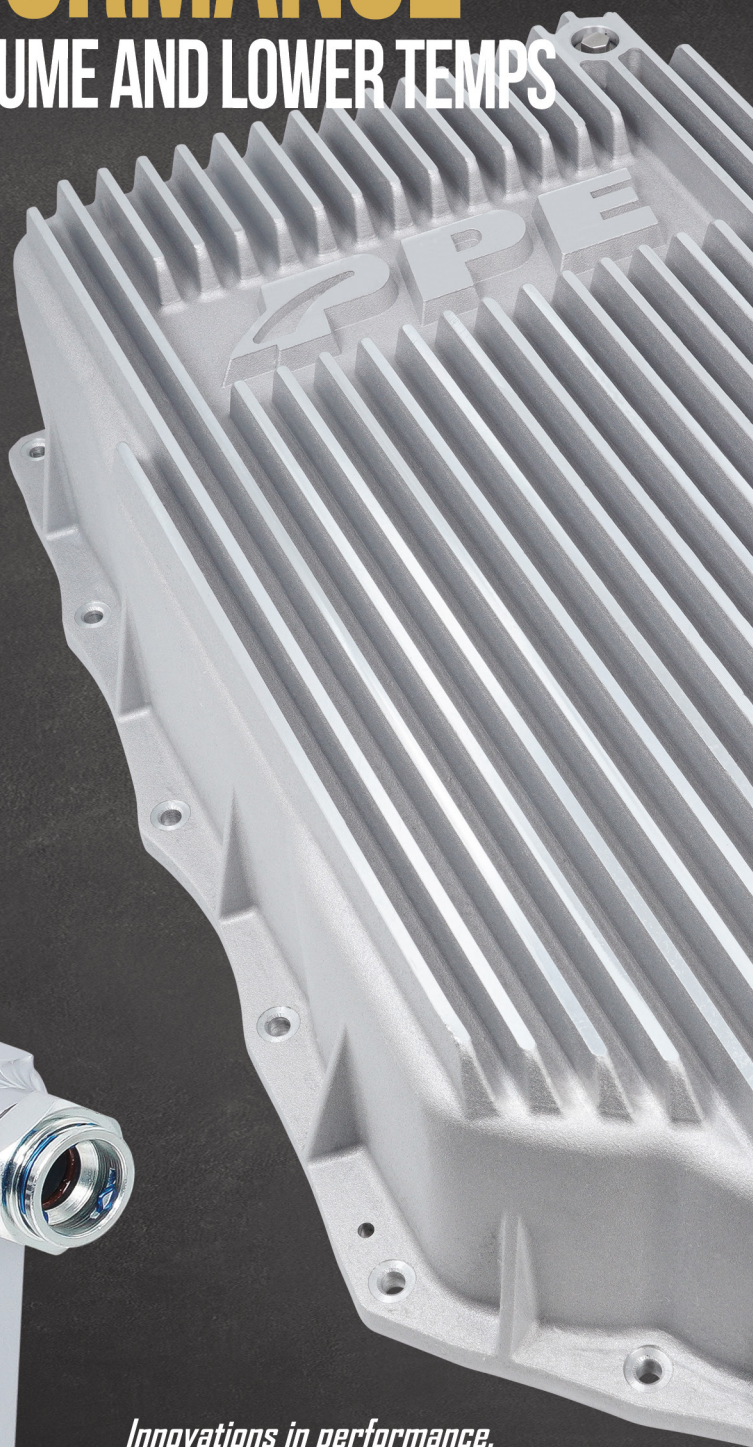

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FROM THE EDITOR

Three things I think as winter turns to spring and a new racing season gets underway across much of the country:

1) I THINK WORDS LIKE "LEADER" AND "inspiration" get thrown around a lot these days, but I just can't come up with a better way to describe Force Indy Team Principal Rod Reid. The subject of our *Industry Insights* profile this month, Reid studied engineering at Purdue University, then forged a successful career in business before overseeing teams in Formula Ford and Super Vee in the late 1970s. But it would be another few decades before his vision for an inclusive, multi-faceted motorsports program for underserved youth was realized. In operation since 2006, the Nexgeneracers (NXG) Youth Motorsports Academy now offers kids from the Indianapolis area a well-rounded curriculum of mechanics, racing skills, finance, and STEM education. It's made possible through support from corporate partners like Lucas Oil, Honda, and others. And over the last 15 years it has served more than 2,400 youngsters. Reid's future outlook for NXG is ambitious—a national program with chapters in Detroit, St. Louis, Dallas, Portland, LA, "or any place that has an urban environment," he told us, stressing the importance of education in those efforts, albeit with a twist: "When I say education, I'm not necessarily talking about formal," he noted. "I'm just talking about being informed. If a young person doesn't know that this industry exists as an opportunity, whether it's an opportunity to be a fan, or an opportunity to work in the pit crew, there's no way they will engage." For more on how Reid is developing the next generation of motorsports enthusiasts and professionals, see our coverage beginning on page 26.

2) I THINK THAT WHENEVER RACE PARTS manufacturers are willing to pull back the curtains on their R&D processes, we're more than willing to share those stories.

DAN SCHECHNER
dans@performanceracing.com

In this month's report on suspension titled *Up to the Test*, contributor Alex Nishimoto does just that, providing a behind-the-scenes look at how suppliers develop shocks, springs, bump stops, etc. from ideation to design, prototype, and then eventually finished product. Certainly there are similarities. For example, each manufacturer we spoke with puts their parts through rigorous in-house testing, fine-tuning, and real-world verification before they're ever given the green light for production. But we also discovered distinct differences, like QA1's use of a six-step "phase gate process" to determine whether a project should be terminated or move on to the next stage. For much more on the technology and engineering that goes into each high-performance part, see our coverage beginning on page 72.

3) I THINK THE INDUSTRY WILL MISS ALEX Borla, 75, who we were saddened to learn passed away in early February, just as this issue was going to print. The co-founder and CEO of Borla Performance Industries is credited with developing groundbreaking exhaust systems and muffler designs over his decades in motorsports and the performance aftermarket. Our condolences to his family, friends, and all those whose lives he touched. PRI

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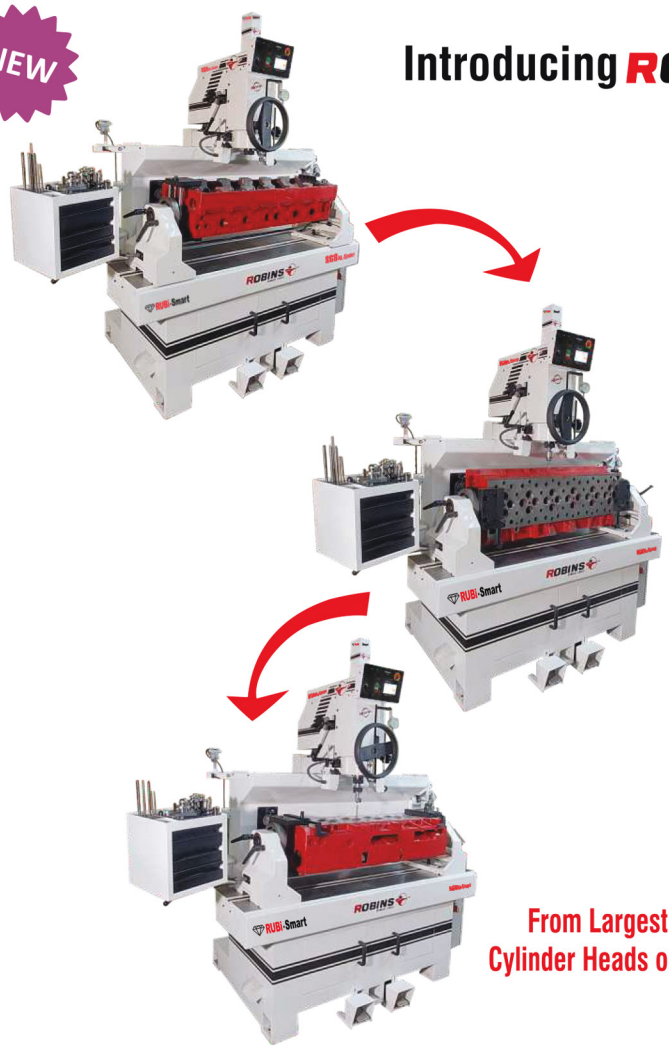

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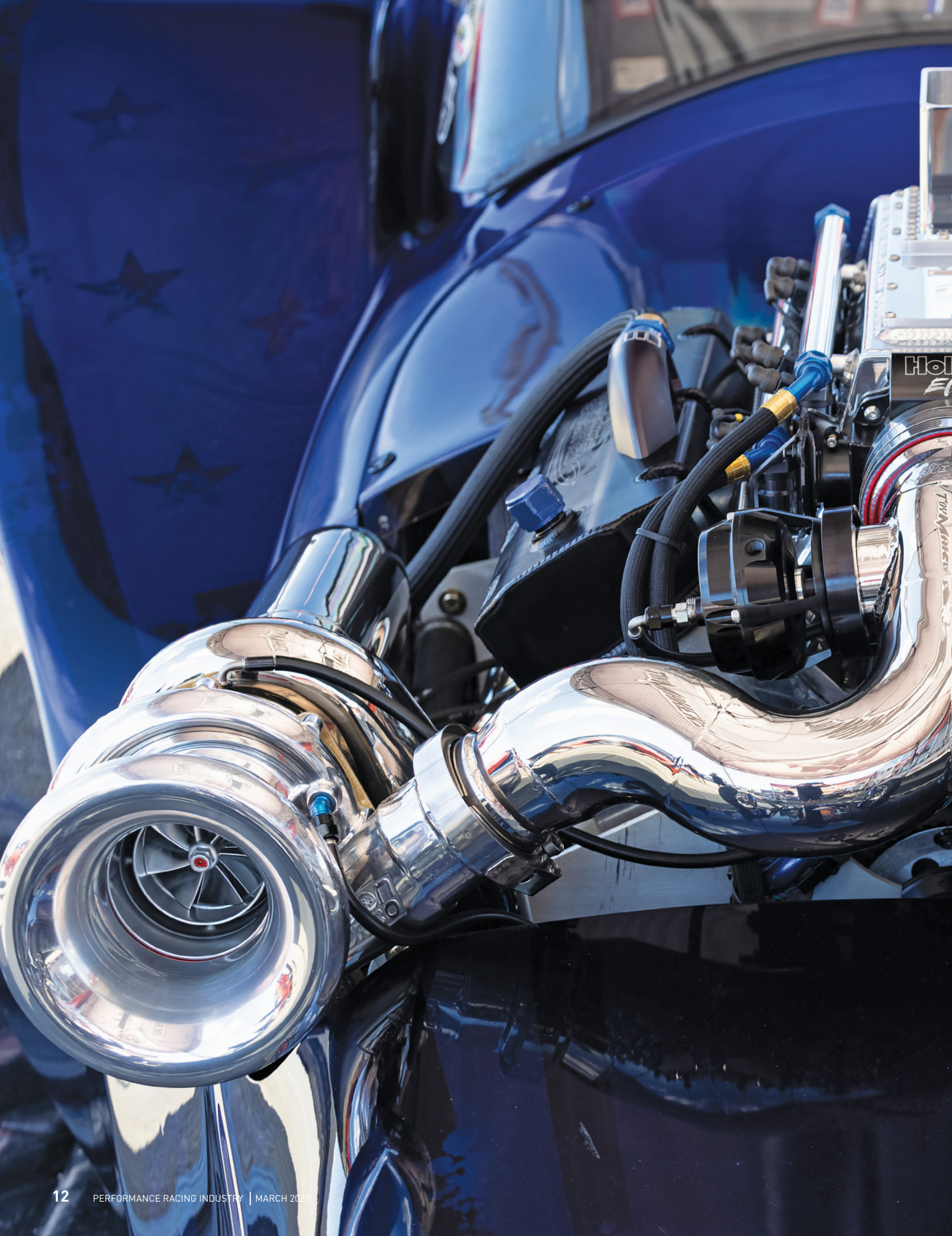

LEAD POSITION

While turbochargers are the power adder of choice for many competitors, achieving the best horsepower results isn't always a matter of racers "just buying the biggest one they can afford," according to one industry insider. Factors ranging from the size and location of wastegates, to inlet and outlet pressure ratios, to preventing debris or foreign objects from entering the system must all be considered when the goal is optimizing performance. In our report titled "Defeating Turbo Lag" beginning on page 82, we examine seven of the most common reasons racers may not be realizing the full potential of their turbo setups. And, as an added bonus, we've also highlighted a few of the combinations on display at the latest PRI Trade Show that especially caught our attention (and maybe yours as well).

ASK THE EXPERTS

ENGINE OIL ADDITIVES

Learn how to reduce friction under the hood, along with the factors that'll help racers arrive at a solution that's optimal for their particular application.

By Drew Hardin

With unpronounceable ingredients like molybdenum, zinc dialkyldithiophosphate, and polyalphaolefin, is it any wonder that engine oil and its additives can be mysterious and confusing? To explain these and other tribological terms and shed light on how to best use them, we spoke with representatives from some of today's top lubricant companies specializing in racing oils.

At Hot Shot's Secret, "Our goal is to slow the rate at which the engines eat themselves," said a company contact, who explained that "horsepower gains are just a byproduct of an effective racing oil freeing up horsepower by reducing wear." Pictured here is Hot Shot's Secret's FR3 Friction Reducer, which has been formulated using carbon nanotechnology.

"A race engine generally operates under tight tolerances and extreme horsepower loads, and under those conditions wear takes place," said Kyle Fischer of Hot Shot's Secret, Mt. Gilead, Ohio. "Our goal is to slow the rate at which the engines eat themselves. We want our customers to stay on track all year and not worry about refreshing their motors multiple times a season."

While much attention is paid to oil additives, high-quality base oil is critical for race engine protection, said Danny Vaca of LAT Racing Oils, Orange, California. Base oils are categorized into five groups. The traditional synthetic oils are Groups IV and V, the polyalphaolefins (PAOs) and esters that LAT Racing Oils uses as its base oil, he said. "The man-made synthetics have film strength, molecule-size consistency, and lubricity that are far superior and unmatched by mineral oils."

Of the anti-wear and friction-reducing additives used in race oil, one of the most common anti-wear agents is zinc. In a race application, "we beef up the zinc package far more than in a standard passenger car oil because of all the extra anti-wear that's needed," Fischer said. "Probably 98% of the industry uses ZDDP," a phosphorous-based zinc. Hot Shot's Secret formulates its oil with a sulfur-based zinc which, Fischer admitted, is expensive but is also "a better zinc agent. We can use less zinc when it's sulfur-based, which leaves room for more good stuff for our tribologists to add to the package."

While a certain zinc threshold is good, too much zinc "will break down the oil," Fischer said. One of ZDDP's beneficial properties is as an anti-oxidant, "but too much ZDDP does the opposite and oxidizes the oil. Once oxidation starts, the oil will shear, come out of grade, and lose all its protective qualities." For that reason, he advised racers against "making their own racing oil by really jacking up the ZDDP package. Leave the lubricant blending to the experts."

Molybdenum, a metal better known as moly, is a popular friction reducer. LAT Racing Oils' liquid friction reducer additive—the "LFR" on the bottle label—is "a mixture of moly, boron, and other friction modifiers," Vaca said. The amounts are carefully controlled because, as with ZDDP, too much of a friction reducer can be harmful to power production. "Some people will over-treat an oil, thinking more is always better, but it's not. Not carefully balancing formula components and instead adding too much friction modifier is going to negatively affect ring seal and not be able to hold compression."

Hot Shot's Secret formulated its FR3 Friction Reducer using carbon nanotechnology, Fischer said. The nanoparticles in FR3 are

Racers who produce an extreme amount of horsepower are encouraged to communicate directly with their oil suppliers, gain a clear understanding "about what the oil contains, and get good technical support for their products," said our source at LAT Racing Oils. "Do the research," he added, "[and] ask questions."

"microscopic carbon balls" that will "find a machining mark in a new engine or a wear mark in an engine with some run time on it and fill them in, making a flat film layer. That allows us to build nano lubricant on top of that film layer to protect both surfaces from touching."

The choice of oil additives can vary by racing discipline, Vaca said. "A road race engine can use synthetic or conventional oil, which will work very well. A drag race engine requires a much higher-end oil for maximum performance, like a Group IV or V, because of the high rpm. The road race engine is also going to need more of a detergent pack to keep that oil healthy over a longer period of time than a drag car. The drag racer changes oil every three to four passes, while the road racer changes their oil every three to four races."

To Jeff Green of Blud Lubricants in Medina, Ohio, it's not the racing but the "fuel type that's going to drive the product put into that engine. If someone is running an alcohol dragster and uses a conventional oil, the detergents in that oil will hold water in there and cause all kinds of issues. Whereas an alcohol oil has very few detergents in it for that reason." Conversely, a diesel engine "needs more detergents because of the particles it's producing during the combustion process." And nitro? "Nitro's tough on any oil," Green admitted. "It needs an alcohol oil, but it has to be changed much more often. Nitro destroys the oil."

Ultimately, all of our sources agreed that communication with your oil supplier is the best way to arrive at an oil additive package that's right for a particular race vehicle.

"High-end racers who produce an extreme amount of horsepower need to ask questions of the oil companies about what the oil contains and get good technical support for their products," advised Vaca. "Do the research. Ask questions. I'd love to sell you my most expensive oil, but that may not be what you need."

"We at Blud have a very extensive support program for racers to make sure they're getting the right oil," said Green. "Talk to the oil company. I love hearing from racers. My favorite part is talking to the guys."

The research should begin with an oil analysis, Fischer said. "Get a baseline. Let's see how the oil is performing and if we can improve on that. By improvement, I'm talking about particle count. These guys love to see horsepower gains, and we show them all the time. But horsepower gains are just a byproduct of an effective racing oil freeing up horsepower by reducing wear. I want to see that particle count in an oil analysis drop. I want to see the engine eating itself less by the changes we're making." PRI

SOURCES

Blud Lubricants
bludlubricants.com

Hot Shot's Secret
hotshotsecret.com

LAT Racing Oils
latracingoils.com

STOP DOING THAT...DO THIS INSTEAD

DRIVER DEVELOPMENT

An urgency to compete in the top echelons of motorsports often prevents young racers from gaining the experience needed to reach their full potential.

By Jim Donnelly

Auto racing is all about going faster than everyone else. And most realize that the best habits are learned young. Any effective driver-development program imparts skills from car control to self-marketing. However, it's the pure, going-fast part that can pose a problem.

It happens when a student is trying—or urged to try—to go fast too soon. The pace, and level, of development is crucial in determining whether a young driver ascends. Push too hard, and the results can be wadded-up equipment, impatient backers, and a terminally crestfallen prospective prodigy.

"A lot of the mistakes that the kids make really have more to do with the parents," said Michael Faulk of Lee Faulk Racing and Development, Denver, North Carolina, which has counted Tanner Gray, Anthony Alfredo, and Kyle Larson among recent NASCAR aspirants. "At 13 years old, they don't really know what they need to be doing yet. The decision makers behind them—parents, sponsors, whatever—try to rush them through the ranks too quickly, figuring they've got to get them into the Truck series by the time they're 16. If they just stay in a Late Model or developmental program for two or three years, get a lot of good experience, they'll do better when they move up to the next level."

Alfredo enjoyed measurable success, even at the NASCAR Cup level, after spending three years in regional Late Models with Faulk. Those laps, more than simulator time, create a driver who can communicate effectively with a crew chief. "It's all about laps," Faulk said. "That and being at the shop. Those are the ones who get there."

Robert Wright, partner in Salem, New Hampshire-based Formula Race Promotions, sees the most fruitful path leading from karting through formula cars. He echoed Faulk's homily about being too upwardly mobile. "The really spectacular drivers, you see them coming at a very early age," he said. "They'll be noticed wherever they race. By definition, they almost have to come up through karting. One of the biggest mistakes happens when kids come out of karting and the parents, who aren't racers themselves, let them come out and they're not ready for it. They blow their money and then disappear."

Wright sees three commonly made mistakes: "Spending the money in the wrong place early, not getting enough seat time by not spending the money properly and getting enamored with the glitter and glitz. They're not focusing on the core competencies. These kids need to get their training where nobody is watching, like in Formula 1600."

The most common mistakes parents make are spending money unwisely, not getting their child adequate seat time, and becoming "enamored with the glitter and glitz," said our source at Formula Race Promotions (FRP). "They're not focusing on the core competencies. These kids need to get their training where nobody is watching, like in Formula 1600." Pictured here is 14-year-old Austin Hill, 2021 FRP Formula Atlantic champion and FX Hoosier Super Tour champion.

At BMR Drivers Academy in Roseville, California, principal Bill McAnally has been doing NASCAR-centric training for decades involving drivers ranging from a young Clint Bowyer to Cole Custer, Chase Briscoe, and Hailie Deegan. A highly experienced mentor, McAnally emphasizes professionalism and patience with his charges.

"Drivers need to accomplish one step at a time, winning races at that level, before they move on," he explained. "Young drivers in a hurry move too quick, and then they're not successful. NASCAR has a great ladder system if they just follow the steps. Some win a race in a Late Model and then want to go to Trucks or ARCA. They have to earn their accomplishments at the first level first."

Assuming a young driver has IndyCar dreams, the accepted career path has been the Road to Indy program conducted by Andersen Promotions in Palmetto, Florida. The traditional ascent encompasses USF2000, the Indy Pro 2000 Championship and then Indy Lights presented by Cooper Tire.

Development director Rob Howden said USF2000 is now so competitive that a new layer of training outside the official Road to Indy ladder, the USF Juniors, will use HPD-powered Ligier F4 chassis. Howden echoed the moving-too-fast caution, adding, "With each level of competition, drivers are faced with more, and more difficult, challenges. Going from karts to cars is much different because the car is dimensionally larger, so they struggle with close-contact racing, plus now they're dealing with aero, too.

"Do a significant amount of car testing and have the budget before attempting any wheel-to-wheel racing," Howden advised.

Road to Indy instructor Jeff Braun, a longtime race engineer and the father of NASCAR and IMSA veteran Colin Braun, takes Howden's logic considerably further: "Find a series where they do decently well, then drop back a couple of levels, and use the resources to test, test, test. The resulting wins, not consistent mid-pack finishes, will get a driver noticed.

Bill McAnally, pictured at right with, from left, Hailie Deegan, Derek Kraus, and Cole Rouse, stresses professionalism and patience, noting that young drivers must "accomplish one step at a time, winning races at that level, before they move on."

"Nobody goes, 'Oh look, that guy ran 10th.' They have to win," he added. "Scrape the money together, drop back two series, and then go kick everybody's butt. That gets attention. If they can afford two or three Indy Lights races, my suggestion would be, do one race. Pick the race and the track. Then spend the money for the other two races to test there instead. Test like crazy. Dial it in. Know it perfectly. People will notice a podium out of that race because they exceeded everyone's expectations." PRI

SOURCES

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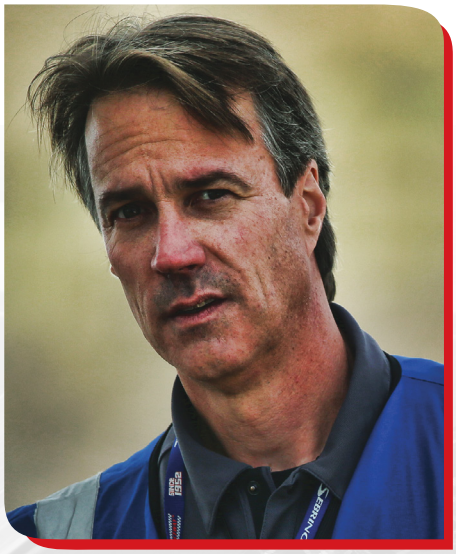
MAKE THE CASE

TOUGHER ON PARTS: ENDURANCE RACING VS. TIME TRIALS

Endurance racing has long been considered the ultimate crucible for vehicle components, but time trial events can put parts through an incredible amount of stress in a very short amount of time, and the flat-out nature of the format leaves little room for mechanical sympathy. While our advocates represent sanctioning bodies that play host to both styles of racing, they do offer different perspectives regarding which discipline is the most demanding test of durability.

By Bradley Iger



ENDURANCE RACING—TOUGHER ON PARTS

Brett Becker, National Auto Sport Association (NASA)

"THE PARTS THAT EARN A REPUTATION FOR BEING UNBREAKABLE TEND TO BE THE COMPONENTS OF CHOICE FOR MOST ENDURANCE TEAMS."

There's no doubt in my mind that endurance racing demands more of race cars and their components than time trials do just by virtue of the duration of the stints. Most endurance races are at least three hours long. Any event longer than that is usually going to involve more than one driver, which means there is the possibility at least two different driving styles will have an effect on durability as well.

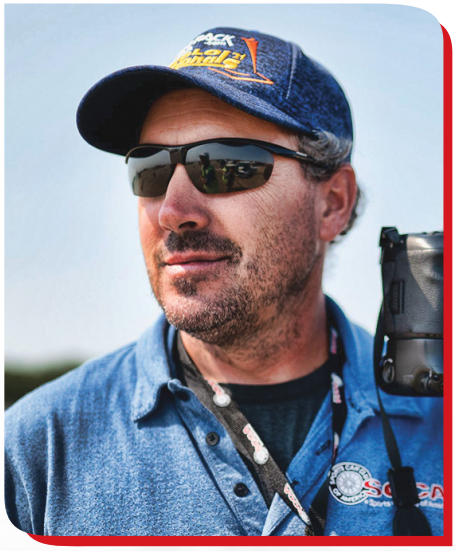
It's just hours and hours at a time of driving at race pace, and the shorter the enduro event is, the more intense the driving tends to be. From what we've seen in our Western Endurance Racing Challenge series, the three-hour races run at nearly the same pace as a 30-minute sprint race.

With endurance racing, there are essentially two main considerations when it comes to parts and overall durability. There are consumables—brakes, tires, and other components like that. Those parts are seeing a lot of wear over the course of one race. The tires are basically being subjected to one heat cycle that's three hours or more, and the brakes are just heated and cooled again and again with very few pauses along the way. It's a situation that has required manufacturers to respond in turn. Companies like Hawk Performance, for instance, have developed new and more robust pad compounds for endurance racing as a result. That demonstrates that there was a need for a better, more durable part specifically for this type of motorsport.

The other big consideration is the hard parts—transmission gears, shafts, axles—all of the things that have a longer shelf life, but still incur fatigue over time. I've talked to a lot of people about what it takes to prepare for an event like the 25 Hours of Thunderhill, and they all say that they basically have to have a brand new car at the beginning of the race because they're essentially putting an entire season's worth of racing on the car over the course of two calendar days. Axles that would normally last a couple of years in other racing disciplines might only be good for that one race.

The intensity that those parts are subjected to in endurance racing is immense. BMW E36 and E46 chassis are very popular in grassroots endurance racing, but there are elements of those chassis that will actually crack under the stress of this type of application. The tabs where the sway bars mount, the floorpan where the differential mounts, and the strut towers weren't originally designed for the loads they're subjected to in endurance racing, and that's why reinforcement kits for those cars now exist.

Although the format of this type of racing allows the drivers to conserve the car a bit over the course of an event, there will be numerous teams at a race like the 25 Hours of Thunderhill finishing with one working forward gear. There might not be enough time left in the race to replace a transmission, or replace a bad CV shaft, so they just stay out there and do their best to keep the car together just long enough to get over the finish line. Given that, the parts that earn a reputation for being unbreakable tend to be the components of choice for most endurance teams, as opposed to the lightest or otherwise higher-performing options out there.



TIME TRIALS—TOUGHER ON PARTS

Jon Krolewicz, Sports Car Club of America (SCCA)

"A WORLD-CLASS TIME-TRIALS CAR IS MORE AKIN TO A TOP FUEL DRAGSTER THAN AN ENDURANCE RACER IN TERMS OF PARTS LONGEVITY. IT JUST HAS TO LAST FOR THE NEXT 90 SECONDS WITHOUT BLOWING UP."

Colin Chapman once said that the perfect race car turns to dust as soon as it crosses the finish line. Whether it's a flying lap in a time-attack event, 24 hours in an endurance race, or a quarter-mile in a Top Fuel dragster, reliability is critical, but each discipline defines it a bit differently.

Time trials put an incredible amount of stress on everything in the car for the time it's out on track. The engine is on boil, the tires and the brakes are being pushed to their limits—everything is being asked to perform at its absolute maximum. That ultimately equates to more abuse on the parts involved. Although endurance racing is absolutely going to test the durability of components, drivers are factoring that into their larger overall strategy. They're not going 11/10ths all of the time because longevity is one of the highest priorities in an endurance format, whereas the fastest time-attack cars in the world do a slow out lap, absolutely burn it down for lap, and then basically coast into the pits. Those cars don't have anything left at the end of one of those sessions because they're being pushed right to their breaking point. It's not about making it last, it's about making it fast.

With that in mind, the durability concerns are different. At the pointy end of time attack is usually an engine combination with forced induction, so there's a lot of stress on engine components. Splitting a header is something that might happen in an endurance car after four or five seasons of racing, but we were pressure-testing our headers after each weekend on our time-attack car. Because we're running at the edge of the car's performance envelope, we're dealing with dramatic spikes in heat and pressure rather than levels that are sustained for extended periods of time.

Durability is an important factor for any race car, and weight is also a really big consideration when it comes to time trials, but the core goal is to build a combination that's going to yield maximum performance right away. In an endurance race it's okay if it takes a little while for components to get up to temperature, but time trials require components that can take the abuse immediately and perform at peak levels. A world-class time-trials car is more akin to a Top Fuel dragster than an endurance racer in terms of parts longevity. It just has to last for the next 90 seconds without blowing up. PRI

EDITORS' CHOICE

Hundreds of new product announcements cross the desks of PRI editors each month. Following are our top picks for March.

OEM REPLACEMENT HEAD GASKETS FOR LS & LT ENGINES

ENGINE PRO

enginepro.com

Engine Pro of Wheat Ridge, Colorado, has introduced a new line of OEM replacement multi-layer steel (MLS) gaskets for GM's LS and LT engine families that are available in three, five, or seven layers to accommodate different power levels.

"There's nothing hotter than the LS market," noted Jessie Jones. "With all the different things people are doing with this engine, we felt it was important to offer a choice."

In the Engine Pro catalog, customers can reference the OEM gasket number as well as engine codes and engine dimensions to find the correct replacement, or they can check the performance chart where they find the five- and seven-layer applications. The catalog is available as a free download from the website or as a printed catalog available at any Engine Pro warehouse.

"We try to make it as easy as possible during the selection. The charts in the catalog should answer everyone's questions," said Jones.

These cylinder head gaskets are constructed from beaded, elastomer-coated spring-steel layers and are designed to provide high thermal stability in extreme conditions, including nitrous, supercharged, and turbocharged applications. Engine Pro also offers other LS gaskets, including oil pan, timing cover, valve cover, and exhaust. *—Mike Magda*

AIR-COOLED DRIVER'S SEAT SYSTEM

SPEED SEAT FACTORY

speedseatfactory.com

This new driver cooling system from Speed Seat Factory in Delafield, Wisconsin, is easy to install and designed to provide an unlimited supply of air during a race.

"It took us two years to develop the blower motor alone," said Gayle Gaborsky.

The permanent-magnet, 12-volt motor forces air through a splitter, which is connected to the Speed Seat system by two flexible hoses. The Speed Seat cooling component is constructed of a honeycomb mesh that allows air to be dispersed through the entire seat. As the driver sweats, the cool air stimulates evaporation, which helps keep the occupant cool.

"The mesh is also treated with a fire retardant," said Gaborsky. "It's easily attached to the seat with hook-and-loop."

A three-outlet splitter can also be utilized to supply air to a helmet designed for air cooling. This splitter features two 1.5-inch outlets and a 1.25-inch outlet for the helmet.

"All the air blows straight through to the driver," noted Gaborsky. "There's no return."

The motor has a built-in mounting flange, and the system comes with a pair of 4-foot hoses. An air filter is also available. The system is easily adaptable to endurance vehicles that use seat padding to compensate for different driver sizes. *—Mike Magda*

COMPETITION SERIES INTAKE MANIFOLD FOR CUMMINS 5.9L

BD DIESEL

us.bddiesel.com

Savvy owners of 2003–2007 Ram trucks with the 5.9-liter common-rail Cummins diesel know that the grid heater plate imposes a significant air restriction and impedes performance modifications. BD Diesel of Blaine, Washington, now offers a competition intake manifold that solves that problem.

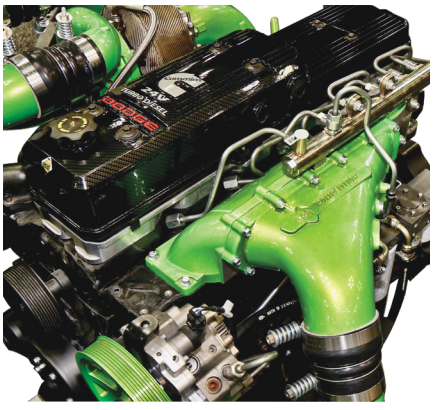
"It's a two-piece design and it's designed for race applications," explained Jim Pace. "The big benefit is the considerable savings in machine work. Racers don't have to shave off the heater grid that's integrated into the cylinder head."

BD Diesel's new design allows the intake manifold to be attached directly to the cylinder head plenum, which then improves flow distribution to all cylinders and reduces system pressure drops.

"There is significantly more airflow and even air distribution," added Pace.

The intake is designed to support larger high-performance turbochargers and dual CP3 kits. It comes with auxiliary ports for sensors, and the kit includes a charge pipe, CCV relocation hose, required extension harness, and new fuel pipes.

"The fuel rail is not included," noted Pace, who added that racers will need one "from the 6.7-liter Cummins. But the new fuel pipes take care of all the rerouting needed for the intake." *—Mike Magda*



MOPAR DRAG RACING FRONT COIL-OVER CONVERSION

QA1

qa1.net

QA1 in Lakeville, Minnesota, offers a drag-racing version of its front coil-over conversion kits for Mopar A-, B-, and E-body applications.

"This kit enables Mopar owners to take their cars to the next level," explained Dave Kass. "With our clean-sheet design, everything is optimized from the start."

The QA1 kit replaces the factory front torsion-bar setup that limits pickup-point locations and potential performance improvements. It's constructed from steel tubing that reduces weight over the factory K-member and allows for big-tube headers. The modular motor mounts support a wide range of engines, including the Gen III Hemi.

The kit features tubular control arms, Mustang II-style spindles, power rack-and-pinion steering, and a choice of single or double coil-overs.

"It's a complete bolt-on kit, there's no cutting or welding," noted Kass. "We can custom tailor spring rates for any purpose."

The drag racing version has a lighter spring rate for the front to improve weight transfer by reducing deflection, and the drag kit can offer up to a 2-inch drop.

For Pro Touring or autocross racers, there's a handling configuration that uses poly bushings on the lower control arm to improve cornering. Those kits can be ordered with up to a 4-inch drop. The QA1 kits offer other options in brake and sway bar choices. *—Mike Magda*

TRIPLE-DISC, BOLT-TOGETHER 8HP70 TORQUE CONVERTER

TCI AUTOMOTIVE

tciauto.com

Racers can adjust the stall speed on their Gen III Hemi vehicle at home with TCI Automotive's newest triple-disc, bolt-together torque converters for 8HP70 transmissions.

"Higher stall speeds will complement a bigger cam and other engine modifications," reported Rusty Samsell of the Ashland, Mississippi-based company. "This triple disc will hold a lot of torque."

The billet, self-serviceable design also features a lockup function. Removing the billet front provides access to the entire lockup assembly, turbine, stator, and bearings for servicing. There's no need to ship it back to the factory since cutting and welding are not required.

The lockup clutch features the latest-generation carbon friction materials with a high torque capacity. The team at TCI reported the torque converter can handle more than 1,000 horsepower and is designed to withstand the punishment of continuous slip lock-up control.

With CNC-machined billet construction, this converter offers increased strength over traditional stamped-steel designs. Other features include a furnaced-brazed impeller and TIG-brazed turbine fins. As with all TCI converters, this model has the HDT thermal coating to dissipate heat more quickly.

"It's a drop-in for Dodge Chargers and Challengers," noted Samsell. When paired with a Comp Cams Stage 3 HRT cam, tests have shown 0–60 times will drop as much as a full second. *—Mike Magda*

DRAG RACE ALUMINUM THIRD-MEMBER CASE

SPEEDMASTER

speedmaster79.com

Constructed from 201-T6 aluminum, this new third-member case from Speedmaster in Rialto, California, supports all Ford 9-inch differentials. Even though the nose is extended by .750 inches, it will work with all 9-inch ring and pinions.

"It can also handle oversized ring and pinions," noted Jason Kencevski. "Trophy truck racers pushed for the development of this product, along with drag racers and street outlaws."

A key feature is the CNC-machined 7075-T6 billet bearing cap and the 9/16-inch through-bolt design to secure the caps and increase overall strength. The carrier bearing diameter is 4 inches.

Also, the case can be used with standard or aftermarket pinion supports of either 5- or 10-bolt design.

"We added extra webbing in the areas of the case that were known for failure," explained Kencevski. "Racers want strength and light weight."

This new case also works well with Speedmaster's 40-spline limited-slip differential in addition to other popular LSDs, lockers, and spools. *—Mike Magda*

LSXHR 103-MM INTAKE MANIFOLD FOR LS CATHEDRAL-PORT

FAST

fuelairspark.com

Leveraging the popularity of its first LS polymer intake manifold, FAST in Memphis, Tennessee, has designed a newer version with boosted engines in mind. Designated as the LSXHR, it comes with a 103-mm throttle-body opening that can be port matched up to 105 mm. Its revised polymer construction has been rated for up to 45 psi of continuous boost pressure.

"Even though owners were putting boost to the original, there was a real need to build an intake designed for boost," said Mark Campbell. "This one is designed for boost. It's taking the original to the next level."

The manifold can support dual fuel injectors on each intake runner. It also offers the flexibility of changing the velocity stacks inside the plenum. Tall stacks are standard in the intake, but medium and short stacks are available and can easily be swapped in place, giving racers the ability to tune the intake for their particular application.

"Racers sometimes like the long runner to help build torque needed to bring up the engine on boost," added Campbell.

The manifold has been optimized to make power from 5,000–7,500 rpm. Tests reveal a 20-plus horsepower gain over competitive tunnel-ram intakes.

Included in the manifold kit are custom fuel rails and all necessary hardware. *—Mike Magda*

NEWLY APPOINTED

BRIAN REESE

This industry veteran's career has been steeped in gasoline and tire smoke, with piston-engine roar for a soundtrack. Now, he has a vision for steering an EV performance tuner brand (spoiler alert: it includes racing).

By Jim Koscs

It's not unusual for the top executive of a tuner brand to drive a car that tests the company's wares. In this case, Brian Reese chose the quickest accelerating production car in the world, the 1,020-horsepower Tesla Model S Plaid. (*MotorTrend* clocked the Plaid's quarter-mile time in 9.25 seconds at 152.6 mph.)

Many know Reese from his stints as CEO of Race Winning Brands and Driven Lighting Group, and other racing and performance brands including Edelbrock, Craftsman, and Roush Performance. He recently took on the role of CEO of T Sportline, a leading designer, marketer, distributor, and e-commerce retailer of parts and accessories for Tesla and other electric vehicles.

While T Sportline is expanding its products to other EVs, Tesla by itself presents a huge market. The EV maker reported worldwide deliveries of 936,172 vehicles in 2021, a staggering 87% increase over the 499,647 it reported in 2020. That is a quantum leap from the 22,477 cars Tesla delivered in 2013, the year T Sportline started.

Reese recently spoke with PRI about his goals and vision for the brand, and the market for EV performance as a whole.

PRI: Since you have a background in traditional motorsports, what are you most looking forward to being involved in the electric vehicle market and T Sportline?
Reese: It is a pioneering time in the EV market, which is a lot of fun, since everything is new. Tesla has already proven that EVs can be intoxicatingly fast. Now everything that goes with fast, like wheels and tires, brakes, suspension, and aero parts, is all open for development. That is where T Sportline will focus.
PRI: Are there plans to expand into motorsports and the EV racing segment?
Reese: Yes, for sure. We're working on that right now. My Tesla Model S Plaid will be a rolling R&D testbed for T Sportline. And, the company owns one of each Tesla model for product development.
PRI: What do you see as the biggest challenges ahead of you?
Reese: The same challenges facing the entire automotive aftermarket: preserving the freedom to modify and personalize vehicles and convert to racing use if desired.
PRI: What are your top strategic goals for the next 12 months?
Reese: Hiring top talent to support the growth of T Sportline and putting the necessary infrastructure in the company to support the scaling.

"IT IS A PIONEERING TIME IN THE EV MARKET, WHICH IS A LOT OF FUN, SINCE EVERYTHING IS NEW."

BRIAN REESE

TITLE:
Chief Executive Officer

ORGANIZATION:
T Sportline

HOMETOWN:
Atlanta, Georgia

FAST FACTS:
Brian Reese currently serves on the SEMA Board of Directors and is also the co-founder and partner in a company making accessories for the popular Peloton exercise bike.

PRI: How can the racing industry be more accommodating to the EV category?
Reese: By creating classes for EVs and welcoming EVs to the community of racing.
PRI: How does your personal interest in EVs shape your approach to how you'll steer T Sportline?
Reese: The big pivot point for me was when EVs became fast. That made them cool.

The shift to EVs is completely inevitable. Every OEM is committed to making the transition. They're racing to get there, actually battling to get there as quickly as possible. It's pretty obvious that the future of the automobile is electric. It's a great time to get in at the beginning and build the business in parallel with the adoption of EVs.
PRI: Are there any critical differences between working for an EV-oriented performance brand and one more aligned with "traditional" performance vehicles?
Reese: I've been making cars go faster, turn better, and look better my entire career. This is no different. The only difference is it's not gasoline or diesel. It runs on batteries. Other than that, it's the same.
PRI: What do you see as the main barriers for acceptance from the motorsports' community regarding EV racing?
Reese: The powertrain classification will need to be architected in an electric vehicle sense. Things like cubic inch rules, intake restrictors, or gear rules obviously won't apply.
PRI: What would you say to people

"IT'S A GREAT TIME TO GET IN AT THE BEGINNING AND BUILD THE BUSINESS IN PARALLEL WITH THE ADOPTION OF EVs."

in this industry who are unsure of the opportunities in the EV performance field?

Reese: I think opportunities are there for anyone in the aftermarket. It's a change in fuel source, but the other elements of customer interest are the same. EV enthusiasts want to modify their cars to go faster, turn better, and race. They want to personalize their cars.

PRI: What's your most gratifying professional accomplishment?

Reese: Successfully mentoring many talented people in the industry, who have achieved incredible success, both personally and professionally.

PRI: Who has been the biggest influence in either your professional or personal life and why?

Reese: It is hard to single out any one influencer. I am a product of a collection of mentors from the entire course of my career. I have benefited tremendously from working for several different companies and owners, each of which had unique influences on me.

PRI: Who inspires you, and why?

Reese: Endurance athletes, because their mental toughness to endure the uncomfortable is amazing.

PRI: Excluding your cellphone/tablet/computer, what's one thing you can't live without? Why?

Reese: My family, because they truly are my life. PRI

INDUSTRY INSIGHTS

ROD REID

This longtime team manager and businessman is investing in the future of motorsports through his NXG Youth Motorsports Academy, which removes barriers to the sport, especially for children of color, and teaches them valuable life skills including STEM education, mechanics, and leadership training.

By Jeff Zurschmeide

Ask any racing professional about the future of motorsports and they'll talk about the challenge of getting young people involved. It's not just the cost of a vehicle and equipment; there's a considerable investment in experience required to fully participate in any facet of racing. The barriers to entry into the sport are even higher for young people of limited means.

Rod Reid of Indianapolis, Indiana, has a program to bring young racers around those barriers, and to give them a solid grounding in the complete picture of motorsports. Reid's Nexgeneracers (NXG) Youth Motorsports Academy takes primarily kids of color from the Indianapolis area and delivers a rigorous curriculum including mechanics, racing skills, finance, and STEM (science, technology, engineering, and math) proficiency, covering the whole sport of racing.

Reid didn't come to NXG without experience of his own. After a successful business career, he was a team manager in Formula Ford and Super Vee starting in the late 1970s. In 2021, Reid's Force Indy team entered the USF2000 series, where it earned a trip to victory lane; this year, the team jumps to Indy Lights.

"MY OBJECTIVE IS TO NOT TEACH YOUR SON OR DAUGHTER HOW TO ROAD RACE. IT'S REALLY TEACHING THEM SOME LIFE SKILLS THAT THEY CAN TAKE AWAY."

PRI: Your program is all about helping kids get into racing, but how did you get into motorsports?

"WHAT MOTIVATES ME IS THAT POSSIBILITY OF BRINGING A YOUNG PERSON INTO THE SPORT AND SEEING THEM FLOURISH."

Reid: I was not at all aware of motorsports as a youngster, until my family moved to Indianapolis. My family wasn't really into it, but for some reason I just gravitated toward it, maybe since I liked cars. When I was 17, I wanted to go to the 500, so I became a yellow shirt volunteer. I worked the night before the race, and then that morning I was off. That was my first 500, peering over the fence because I didn't have a seat. I thought it was the greatest thing in the world!

Then I went on to Purdue University, where I studied engineering and then worked for an engineering firm. I started going to the 500 at that time as a fan. I didn't get involved beyond that until I started my own business doing advertising and branding.

PRI: What pulled you into active participation?

Reid: I was doing some advertising work with a home fuel oil company. There was a young man who approached the owner of the company about sponsorship in racing. His name was Charles Wilson. Because we handled the advertising for the company, the owner sent him to us. I met this young man, and we went through his portfolio and his request for sponsorship. It didn't fit for that company, but I told Charles, "I'm interested in what you're doing. I think I can help you raise money." That's how I got started, doing sponsorships for Charles Wilson. We raised a few bucks, and eventually got to the point where we became best friends."

PRI: How did this lead to Nexgeneracers?

Reid: I was there when Willy T. Ribbs came to the Indy 500 in 1991. I was thinking the tide had turned, and we were going to start seeing other African-American folks come into the sport. But here we are 30 years later, and there's only been one other African-American, George Mack, to run the 500. That's really, really sad. Charles and I thought, if we're going to have African-Americans in motorsports, they have to start when they're young. Whether it's drivers, mechanics, what have you. That's how we started.

PRI: What was the biggest challenge to getting started?

Reid: We realized, very quickly, something that I preach today: There is a major cultural divide. Even if they don't play basketball, the average Black kid knows what it is. They understand it. In our communities, we have no clue what racing is. Even those who may go to a concession center and run a go-kart, they don't understand what this is all about. They just jump in and go, "Wow. This is racing. This is fun." They don't understand the business side, or even the sports side, from a competitive perspective.

We decided that the best way to teach kids about motorsports would be to start with go-karts. It took us from 2000 to 2006 to start the program. We used our own money, of course. We held our first class in September of 2006 with kids from local schools and community groups.

Rod Reid created the NXG Youth Motorsports Academy to expose young people to motorsports while teaching them valuable life skills that can serve them in any pursuit.

PRI: How has the program grown since 2006?
Reid: We are celebrating 16 years, and more than 2,400 kids have come through the program. We quickly found out that we could use this motorsports platform as a way to teach kids some things that were much more sustainable in the long run, like STEM education and life skills. Our early curriculum would have been very similar to a Skip Barber Racing School: "Let's get you in there, teach you all about the track and how to drive, and race." We morphed very quickly to, "Let's talk more about math and science, and geometry related to racing. Let's talk about health and nutrition of a race car driver. Let's talk about taking care of equipment." Those are life skills that can be used way beyond racing.
PRI: The program is designed around African-American kids, but can anyone attend?
Reid: Obviously I target the African-American community, but we're open to anyone. We probably have about 4% or 5% non-Black kids. I get a lot of the white parents who say, "I really want a program like this for my kid because he's been running go-karts since he was five, but he doesn't know how to drive. Can you teach him how to road race?" Yes, I can, but that's not my objective. My objective is to not teach your son or daughter how to road race. It's really teaching them some life skills that they can take away. I want the kid who has never been in a go-kart before."
PRI: Driving is great, but even talented drivers rarely reach the big time. I'm interested in the part where we teach kids about all the other opportunities in racing.

Although the NXG program was created primarily for urban African-Americans, it's open to anyone. "We probably have about 4% or 5% non-Black kids," said Rod Reid.

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Reid: I say, keep the dream. If your A-plan is to be a race car driver, I'm not discouraging you. I'm just saying, look at the reality. Does your family have the funds for you to do it, even at a go-kart level? There are kids spending $60,000 or $70,000 a year for go-karting. Our families don't have that kind of money. I tell the kids, you can become someone who maybe learns technology, can be in timing and scoring, or maybe work in the office at a motorsports organization like IMS [Indianapolis Motor Speedway]. Then, if you get some money and you want to spend it in racing, see what happens.

PRI: How can a kid grow in racing through your program?

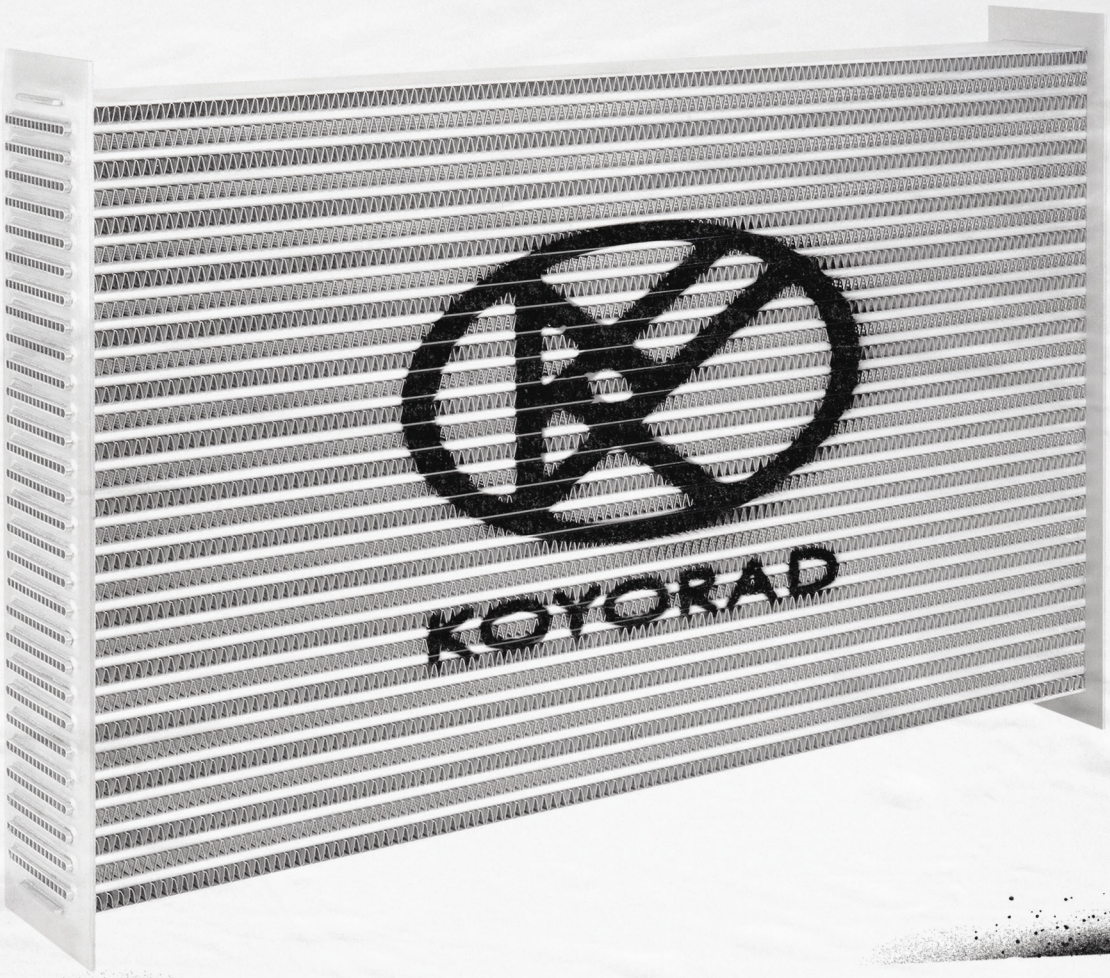
Reid: What motivates me is that possibility of bringing a young person into the sport and seeing them flourish. Right now, we have three programs. We have the Academy, which is introductory. Then, I have our own little race series, the Grand Prix series. Those kids who graduate from the Academy, usually they do 10 events in a season. They race for points,

> *"WE ARE CELEBRATING 16 YEARS, AND MORE THAN 2,400 KIDS HAVE COME THROUGH THE PROGRAM."*

and we crown a champion, but the highest trophy goes to our Driver of the Year. The Driver of the Year is a person who has worked hard, on and off the track. Now we have a new program called Path-to-Pro. That is where we help our graduates find internships.

PRI: There's no set fee to put a kid into your NXG Youth Motorsports Academy. How do you fund all the costs to be able to offer that curriculum to a kid whose family can't pay for it?

Reid: We have been really blessed with some really strong sponsorship. I've got to give a real big shout out to Lucas Oil. We met Forrest Lucas back in 2005. He really liked the idea that we were doing good things for kids. He has been our greatest benefactor.



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Beginning as a 17-year-old Indy 500 volunteer, Rod Reid honed his skills in motorsports and business for decades before launching NXG in 2006.

He has provided funds for us since 2006. All 15 years, he's been our predominant sponsor. That in turn allowed us to get sponsorship with Honda, that we've enjoyed now every year. Honda has been our second-longest-running sponsor, providing us motors for the go-karts. We have anonymous people who will send us $1,000 gifts. I also include IMS and IndyCar. They don't give us cash, but they allow us to be on-site and provide us a lot of support there.

PRI: If you had all the money you needed, what would Nexgeneracers be doing?

Reid: When we started, I wrote down our vision. Our vision was to be a national program that we would have in Indianapolis, Detroit, St. Louis, Dallas, St. Pete, Portland, LA, or any place that has an urban environment. Last year we introduced our first city outside of Indianapolis, and that was Detroit. We did two events there, and it was extremely well received. We're going to do four events this year, and we're going to keep increasing until we can actually have a similar program to Indianapolis, a nine-month program, in Detroit. I'm looking at St. Louis, looking at Dallas, any place that I can get local support. That's my vision to have NXG Youth Motorsports across the country.

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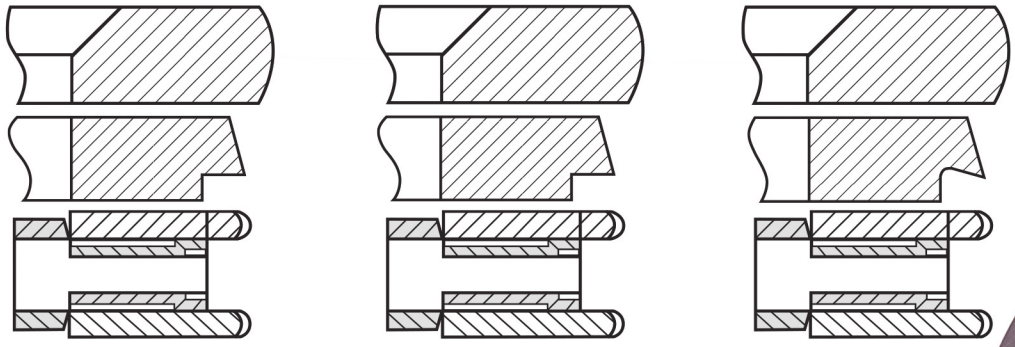

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4.035	20-GNHD4035K8	20-GNHM4035K8	20-GNHS4035K8
4.045	20-GNHD4045K8	20-GNHM4045K8	20-GNHS4045K8
4.065	20-GNHD4065K8	20-GNHM4065K8	20-GNHS4065K8
4.130	20-GNHD4130K8	20-GNHM4130K8	20-GNHS4130K8
4.155	20-GNHD4155K8	20-GNHM4155K8	20-GNHS4155K8
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PRI: How can different motorsports stakeholders engage kids in motorsports?
Reid: One word: Education. When I say education, I'm not necessarily talking about formal; I'm just talking about being informed. If a young person doesn't know that this industry exists as an opportunity, whether it's an opportunity to be a fan, or an opportunity to work in the pit crew, there's no way they will engage. I use this scenario: In school, as a part of exercise, they'll probably pull out a basketball. Those kids could be five years old. Well, I don't have a go-kart to pull out, and I can't go to the corner and run it.

> *"BEING DISCIPLINED, BEING ORGANIZED, AND BEING RESPECTFUL OF EVERYBODY. THAT'S GOING TO MAKE A GOOD LEADER, IN MY OPINION."*

My idea is, you may not be able to run a go-kart on the school parking lot, but you can start with RC cars. If you take a little RC car and say, "Let's take it apart. Let's put it back together. Then we're going to go race it." Look at what's happening. You're teaching motor skills, dexterity, teaching me about a sport. You can teach that, just like you teach basketball.
PRI: It's a tall order to keep a bunch of kids focused and understanding what's going on. What are the keys to good leadership, and what makes a good leader and role model for these kids?
Reid: This sounds really cliche, but you have to love kids. My experience has been, the average person who is a backyard mechanic and works on cars, they aren't necessarily the same person that wants to go out and play with kids. I say play because that's, in essence, what you really are doing. You're teaching, but you're playing with them. There

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are two reasons why kids want to work with us. First, they want to drive the go-karts, and then they want to hang out and tinker on them. The same thing that lures a kid to want to come into the program, the go-kart, is the same thing that lures adults. Then the adults realize that a lot of this is sitting around. You've got to be comfortable sitting there mentoring a kid, talking to them, providing discipline and information to them. It's not glamorous at all.

PRI: What's the most important learning that your kids take back to their communities?

Reid: I think it's discipline and respect. We have a little thing that I wrote when I first started the program. The acronym for kart, K-A-R-T, stands for knowledge, awareness, respect, and thinking. Racing is a thinking person's sport. I put that up on the board and we say it in the first class. That's our mantra.

When they leave us, most kids will say, "Gosh, Coach Reid's really disciplined." They have to walk in a straight line, they all have a uniform on. Think about it: A kid is 12 years old and hasn't walked in a line since kindergarten. We start that way, because I said, this is how you're going to drive. I need you to drive in a line because I'm going to teach you the line.

We use that discipline piece, and then I tell them to respect each other. You can't race against each other unless you respect each other. Otherwise, you'll just run over someone. That gives them good leadership skills. Being disciplined, being organized,

Rod Reid teaches a deep skill set as part of his NXG program. "The acronym for kart, K-A-R-T, stands for knowledge, awareness, respect, and thinking," he explained.

"RACING IS A THINKING PERSON'S SPORT."

and being respectful of everybody. That's going to make a good leader, in my opinion.

PRI: How can the motorsports industry in general be more welcoming to people of color?

Reid: Some don't want to hear it, but I can tell you. First of all, they need to know history. There are people who feel we don't belong there, and that the only reason we're there is because somebody was sympathetic. But we have been involved with racing since the very beginning. Jack Johnson, who was a famous boxer, bought a Thomas Flyer and challenged Barney Oldfield to a race. Nobody knows that. They don't realize that there was Rajo Jack, Charlie Wiggins, Red Oliver, or Wendell Scott. They don't realize that the Colored Speedway Association existed. Back to your question, I think knowing that it's not an anomaly for Blacks to like racing, and to want to be engaged in it. It starts there. Racism is based on ignorance. People look at me and they say, "You got the attention of Roger Penske. It's because of George Floyd." I said, "Absolutely, it's because of George Floyd." I hate to say it, but because he was murdered, it became optical for Black folk. All of a sudden, we could be seen. You wouldn't believe how many calls I got from people in and around motorsports after Floyd got killed. It's because there was that empathy. Now, that's going to go away; I'm realistic about it. People look at this and they think that this whole thing, diversity, equality, and inclusion, is just the flavor of the month. Don't make it the flavor of the month.

PRI: All racers have heroes and role models. Who are yours?

Reid: I don't know that I have a major hero. I think, for me, it's those people who worked hard, but are unrecognized. For example, the Tuskegee Airmen who fought in World War II. I realized what those men sacrificed to do, with very little respect. My heroes are more the folks who work hard, behind the scenes. They didn't do it for glory, they just did it because it was the right thing to do, even in the face of adversity. PRI

SPECIAL REPORT

SHIFTING GEARS

The motorsports industry answered the challenge of the global pandemic, but are there lasting effects from this pivot to health and safety equipment?

By Steve Statham

Few people will ever forget those early days of the COVID-19 pandemic in the spring of 2020. The world came to a grinding halt as individuals, governments, and industry attempted to navigate the uncertainty, fear, and health consequences of the rapidly spreading virus and the response to it by governments worldwide.

However, a number of companies from the motorsports industry sprang into action like it was the final pit stop at the Indianapolis 500. These businesses pivoted from producing racing parts to manufacturing health and safety equipment with sometimes astonishing speed.

To get a sense of the lasting impact (if any) of these excursions into the personal protective equipment (PPE) market, we wanted to follow up with these companies as this month marks two years since the COVID breakout led to disruptions within the American economy and the pandemic disruptions that still linger. Were motorsports companies still making these products? Did that pivot to health and safety equipment deliver any lasting business opportunities? What lessons were learned?

With the company representatives we spoke to, the different stories have very similar elements: a recognition of need for safety equipment, a desire to keep employees working, and a rapid swing into action. And, ultimately, a step back from COVID-related products as demand for racing parts came roaring back. All the companies leveraged their own unique capabilities to get the wheels turning.

THINK FAST

Impact Racing in Indianapolis, Indiana, is a manufacturer of driver suits, racing gloves and footwear, and other related products. Like so many businesses in the spring of 2020, the crew at Impact suddenly found themselves with plenty of free time on their hands.

"March 2020 the world came to a halt," said Ben O'Connor Jr. "As manufacturers of motorsports safety equipment, the wheels screeched to a halt. Nothing was going for us. It wasn't a money thing; people just didn't need anything because they weren't racing."

When the pandemic hit, the motorsports community responded with creative PPE solutions, such as these face shields manufactured by Fleece Performance.

While following the news, O'Connor said he became aware of the shortage of PPE, which sparked an idea. "I thought, 'It sure would be cool if we could do that,' but the FDA requirements to get involved in that—I did some research—are just mind-numbing. The red tape to be able to do that was just nuts. Well, one day they came on and said, 'Hey, we're lifting these restrictions so that companies can get more involved. We're going to remove some of the hurdles for companies to get involved.' From that point, it was 'Game on. We can do this.'"

As a maker of garments, Impact was in an ideal position to address the need for outerwear. "The big thing for us was the gowns. There was a big shortage of gowns as well as all types of things," O'Connor explained. "In our world, in the cut-and-sew world, the two things from a manufacturing perspective that we felt we could do were the masks and gowns." Impact Racing's isolation gowns were designed to block large particle droplets, splatter, and particulate matter, to be used when FDA-cleared gowns or formal surgical gowns were not required.

For some businesses, word spread through personal connections within the medical industry. That was what lit the flame at Fleece Performance in Pittsboro, Indiana, a manufacturer of diesel performance parts.

"Brayden and Chase Fleece's sister is a clinical nurse specialist at Hendricks Regional Health," said Jeff Merriman of Fleece Performance. "She told Brayden they were in need of PPE, and face shields were one of the main items they were having trouble procuring. As we started reaching out to other state and local officials to see how we could help, we were told that face shields were on their list of needed PPE items as well. So Brayden and one of our engineers immediately started working on a design that could be quickly deployed to the healthcare industry."

For VP Racing Fuels in San Antonio, Texas, the company's background in chemicals made a quick transition to producing hand sanitizer a natural choice. "By nature, our VP team will rise to any challenge and made a seamless transition to the new packaging and distribution model," said Bob Merz. "To meet demand, VP personnel from around the country traveled to our Tennessee plant to kick-off production and shipping for the first two weeks."

Stratasys, headquartered in Eden Prairie, Minnesota, is a leader in the 3D printing space, with a printer division as well as a printing division. The company was ideally positioned to manufacture face shield visors and face shields at its various facilities.

"My team is the team that got behind it. I run the team that runs the internal labs. We got on it and started making them on day two," said Pat Carey.

"We printed the band, and the shield was Mylar," Carey said. "People didn't print the actual shield. As it happens, a big part of our printing process uses Mylar. Our big printers actually print on Mylar, then we throw the Mylar away. We had many, many giant rooms full of Mylar that could be stamped into that shape. So not only did we do the 3D printing, we already had the Mylar. That was when the world was shut down and nothing was available."

Lubrication Specialties in Mt. Gilead, Ohio, was another company able to shift production to hand sanitizer. "Hand sanitizer was so difficult to find, we originally wanted to manufacture hand sanitizer simply to donate to local businesses, industry partners, etc.," said Eric Trimble. "We were in a unique position when the opportunity came up to produce hand sanitizer as we already have blending equipment, bottling lines, etc. We were already well positioned to switch over our manufacturing process to accommodate the demand."

Labeled under the company's LSI brand, Lubrication Specialties released hand sanitizer in 16-, 32-, and 64-ounce bottles, 1- and 5-gallon bottles, and bulk sizes including 55 gallons and 330 gallons.

Companies with chemical facilities readily transitioned to making hand sanitizer. For a brief time, VP's hand sanitizer far outsold the company's "normal" products.

SCALING UP

For many of the company sources we spoke with, the step from the motorsports niche into a more general market hungry for health and safety equipment delivered eye-popping sales, even if they were short-lived. "The demand was huge," said VP's Merz. "For example, the daily production of our hand sanitizer gallon-size package was over three times that of our 'normal' VP products. Our quart production exceeded the normal products by nearly five times." In a company-wide email from May 2020 that VP shared with us that gave credit to all involved, the company highlighted "Reeling in the Whale," a 300,000-gallon order from the Auto Zone parts chain.

"We had a record April [2020]," said Impact's O'Connor. "The best April in the history of the company. When May came, the traditional supply chain started catching up—the 3Ms of the world, and so on. It was only a matter of time; we knew that. We figured it would be short-lived because we knew the traditional supply chain would

"IT REALLY JUST SHOWS WHAT PEOPLE CAN DO IN TIME OF NEED, WHEN THEY REALLY NEED TO COME TOGETHER. THAT WAS IMPRESSIVE."

eventually get caught up. And it did. So by about mid-May, that deal stopped."

Stratasys assembled a team of some of its biggest customers and coached them on how to ramp up production of 3D-printed visor products. "Customers were calling us: 'Can you help? Do you have materials? How do we work with you?'" Carey said. "So we built this COVID Coalition. We got together 150 of our customers, including most of the race teams that we deal with, like Penske, Andretti, and Gibbs, and said, 'We can help you. We can send you the materials for printing.' In a lot of cases I sent people free materials. I turned on stuff on their printers, features they didn't pay for. And then we said, 'Rather than you print and try to figure out where to send those, send them to us.' We used our logistics team to distribute them."

For companies that were able to contribute to the health and safety effort, word spread quickly. "We were very surprised by the immediate response on social media regarding the need for our face shields," Merriman said. "In fact, those social media posts had the most engagement of any social media posts we have ever had. Many people that work in industries that were not able to order face shields through normal channels were reaching out to us to make smaller orders, between five and 500 at a time."

The speed and efficiency with which the companies shifted gears revealed much about the quality of their workforces, our

Stratasys made face shields from vast stockpiles of unused Mylar. This and other applications showcased the broader potential of the company's 3D printing facilities.

sources told us. "I was absolutely amazed at what they were able to accomplish in such a short period of time," O'Connor said. "Everybody there came together as a team and just made it happen in such a fast time. It really just shows what people can do in time of need, when they really need to come together. That was impressive."

"Our guys were here working 12 to 18 hours. And they would say, 'I feel good because I'm doing something. Otherwise I'm just a victim sitting at home,'" Carey said. "It was really good for our team spirit."

UNCHARTED TERRITORY

The success stories were many, but the health and safety market provided its share of chicanes that slowed things down, even under the emergency order that opened up opportunities to independent producers. "There are still strict guidelines," O'Connor said. "We can't call it PPE. Look at any of our literature and any of the stuff we did at the time, we never referred to this as PPE. It was 'masks and gowns.' You couldn't say 'medical gowns.' We had to be very careful about how we worded it."

Lubrication Specialties had similar run-ins with the legal fine print. "One of the largest obstacles were the legalities—the process of acquiring approval to produce hand sanitizer, ensuring we were meeting quality standards, and even the shipping process proved to be difficult at times," Trimble explained. "There were companies that received an exemption to create hand sanitizer but ultimately lost those privileges because the quality of their product wasn't meeting standards."

Besides the immediate need for these products, the clock was ticking for another reason: The traditional supply chain was slowly but surely cranking back into gear.

"We got out of this quickly, because there was a cheaper, faster way to do it—eventually," Carey said. "In the meantime, this group of 150, we made 100,000 of those shields and distributed them. But its time was over.

"We probably printed for about 180

days," Carey continued. "The reason we started was, you couldn't get them. There wasn't enough PPE, and traditional manufacturing could not scale up fast enough.

"Eventually we had an injection mold made, and we started to mold those parts. It's faster and cheaper," Carey added. "But it took us like 12 weeks to do that. That's the problem with traditional manufacturing. It takes a while. So when that spun up, it got cheaper and faster for everybody, so we stopped printing them. Then we started doing injection molding at a high volume."

BUSINESS IMPACT

For motorsports businesses, the "all-hands-on-deck" phase of pandemic relief was relatively brief. Even so, some lasting operational insights and relationships were formed.

Stratasys worked with many companies that had 3D printing abilities, but often these businesses viewed it as a niche part of their operations. "The amazing aftereffect is that in a lot of these companies, 3D printing rose in its importance," Carey said. "The top executives never realized how flexible it was. They hadn't thought about this 'bridge' manufacturing. They hadn't thought about the flexibility of these printers. In a normal factory, a sheetmetal roller, a cast machine, does one thing. If you want something else done, you buy another machine. A 3D printer can do almost anything. That's what makes them unique. So it opened a bunch of doors for us. The aftereffect of this is that 3D printing grew because more people realized the power of it. We helped a lot of people."

"THE AFTEREFFECT OF THIS IS THAT 3D PRINTING GREW BECAUSE MORE PEOPLE REALIZED THE POWER OF IT."

At VP Racing Fuels, the production lines have switched back to the traditional additives, lubricants, and other offerings. "We no longer regularly produce sanitizer though the product lines are still readily available," Merz said. "The initial operation ran from April through November 2020, though we are capable of ramping up for special orders." The experience gave the company the opportunity to test itself in fresh ways. "New products often highlight opportunities for improvement. Sanitizer quality, production, and distribution followed many of the same strict protocols we use for our race fuels and consumer products. Our most significant changes were to adapt to the massive scale and demand."

The move into the hand-sanitizer market

Lubrication Specialties quickly responded to an industry need and made hand sanitizer. Many aftermarket companies are seeing long-term benefits from their brief stint in the PPE and personal hygiene market.

did yield new business relationships for VP as well. "New suppliers of needed materials surfaced. We even worked with one supplier, Plum Grove, Inc., to make custom stands for our gallon jug dispensers of hand sanitizer," Merz added.

It was a similar situation at Lubrication Specialties. "While we still have hand sanitizer available for sale on our website, we are not currently producing any more," Trimble said. "During the peak of the pandemic, demand was so great we were able to sell thousands of gallons." Lubrication Specialties also forged some lasting business ties. "For example, one thing we wanted to do was support race tracks. The pandemic hit race tracks hard, and we wanted to help them reopen as smoothly as possible. We were able to donate and offer special pricing to race tracks across the country, so they had hand sanitizer readily available when they did open to the public. We're grateful to have worked with some amazing people, and those relationships continue to this day."

Fleece Performance produced face shields and sneeze/cough guards from March 2020 until January 2021. "There were a few other businesses we have relationships with now. Although we don't do business on a regular basis, we are now connected. We have also made some really good contacts within our local, state, and federal government," Merriman said. "It is always nice to be recognized for your efforts, and we definitely received more exposure than we expected. We were also mentioned in a web conference by Vice President Pence and featured on a few local media outlets. But that's not the reason we did it. We were responding to a need to help frontline workers stay safe in a way that we knew we could quickly have an

impact. It was also beneficial to help keep our workforce employed and busy during a difficult time for our business."

O'Connor said that Impact Racing shipped the last of its special gowns in August 2020. "The masks we stopped making relatively shortly. We built several thousand of them, but for a lot of people, it's a disgruntled purchase to begin with. If they have to wear one, they want it to be somewhat of a style statement. We just didn't have that element of it."

The mask-and-gown effort was successful enough that Impact explored the viability of it over the long-haul. "The thought was, 'Can we do this long-term?' But then it came back to the FDA thing," O'Connor said. "We started looking at it. To do this legitimately to build and sell to these companies, we would have to have FDA approval. And again, the process for doing that is mind-numbing for a small company. I'm sure these big companies have full-time staff where that's all they do, deal with FDA red tape and paper filings and testing.

"The other aspect of it was, because we build the best gown imaginable, we know that works well in motorsports. It's a good business model, but not so much in the medical field, because in their world, it's not worth it to them to take a gown and have it washed. They have to sanitize it, repackage it, bring it back." The disposable, one-use business model for medical garments, almost all of which are sourced off-shore, is not one in which a domestic maker of quality racing apparel has any advantage, O'Connor added.

Even so, doors were opened. "We've looked at other areas in terms of safety equipment because of that," he said. "Maybe not necessarily on the first-responder side of things, but maybe more toward industrial safety and things of that nature."

While none of the companies we spoke with for this report are still producing the health and safety equipment they launched in 2020, it's also clear that they have no regrets. Their efforts made a difference, they kept people working, forged new relationships, and learned a few lessons along the way. And if another global emergency rears its ugly head, they'll be ready to spring into action. PRI

SOURCES

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Lubrication Specialties
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Stratasys
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vpracingfuels.com

COURSE WORK

As the 2022 season gets underway, road racing is experiencing a growth spurt, especially at the amateur levels. So how are these racers and teams improving their programs while still grappling with pandemic-related supply-chain obstacles?

By Drew Hardin

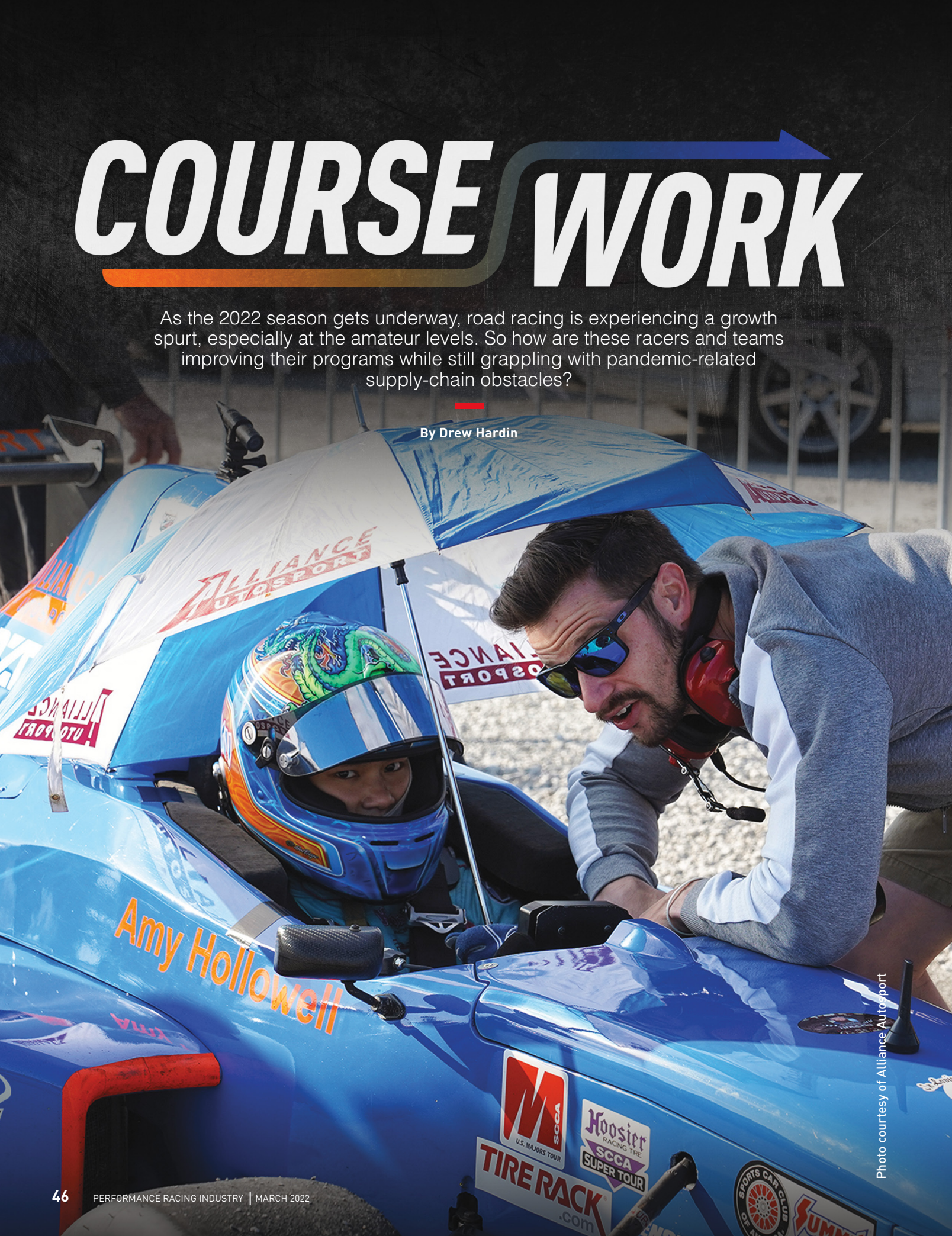

Photo courtesy of Alliance Autosport

It looks like 2022 will be a boom year for road racing. As this report was being compiled in January, the SCCA's first Majors event at Homestead-Miami Speedway in Florida was run with an entry list that was not only larger than last year, it also eclipsed the number of entries in pre-pandemic 2019. Likewise, the field for the Rolex 24 at Daytona, season opener for the IMSA WeatherTech SportsCar Championship, will be the largest in years if the entries for the Roar Before the Rolex 24 are any indication. Some 61 cars, the most since 2014, were signed up for the two days of testing that make up the Roar.

At the other end of the road race spectrum, "there's this huge boom of participation in entry-level endurance racing," said Eddie Nakato of AR Motorsports, Tigard, Oregon. "This boom in demand is honestly pretty insane."

Bruce Griggs of Griggs Racing in Sonoma, California, agreed. "Endurance racing is growing like crazy at the amateur level," he confirmed.

Both Nakato and Griggs have customers who participate in the Lucky Dog Racing League, a series that "grew out of the $500 car Lemons deal, but it's growing and becoming more sophisticated," said Griggs. "There are all kinds of cars in it. We have a couple of older Mustangs, Fox-body and SN95s, under construction here. We're putting Lexan in them, composite body panels. And I'm doing a chassis development project on a mid-engine, LS-powered 1967 Corvair with a tube frame."

"The demand from drivers to go racing is really, really high right now. We're seeing record car counts," said Scott Rettich of Alliance Autosport, Columbus, Ohio. That is despite the fact that many of his customers are having trouble "making the time to get away to go racing. Given that we are in club racing [Alliance Autosport is a customer service representative for SCCA Enterprises], all of our customers are essentially gentleman drivers. Some of them have businesses that are now booming, and they're having a hard time getting employees. Or they're getting double-scheduled because of all their family activities." Yet his business is growing, aided by the fact that "there's a huge number of new drivers coming in."

> *"THERE'S THIS HUGE BOOM OF PARTICIPATION IN ENTRY-LEVEL ENDURANCE RACING."*

Fred Lux of the Lux Performance Group in Portland, Oregon, is experiencing this growth surge in a different way. He said it's getting more challenging to find the experienced crew members that he hires to support his team of Trans-Am Vipers on race weekends. "The market is pushing less experienced crew members to come forward, and they're asking for bigger compensation, too. We are focusing on a mentality of retaining people on the team. We want to be 'that' company to work for in terms of professionalism, but also in taking good care of our team members."

Nakato, too, said one of his biggest challenges is "making sure we have the drivers available to transport the vehicles, the mechanics available to work on the vehicles, and the crew available to support the vehicles while at the race track."

AR Motorsports is "a bit unusual," Nakato said, in that it builds, maintains, and supports customer-owned race cars as well as renting race cars for arrive-and-drive customers. "Typically, those are two different types of businesses." During the height of racing season, "the demand [for personnel] is outstripping our supply and availability of labor to be able to turn the cars around fast enough to hit another race."

Personnel shortages are just one of the many challenges racers face in this pandemic-affected season. How are they coping, and what are they doing to improve their chances of winning?

ADDRESSING CHALLENGES

Like many other forms of competition, road racing is experiencing parts shortages, with tire supply among the most problematic.

"Parts supply is a nightmare, and where it hit us the hardest was with tires," Nakato said. "Racers can drive without the upgraded turbo or this extra control arm, but not without tires."

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Road racing is enjoying renewed popularity, spanning the gamut of classes and cars. "The demand from drivers to go racing is really, really high right now," noted our source at Alliance Autosport.

DRIVER'S ED: HOW CAN ROAD RACERS STEP UP THEIR GAME?

Among the team owners, car builders, and driving instructors we interviewed about the state of road racing today, several mentioned one tip to help drivers improve their performance: Don't make mistakes. How does a driver achieve that easier-said-than-done goal? A few of our sources elaborated.

"Almost all drivers, from hobby drivers to professional racing drivers, have room to improve how they maximize tire performance, manage weight transfer, and use the entire track, from edge to edge," said Mark Hicks of Chin Track Days, Orlando, Florida. "That is the secret to making great road course laps. Not horsepower. Often the drivers misplace their priorities, giving emphasis to adding power over improving grip. Tire performance is where it's at."

Chris Taylor of Chris Taylor Racing Services highly recommends making any sort of changes or trying different setups on the race cars in what he calls a "low-pressure environment," rather than on race day. "I can't say enough about renting a track for a day to focus on trying stuff and not be worried about the fact that there's just one practice session before qualifying." Taylor's Del Valle, Texas, shop is "across the street" from the Circuit of The Americas and about 20 miles away from Harris Hill Raceway in San Marcos. "If I have enough fuel, tires, and drivers, we can go to Harris Hill and run from 9 a.m. to 5 p.m. nonstop. It's nice to be able to make all those changes and write them down." That way, he said, a team doesn't find itself at the track on race day "with a car that's not fast, wondering, 'Where do we even start?'"

Hicks has seen "lots of well-developed professional teams" out of World Challenge, IMSA, Porsche Cup, and others at Chin Track Days "to get quality test time that's outside the boundaries of test requirements of their sanctioning bodies." A track day is also a good opportunity "for work on experimental or prototype stuff, because they're not getting scrutinized by other teams in the series."

While tracking the results of setup changes and keeping tabs on driver performance is often done via data acquisition, Hicks and Taylor agreed that even the most sophisticated of those systems can't replace the feedback from a competent human coach. That is especially true with the "hobby enthusiast" drivers that populate many Chin Track Days events, Hicks said.

"There is a learning curve initially to help drivers understand the fundamental vehicle dynamics that occur on a race track," Hicks explained. "In-car coaching is helpful for drivers in real time, to have an expert instruct where to position the car, how to use the wheel and pedals for best effect, manage traffic, all of those things."

"People communicate and learn differently," Taylor added. For example, "brake pressure data may show a driver is using 1,600 psi in one corner, but in another they're using only 800 psi, and the Garmin is saying, 'Brake harder.'" In that same situation, Taylor may tell his driver, "Instead of easing on the brakes, wait just a second, or just a beat longer, and then stomp on the pedal for all it's worth."

The best part of doing that kind of coaching, Taylor said, is "seeing the 'a-ha' moment, when people get it."

Allen Berg of Allen Berg Racing Schools in San Diego, California, offered a different kind of advice, to improve what he called "the off-track element" of driver funding.

"The cost of actual track racing has gone up significantly, while the age of participation has dropped," he noted. "Drivers are now coming into Formula 1 in their late teens, which means they're starting racing when they're very young, 7–8 years of age, and moving up through the ladders. Because these drivers are younger, they're kids in school, and they don't have the skillset to put together financial support packages for themselves to go racing in Formula 4 or Formula 3. That makes them reliant on family money to pay for the racing.

"It's a real weakness in the sport, and an area that drivers can explore and improve on," Berg continued, while acknowledging, "it's also the hardest part of the whole business." *—Drew Hardin*

Instruction and coaching can improve driver performance, but oftentimes a racer's success comes down to the "off-track element" of funding a team, observed our source at Allen Berg Racing Schools.

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At the 25 Hours of Thunderhill in December, "our first, second, third, and fourth tire choices were all unavailable in the quantity we needed," he continued. "And that was 120 days out from the race. We ended up going with a tire that was not ideal, and it caused a lot of problems for us, but that was all that was available."

Nakato admitted the problem was exacerbated by the quantity of tires he needed, "something like 14 sets of tires. That's where we got hit. Everybody could provide us with two or three, but nobody could provide us with 14."

To mitigate the supply problem, Nakato is considering "ordering tires a year in advance, just to make sure we have them. Honestly, that's unheard of. Tires don't really keep for that long, particularly race tires. But we don't have a choice, because the alternative is having to call somebody and say, 'Hey, I know you spent a large amount of time and money to prep the car, but now we can't get to the race because we don't have tires to run it.'"

Lux, too, had trouble getting tires. "Michelin shipped me two sets of tires that landed in a warehouse that caught COVID and got locked up," he explained. "Once Jackson Motorsports found that out, they air-freighted me two sets directly, so they went above and beyond to get me what I wanted. They're working hard, doing more work than they used to and staying on top of things. But if a team wasn't shopping at the right places, stuff just wouldn't come. No one would know when it's coming, or even if it's coming."

Chris Taylor of Chris Taylor Racing Services in Del Valle, Texas, has his own work-around to get the tires he needs for the SCCA B-Spec cars he manages. "The spec tire for B-Spec is Hankook, and Hankook Motorsports is about 10 minutes from my shop," he said. "Thankfully for us they have a couple hundred tires in their warehouse. They're still getting stuff delivered, but maybe not as often as they want."

Also in short supply are brake pads. "We've had supplier problems with the brake pads for our FE2 [Formula Enterprises 2] cars," Rettich said, "so we're having to implement some necessary changes to deal with the supply chain issues that the whole world is having to contend with."

Although the recent boom in road racing is good for the sport, "it's getting more challenging to find experienced crew members," observed our source at Lux Performance.

Supply-chain woes are making many parts difficult to get. Chris Taylor Racing Services is addressing the problem through its one-stop parts shop for SCCA B-Spec racers.

"There's been a shortage of Raybestos, the ST-45 brake pad compounds we use a lot," said Griggs. To a "really good driver, a brake pad is a critical thing. They drive the car a lot with the brake pedal: trail brake, finesse and modulate the brakes to make the car do what they want. When a driver has the car all dialed in with a certain type of brake pad, and their brake rotors are living and doing everything well, they don't want to change. If they have to, then they have to go through a whole process of testing, learning, re-adjusting, and dealing with it, and that can be expensive."

Joe Aquilante of Phoenix Performance in Phoenixville, Pennsylvania, said he's getting an adequate supply of parts for his team (which won all four Touring Class championships at the SCCA Runoffs in Indianapolis last season), "but we have had to order extra things. We're probably carrying $100,000 more in parts inventory than we normally would. Normally we do a just-in-time philosophy because it saves cash flow, but now we have to buy two of everything. Now those parts are sitting in inventory, and that sucks up cash, so we have to be careful about that."

Aquilante said he buys parts from "whoever has them. From there it's who has them that's close by so we can eliminate shipping. Then it's whoever gives the best discounts for volume buying." He uses "three or four major vendors: Turn 14 Distribution, Atech Motorsports, and Hoerr Racing Products are probably the major ones that we check for everything." And while availability is important, "we can't completely sacrifice pricing. There is a limit to what the customers will pay. We have to be really careful from the customer's viewpoint to make sure we are paying the best prices we can get."

To ease supply woes, some race teams have branched out into the parts business.

Taylor, for example, retails suspension parts, brakes, and other pieces for the compact cars that race in the B-Spec class. “One of the things I spotted early on was our rulebook said we can run this, this, and this part, but nobody sold all those parts. Racers would have to find the guy to buy the sway bar from, find the guy to buy the shocks from. So I tried to put everything in one place.”

The ubiquity of B-Spec donor cars means parts are widely available from major manufacturers and retailers, including Bilstein, Eibach, Hyperco, and Swift. “The Mini guys get a lot of their stuff from Bimmer World,” Taylor said, and major online retailers like Summit and Jegs are good sources for “seats, harnesses, and safety gear. But the nice thing about our group is that they’re big on supporting guys like me, so there are a lot of small-time shops and wholesalers that people buy their parts from.”

AR Motorsports specializes in German makes—primarily BMW and Porsche—and sources parts from Ground Control, SPL Parts, Hyperco, and Eibach. Also, Nakato recently acquired Cobalt Racing Brakes,

Road racing’s popularity is yielding strong demand for car fabrication, maintenance, and rentals, but it’s also stretching the labor force thin, noted our source at AR Motorsports.

what he described as a "boutique company that catered primarily to professional race teams." Nakato was one of its first distributors some 15 years ago, and he is now "bringing this pro-motorsport-level product to the more mainstream track day market. We mix and manufacture the brake pads all in-house; and because we're such a small company, we're fairly nimble and can change the way we operate in response to the rapidly changing market. That can keep us from running out of materials, which I see all across the brake industry."

GOING FASTER

For Aquilante, coming off of a very successful 2021 season means "making evolutionary, not revolutionary changes. Racing is a game of blocking and tackling. It's three yards and a cloud of dust. Seldom does one thing come along and revolutionize the whole thing, especially in touring cars, which are street-based automobiles. We're not expecting major changes in how to qualify for the Runoffs." The action plan for Phoenix Performance, Aquilante said, is "Eat, sleep, race, win, repeat. It's been that way for the past four to five years."

Rettich, on the other hand, is looking forward to a change that will revolutionize the SCCA's Spec Racer Ford 3 cars.

"These cars started with a street gearbox, a standard manual transmission, and it was a bit of a weak link," he explained. "Plus, with fewer and fewer people driving stick shift on the street, it became time to switch to sequential transmissions. This year we're switching over to Sadev sequential transmissions. While the gearbox is a big investment, it will make the class more popular. Now, instead of having to use the clutch when shifting and learning how to heel-toe, we're switching to clutchless, no-lift shifting. It's a big upgrade in technology, and the operating costs should go down. They shouldn't have to change clutches and transmissions as often."

Rettich noted that "a few purists want to continue with the stick shift, but most people are excited about the sequential." He said about half of the active cars have ordered the new transmission, and Sadev is shipping "about 25–50 a month, so it's a transition period. It will take until the end of year for most people who want a Sadev to get one."

For Taylor and his B-Spec fleet, "there's not as much we can do mechanically. We don't have a hot new part frenzy, but there's definitely always room for improvement on understanding setup, alignment changes, things like that. One of the big factors in our team's speed increase over the last two years has been getting an understanding of what the perfect alignment is—how to tune the chassis for better handling, faster lap times, and increased driver confidence."

To gain that understanding, Taylor has his drivers do what he calls "sweeps," making laps after a chassis change "as far as possible in one direction, then as

far as possible in the other direction, then recording the actual data from an onboard computer or the good old butt dyno." That way the driver "can make informed and educated changes to make the car better."

For many of these teams, especially those, like Taylor's, in spec series with limited opportunities to make mechanical changes, the new breed of data acquisition systems has helped make critical refinements.

Taylor uses AiM data acquisition equipment, and has favorable experiences with the new Garmin Catalyst, which can provide feedback in real time, even through the driver's comm system.

"It's kind of like AI learning," Taylor said. "A guy runs 10 laps, and it records the car pulling 1.5 Gs in the middle of a corner, so it knows the capability of the car is 1.5 Gs. It will then tell the driver to brake later, brake harder, if the driver is only pulling .9 G under braking because it learned the vehicle is capable of 1.5. The beauty of the AiM and Garmin data is we can compare the entire [B-Spec] fleet and driver pool, both in testing and during race weekends. A bunch of us will be huddled around a Garmin Catalyst five minutes after a session, or a laptop comparing data traces and onboard video before we go out for the next run."

Some teams are ordering parts far in advance and stockpiling extras when they can get them. "Now we have to buy two of everything," explained our source at Phoenix Performance.

Data acquisition "is getting easier and more user-friendly," said Lux. Last year was the first time he put the VBOX system on his team's Vipers. "There's a camera in front, a camera on the driver, and the feeds go straight to a memory card. It has Bluetooth to set up the cameras, and it plugs into the OBD, or the AiM or MoTeC systems. All the data on the cars—the gas, brake, gear, steering input—is overlaid with videos." There's "a lot of data for coaching" on those cards, and he can turn them into the sanctioning body at the end of a run "if something happens on-track. They can use that for answering all the driving and performance questions."

According to Griggs, racers "can't compete well" without data acquisition, especially in road racing's higher tiers—"SCCA at the national level, Major series, the Runoffs, Trans-Am, Trans-Am 2, they all run data acquisition. In IMSA everybody runs it."

The system Griggs uses "integrates with the AiM systems," he said. "It's GPS, but it's absolutely every sensor in the engine management system plus front and rear brake pressure, wheel speeds, all positions of the shocks, the whole attitude of the car. All the math tracks that come from that are calculating all the G loads, pitch rate, roll rate, and everything about the car so we can govern aerodynamics of the car, control the splitter angle on corner entry and things like that. We can really tune things.

"But that's the pro level, and the pro level is only so many people," he continued. "In road racing, the money is being spent at amateur and club levels, everything from open track days to time trials, autocross, and now this endurance racing. It's real race cars and real racing. They're running wheel-to-wheel, driving hard, trying to stay on the track, stay together and not run into each other." PRI

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MAKING INROADS

Road racing can appear like a secret fraternity to the uninitiated, but opportunities abound for those who want to establish a focused career path, move from another racing discipline, or simply climb the ladder from the ground up.

By Bradley Iger

"A BIG PART OF WHAT DRIVES PARTICIPATION IS KEEPING THE COST OF ENTRY LOW."

Photo courtesy of Brett Becker/NASA

The Topeka, Kansas-based Sports Car Club of America has had its finger on the pulse of wheel-to-wheel racing in the US ever since the organization was founded back in 1944. The SCCA's Jon Krolewicz told us that steady growth has been the name of the game over the past few seasons, but as with any long-running motorsports discipline, there's been something of an ebb and flow to road racing interest over the years. Rising car counts in a fairly cost-intensive form of racing typically don't happen by accident.

"Something that's been really beneficial for us is how we've been operating the Runoffs, our national championship," he explained. "Over the past five years, we've held these championship races at the Indianapolis Motor Speedway twice, and it's no secret

"ALL THEY NEED IS A DRIVER'S LICENSE AND A FEW FRIENDS, AND THEY CAN GO RACING."

that offering that as a carrot at the end of the season has been really good for entries. We've seen it help drive up participation elsewhere, too—we go to VIRginia International Raceway, and we go to Road America as well. Having these marquee tracks on the schedule helps build participation for folks who normally might not have the chance to race at these historic road courses."

There's more to it than just the opportunity to race door-to-door with the nation's best at the Brickyard, though. Although many see the current generation of performance vehicles as the second coming of the golden age, the reality is that automakers have been producing pretty formidable machines for some time now. Many of these vehicles are becoming affordable enough to be prime candidates for race car conversions.

"Spec E46 is one of the classes that's seen a ton of interest over the past few years," said Brett Becker of the National Auto Sport Association, Las Vegas, Nevada. "Those are the 1996–2006 BMW 3-Series chassis. There's enough of them out there with a manual transmission to make them easy to source, and that has been growing very well in almost all regions nationwide. Part of it is that this is a natural progression for racers who're running in Spec E30 and are ready to move up. But while the parts are spec, the combination has really been designed to produce a very good race car."

These are certainly encouraging trends, but for the folks who aren't already ensconced in the road racing ecosystem, finding inroads into the sport can be a somewhat daunting proposition. Here we'll take a closer look at the various routes that would-be competitors can take to get in the mix.

The SCCA has long been a launchpad for new road racers. The organization's vast array of classes and cars can accommodate anyone from novices to pro-caliber drivers.

BUILDING THE FOUNDATION

Starting out with the basics not only provides a low-cost entry point for those who are new to this type of racing, it also allows competitors to figure out what their goals are and plot the trajectory to get them there.

"A big part of what drives participation is keeping the cost of entry low, and track day programs like Track Night in America are so incredibly popular because they're very accessible," said SCCA's Krolewicz. "These events expose people to the availability of road racing. HPDEs, solo autocross, and time trials are events that someone can step right into with a regular driver's license and a safe car."

Starting at the ground level not only allows fledgling road racers to get more experience and seat time in this type of competition, it also can provide some insight into what classes might suit them best, thereby enabling these competitors to make informed decisions when it comes time to invest in a fully prepped race car. "It also helps them determine what kind of commitment they want to make," Krolewicz told us. "They're going to need a competition license to move into wheel-to-wheel formats, and they can get that through a school over a weekend. But it really helps to have some track day or time trial experience when doing that because these schools will mainly focus on safety and procedural elements rather than racecraft or technique."

Once a driver is ready to take that step, there is a variety of different classes within major sanctioning bodies like the SCCA and NASA that can accommodate new racers. "The interesting thing about time trials in NASA is that it uses all of the same horsepower-to-weight rules as our Super Touring wheel-to-wheel classes," Becker noted. "So if someone wanted to get their feet wet before going racing, they could build a TT4-class car, spend time in time trials, and really hone their skills and their car's setup, and then move right into Super Touring 4."

B-Spec, Spec Miata, Formula F, and Super Touring Lite would all be considered entry-level wheel-to-wheel race classes within the SCCA, while NASA's Super Touring 6, Spec E30, Spec Miata, and 944 Spec classes are

NASA's Spec E30 class features the plentiful and relatively inexpensive 1984–1991 BMW E30, making it a cost-effective way to get into wheel-to-wheel road racing.

also considered suitable options for new racers within that sanctioning body. Race car rentals are often available for more popular classes like Spec Miata, and that can be especially helpful for racers who are still trying to determine what class they want to pursue, as these prepped vehicles can often cost upwards of $20,000.

Meanwhile, the Stuart, Florida-based ChampCar Endurance Series offers a more informal way to get involved in wheel-to-wheel racing with significantly less investment. "We founded this sanctioning body as an alternative to the established road racing series," said ChampCar's Bill Strong. "The idea is loosely based on the low-budget endurance format of something like 24 Hours of Lemons, but without all of the pageantry. There's more of an emphasis on the seriousness of the racing, but it's still about low cost and accessibility. All they need is a driver's license and a few friends, and they can go racing." ChampCar racers

can also join arrive-and-drive teams, which essentially allows a competitor to buy stints at the wheel.

Held at local tracks as well as iconic road courses like WeatherTech Raceway Laguna Seca and Daytona International Speedway, ChampCar races are between 7 and 24 hours long, depending on the specific event, and drivers are allotted two-hour stints at the wheel before a driver change is required. The series is not only a cost-effective way to get into wheel-to-wheel racing, it also provides drivers with far more seat time to gain experience and hone their racecraft than the sprint format of the SCCA and NASA's more popular classes, where the duration of most races is less than 45 minutes.

"All of the cars entered in a race are assessed on our Vehicle Performance Index," said Strong. "It's basically a balance-of-power measure to even out the field. Each car is given a value of up to 500 points based on potential lap times. If car A is given a 250-point value, they can add up to 250 points worth of performance parts to reach that number. If a car is entered that exceeds 500 points, then penalty laps are assessed, and every 10 points is an additional lap. This approach tends to even out the field if a team decides to bring something that's disproportionately quicker than what the rest of the field is running."

MOVING UP THE RANKS

For younger, career-minded drivers, organizations like Andersen Promotions in Palmetto, Florida, offer a ladder system that can provide a defined path into semi-pro and professional open wheel racing. "We run three series as part of the Road to Indy," said Rob Howden. "The ladder system starts with the Lucas Oil Formula Car Race Series, then racers move to the USF2000 championship. From there they go to the Indy Pro 2000 Championship, then to Indy Lights, and the last step would be IndyCar."

The Road to Indy ladder system not only provides clear targets for these younger drivers as their talents develop, it also helps them reach the next rung on the ladder. "I think the scholarship program is one of the things that sets this apart from any other

The ChampCar Endurance Series aims for a middle ground between formal road racing, such as this event held at Indianapolis Motor Speedway, and wacky, ultra-casual events.

series," Howden said.

"When a driver is trying to go up through the FIA, they're relying on manufacturer support from the Ferrari Driver Academy or the Red Bull Junior Team—that kind of thing. But in the Road to Indy, those who win, move up. The winner of the Lucas Oil Formula Car Race Series championship in 2022 gets a $75,000 scholarship to move into USF Juniors Presented by Cooper Tires. If they win USF Juniors, they get a scholarship worth a little over $200,000 to move up to USF 2000, and the scholarship amounts increase progressively all the way up to Indy Lights. If a driver wins there, they receive a scholarship worth about $1.4 million to help them step up to IndyCar. Each year's champion gets the majority of the budget that they need in order to move to the next level, and it's been an incredible success story for us and the drivers who are winning. Many of these kids wouldn't have the financial backing required to take that next step otherwise."

"A TEAM OF THREE OR FOUR DRIVERS CAN GET FOUR TO SIX HOURS OF SEAT TIME EACH OVER A WEEKEND."

Howden said that the ladder system was designed to provide a path for national-level kart racers to make their way into auto racing. While many have continued to pursue open wheel racing as their careers have progressed, he said that a number of drivers who've been through the program have also gone on to compete in production-based sports car racing in IMSA, SRO, and other series. "The level of competition in these open wheel series is just incredible," he said. "A driver who's kind of mid-pack in Indy Lights can transition to sports cars and suddenly be incredibly competitive."

MAKING THE SWITCH

There are inroads for those with experience in other motorsports disciplines as well, but Krolewicz still recommends starting out with the basics. "Moving from something like karting is an easy transition," said Krolewicz. "They're going to have the

"WHAT WILL DRIVE THE FORMATION OF NEW CLASSES IS THE PRICING OF USED CARS THAT LEND THEMSELVES TO THIS PURSUIT."

The SCCA's Spec Miata class has attracted fresh talent to road courses for more than 20 years, with tight, fiercely competitive racing that quickly sharpens driving skills.

same flags and a lot of the same operational rules. But if they're coming from oval track, off-roading, or something like that, it's important to remember that these licenses and schools are less about technique and more about understanding the procedures involved. The flags are different, the grid procedures are different—there's just a tremendous amount of stuff like that which will be pretty new to someone no matter how much experience they have in other racing disciplines."

It is also worth noting that someone coming in to road racing can learn most of these procedures over the course of a weekend at a driver's school and be ready to compete the following week. "If a racer has a USAC license, or the NASCAR K&N Pro Series or something along those lines, they can come to NASA with that experience, list it on their application, and can most likely get a competition license within one weekend," explained Becker. "There isn't really a class that we try to funnel folks into when they are coming from other racing disciplines, but if someone has a racing license from somewhere else, it is likely we can get them into competition within NASA in pretty short order."

Series like ChampCar are virtually barrier-free in that regard. "We've had folks come in with zero previous experience all the way to drivers who have competed in Formula 1 and NASCAR," said Strong. "Then we also have a bunch of folks who've come over from spec racing—Spec Miata, Spec E30, and so on, because they want the seat time. A team of three or four drivers can get four to

six hours of seat time each over a weekend."

For teams with cars that exceed the expected performance level of ChampCar entries, the series has teamed up with World Racing League (WRL) to provide something of a ladder program for those racers as well. "These are race-prepped Caymans, Mustangs, M3s—the faster stuff," Strong added. "We don't allow those cars in our series, but there are a lot of people who want to run them, so we work with WRL to provide a path for those teams that are ready to go faster. WRL requires previous racing experience in order to compete, and ChampCar experience qualifies for that."

All of these sanctioning bodies strive to ensure that every driver and every race car has a home within their organizations (or a closely associated one) because the fundamental goal is to foster continued growth. But it's a continually evolving process, and exactly what shape that will take over the coming years ultimately depends on a number of outside factors.

"What will drive the formation of new classes is the pricing of used cars that lend themselves to this pursuit," said Becker. "Maybe sometime in the future we'll have something for the early Subaru BRZ and Toyota FR-S. I'm not saying there will be a spec class for them, but it is possible, and more of them are making their way into our Super Touring 5 and 6 classes. As with any sports car, it's a matter of the price coming down to a point where people are comfortable with the idea of ripping out the interior and putting a cage in it." PRI

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BUSINESS PROFILE

FLIS PERFORMANCE

Taking over production of Mazda's MX-5 Cup cars, the Daytona Beach, Florida-based team of veteran builders and racers bring their formidable business experience and technical savvy to this wildly popular series.

By John F. Katz

Flis Performance of Daytona Beach, Florida, became the exclusive car builder for the Idemitsu Mazda MX-5 Cup series in January 2020, and completed 16 of the spec racers before the end of that year. Production stepped up to 24 cars in 2021; and Todd Flis, who owns the business with his brother Troy, anticipates "a pretty big percentage increase in new teams and new drivers for 2022.

"We've built 39 cars to date," Todd Flis reported in late November 2021, "and we've seen an average of 25 cars at every race this year,"

What's driving such significant growth?

"Number one, in 2021 we moved from IndyCar to IMSA, where the series is a much better fit," Flis said. "IndyCar was a great partner, and we had a great relationship. But IMSA is where we need to be," where an affordable sports car series can not only cultivate young talent, but also provide a natural step to faster series within the same sanction.

"Number two was the pandemic, which prompted so many sales of these cars for use at private country clubs. About 70% of our build volume goes to Monticello, Autobahn, Thermal, Spring Mountain, etc. All of these clubs have their own MX-5 series, and that's where the racers went every weekend. Then they brought their kids, and then they wanted to buy cars for their kids."

"MAZDA PUT ALL OF ITS ASSETS INTO THE MX-5 CUP, AND THAT DEFINITELY ELEVATED THE SERIES."


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Pictured from left, Todd and Troy Flis have created a flourishing business building Mazda MX-5 Cup cars. Some two-dozen fresh MX-5 spec racers rolled out of their shop in 2021, with even more expected this year.

A RACING FAMILY

Third-generation racers Todd and Troy have built and campaigned cars together for most of their lives. "My Dad got us started in go-karts at a young age," Todd Flis recalled, "and we moved up to SCCA sports car racing in the late 1980s. We ran all the way up to Daytona Prototypes and DPi cars, and from there we progressed to prepping cars for other teams and drivers. We ran with racers who had the funding behind them to say, 'Hey, would you run this for us, and we'll pay you to do it?' It was around 2000 when we switched from driving as a hobby to a full-time professional business."

Each brother had already settled into a specific role: "Troy handles the technical and development side," Todd Flis explained. "He's always working on new bits and pieces, and on manufacturing. He deals with our customers' tech issues. If somebody has a problem with their ECU, he assists them. I handle all the sales, the marketing and contract negotiation. That's been the case for 35 years. It's very clear-cut, and it works very well."

Even 20 years ago, however, the racing industry was rapidly changing, and the brothers found they had to adapt. "Our background was in building cars," said Flis, "and we would build cars, prep them, the whole nine yards." But demand for custom building declined with the proliferation and growth of spec series. "So we would still run cars for our customers, or at least maintain them." And by 2015, the brothers' own Spirit of Daytona team was campaigning Corvette and, later, Cadillac DPi cars.

"WE EVEN ELEVATED THE COMPLIANCE PROGRAM WITH NEW ECU TELEMETRY TECHNOLOGY, SO WE CAN WATCH AND MAKE SURE THAT ALL THE CARS ARE EQUAL."

It's not surprising, then, that in late 2019, Todd and Troy were tapped by Mazda to run the automaker's TCR program, based on the Mazda3. "We were originally going to develop the cars, prepare them, and race them for three years, then turn them into a customer program," Flis said. The TCR would have been "a step on Mazda's ladder between the MX-5 and a DPi or GT-style car." Negotiations with Mazda were well under way in November, when the North Carolina-based builder of Mazda's MX-5 Cup cars called it quits—and Mazda offered that program to the Flis brothers as well.

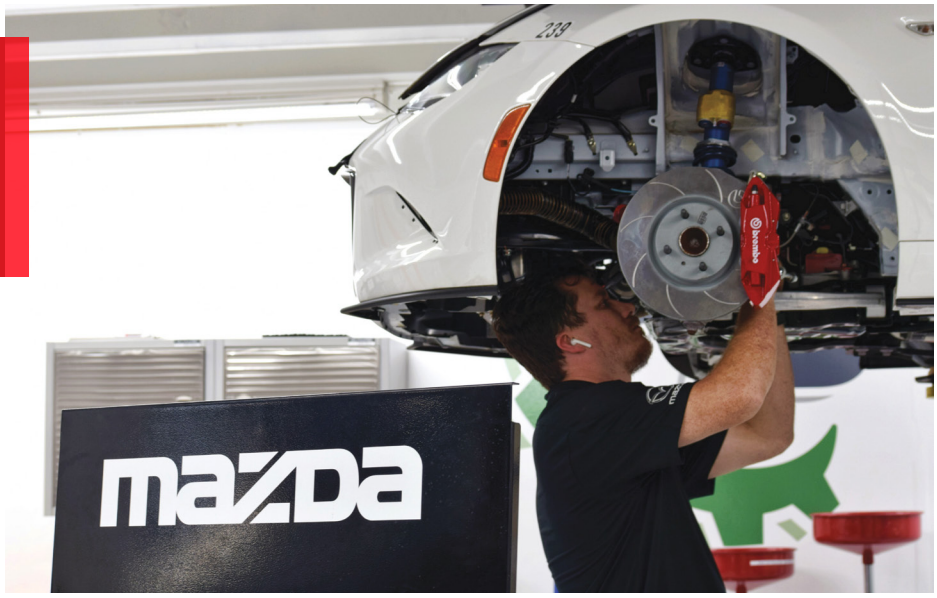
Then, due to the pandemic, Mazda put the TCR program on indefinite hold. "It was a blessing in disguise—sort of," Flis mused, "as it would have been a lot to take on in a very short period of time." Also, with the TCR car back-burnered, "Mazda put all of its assets into the MX-5 Cup, and that definitely elevated the series. We moved the whole MX-5 operation to Florida and hired two employees from the previous builder. We put a staff together and started building cars in January 2020."

ENGINEERING & MANUFACTURING

Flis Performance takes the initial orders, contracts with the buyers and sells the finished race cars. "Mazda does not want to sell race cars," Flis noted, "nor does any other auto manufacturer. So we absorb the liability." Mazda does, however, control parts sales. Flis Performance sells the parts it manufactures to Mazda, "and Mazda sells them to the end-user. If a racer bounces a car off a wall and bends a wheel, they go to Mazda Motorsports to replace it."

For each new car ordered, Flis Performance buys a brand-new MX-5 from Mazda. All are zero-option base models, but they are delivered to the company fully assembled, as they would be to any Mazda dealer. Flis Performance then removes the seats, the soft top, and much of the interior. "We sell some of that stuff," explained Flis, "and some goes right to scrap." It turns out that buying and stripping a showroom-stock model is actually more cost-effective than special-ordering a car without all the parts a racer doesn't need, as the resulting disruption on the production line would cost Mazda more than the parts that are discarded.

Once stripped, each car is "rolled about one block up the street" to the Spirit of Daytona shop. "There we take out all the



Flis Performance team member Kyle Morningstar is pictured working on an MX-5 spec racer. Although the cars are extensively modified, almost all of their parts remain essentially OEM stock.

seam sealers and interior parts and weld in the roll cage. It goes through paint, and then it comes back to Flis Performance for finish fitting and final production. So we have a separate facility for fabrication and paint," and a "clean" shop for final assembly.

Flis Performance, he added, "controls 90% of the engineering of the program. Mazda is very sensitive to the look of the car, so there are no added wings or any other attachments to the bodywork. Mazda is also very, very sensitive to racing what it actually sells. So the only really significant mechanical components that are not in an OEM MX-5 are the racing shocks, the sequential transmission, the brake ducts, the enhanced cooling system, the safety equipment and the ECU. We don't even pull the engine out of the chassis, although we swap out the motor mounts."

The current-generation car "has been raced for three years, and there is not much development left in it." Still, "we are continuously testing new products, pieces and parts to make the car better. Just in the past two years we've issued probably 12 TSBs [technical service bulletins], making the car better. We even elevated the compliance program with new ECU telemetry technology, so we can watch and make sure that all the cars are equal."

MX-5 spec racers begin as complete new MX-5s, just like the ones dealers sell. Flis Performance then strips the cars before crew members like David Acvedo install a roll cage and other competition equipment.

MARKETING THE EXPERIENCE

Knowing their customers' wants and needs has also contributed to Flis Performance's success. "We found pretty early in the game that most club racers want the car to roll off the transporter, and then get in it and drive it all day," Flis said. So, unlike the previous builder, Flis offers "a seat option, a radio communication option," and other choices that contribute to an arrive-and-drive experience. Flis Performance customers can skip those components and provide their own, but most want a turnkey race car. "We even offer a setup option. We know where they are going to run, and they send us their weight. So we set the car up and it's ready to race."

That said, suspension setup is kept intentionally simple. "It's not a GT4 car," Flis noted. "These cars have a very, very small window, and outside of that window can be big trouble." When that happens, however, Flis can talk the customer through the process of "getting the car back where it needs to be. It needs 3 degrees front negative camber, 3 1/2 degrees rear negative camber. X amount of toe, X amount of caster. And once it is back in that window, it can be fine-tuned from there."

Flis is also largely responsible for marketing the series. "When we took over production, we negotiated our contract with Mazda so that we could push these cars heavily. Ninety-nine percent of our marketing is through social media. We also have very close ties with IMSA, so we do some co-marketing with them, and we receive a lot of support that way. That's been a key boost" to Flis's visibility and competitive position. "If someone is going to buy a homologated race car, they can see that we're out here, we're available and we provide great service for the product."

Like so many successful businesses we've profiled, Flis emphasized a commitment to providing high-quality customer service. "We bring our tractor-trailer to every series event," he said. "It's called the Mazda CEC, for Customer Experience Center, and it's stocked with all of the parts, so the customer doesn't have to inventory anything. They buy the parts off our trailer and charge them to their Mazda Motorsports account."

Flis also provides tech support, 24/7. "If someone is running one of our cars at a weekend club event, and a warning appears on the dash"—and the racer can't figure out the cause and/or the remedy—"we can log into the ECU remotely and recommend a fix. Nine times out of 10 we resolve an issue in less than 30 minutes."

In fact, Flis believes that customer service has been the greatest contributor to his company's success. "That's what everybody tells us: 'I can call you on a Saturday afternoon and someone calls me right back, and we work through an issue.' He emphasized that Flis Performance is also "open and transparent" concerning "changes, updates and issues people are having with the cars. People come to us with their issues, and we work with them to try to make the car better." Many of the TSBs mentioned earlier originated with just such

As with any racing effort, the work of Flis Performance demands a tightly coordinated team with a wide range of specialties, including administrator Ashli Richardson.

"WE'VE BEEN IN THIS GAME TOO LONG TO OVER-INVEST. WE'RE VERY HAPPY WITH THE CURRENT SIZE AND DIRECTION OF OUR COMPANY."

conversations. "We've even opened up the ECUs a bit, so the customer can go in and look at the things they want to see."

FROM DOCKSIDE TO TRACKSIDE

When we asked Flis what he and his team have learned from the MX-5 program, he cited the challenge of "direct involvement with multiple teams. It's a lot different from showing up at a race track and preparing one team with one or two cars. Now we have to be concerned about 25 cars. Back in early 2020 we tested 30 cars at Mid-Ohio, and I was sweating like you would not believe until every one of those engines started, and every one of those cars went around the track. Then I felt like the weight of the world was off my shoulders.

"We've also had to learn the ins and outs of a tier-1 partnership with a major manufacturer," he continued. "I communicate with Mazda weekly, if not daily. Of course, we dealt with GM for a long time through the DPi program, and before that we developed the Porsche V8 for its Daytona Prototype. But even that wasn't the same level of involvement with the manufacturer. That's been the biggest learning experience."

That said, Flis has enjoyed strong support from Mazda and other suppliers, especially when dealing with pandemic-related shortages. "We buy, like, 15 cars at a time from Mazda, and with the pandemic we had 10 of our cars sitting at the port. I got a call from a Mazda distribution manager saying, 'Listen, I need those cars for my dealers.' I said, 'Sorry, I need those cars.' A Mazda executive stepped in and said, 'All those cars are reserved for the MX-5 Cup, they don't go to the dealers.'

"We've also been very fortunate to have partners in the industry, whom we have known for a long time, who have stepped up and built things for us that needed to be built or imported parts that needed to be imported."

In all, Flis anticipates a great future for the MX-5 Cup. "There is so much interest, and so much excitement now that everyone has seen the level of competition and professionalism of it. The expansion and growth of the series is going to be great in 2022," he predicted.

APPROACHING A LIMIT?

Between the two facilities, Flis Performance encompasses about 15,000 square feet, with seven employees. "About halfway through 2021, we went from building two cars at a time to building four at a time. And we added one more employee on the fabrication side. But that's it. We've been in this game too long to over-invest. We're very happy with the current size and direction of our company. It's a 90-day wait to get a car, but we'll deal with that," Flis concluded. PRI

UP TO THE TEST

A behind-the-scenes look at how manufacturers of suspension parts put these components through their paces before they're released into the marketplace.

By Alex Nishimoto

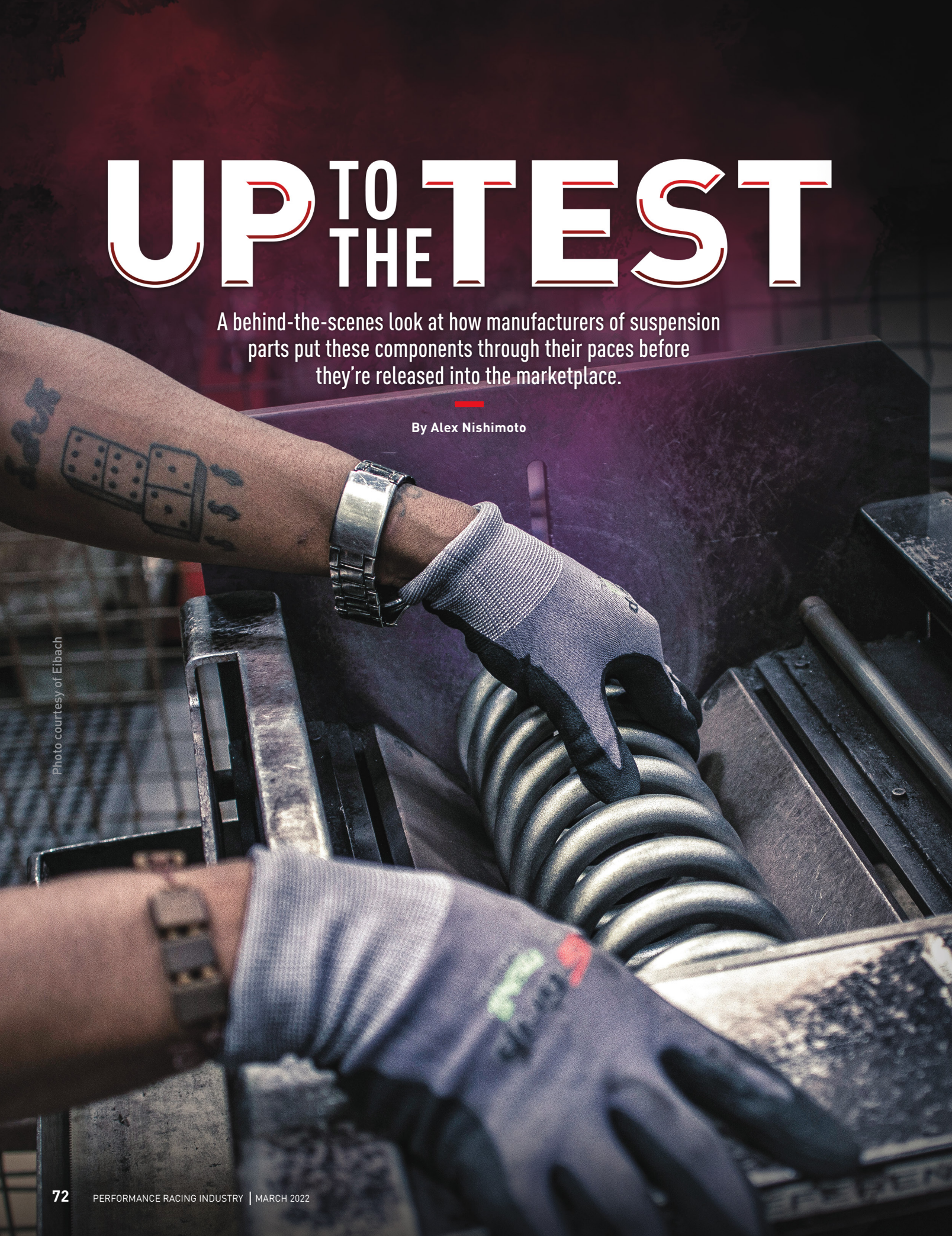


Photo courtesy of Eibach

Whether it's on dirt, an asphalt circuit for 24 hours, or at the highest levels of open wheel competition, a race car's suspension has to perform for its intended purpose, and each component has a job to do to ensure the whole system works to its maximum potential. Each of those parts also has a story behind how and why it was developed, and each goes through a rigorous testing process to make sure it's up to the task.

For a behind-the-scenes look at what goes into the suspension parts that are available for race cars, we talked with six of the top names in the high-performance suspension business to learn about their R&D and testing regimens.

EIBACH

Eibach's rich motorsports history dates back to the 1980s, when its springs carried DTM competitors such as BMW, Mercedes, and Audi to the top of the podium. Since then, the Corona, California, company has expanded into every corner of the racing world, offering everything from extreme long-travel springs for off-road desert racing to coils for the sophisticated inboard pushrod setups used on top open wheel cars. Today, a customer looking for the right set of springs for their race car can choose from the more than 1,500 options, including the popular ERS series of racing springs, in Eibach's existing catalog. Sometimes the right spring package for an application doesn't exist yet, and that's when Eibach's engineering and motorsports teams will get together to see what they can come up with.

In many of those cases, Eibach's motorsports team will be presented with a challenge with certain parameters to work around—if a series changes its rulebook to allow a spring of a different length and diameter than the previous year, for example. After gathering information on what characteristics teams and drivers want from this new spring, the motorsports team then consults the R&D team to see what's possible. Once the green light is given, engineering works on modeling a spring to make sure it can meet racers' specific needs.

A prototype of the spring is made, then Eibach begins its in-house testing. The spring is loaded on a rate grapher, a piece of equipment that plots the spring rate through its entire range of travel, to confirm that it satisfies the racers' specs. It's then put on a cycle tester and run for around 500,000 cycles at various strokes for fatigue testing. If it passes that round of tests without losing any height, rate, or load characteristic, then prototypes are sent out to racers for real-world testing.

It's at this stage where feedback from teams might lead to minor tweaks to the spring. One example came from the company's NASCAR program, said Mark Krumme. "We were able to develop a very special spring with them for use on superspeedways to help control speed and safety of the cars and trucks. That basically came down to back and forth with engineering and saying, 'Look, the ground effects need to be maintained this far off the ground, and we need the load to be at this point.'"

> *"EVERYONE HAS THEIR OWN DRIVING STYLE, AND THAT'S WHY WE HAVE SPRING RATE RANGES TO FIT EVERYONE'S PREFERENCE."*

For Eibach's Michael Seidman, that becomes a matter of fine-tuning the rate curve. Using the above methods, Eibach is able to adjust the load characteristics of a spring at any height to give it a more progressive feel, digressive feel, linear feel, or really whatever a racer wants.

And what a racer wants, of course, is very subjective. "Everyone has their own driving style, and that's why we have spring rate ranges to fit everyone's preference," said Krumme.

ENERGY SUSPENSION

Energy Suspension in San Clemente, California, has specialized in high-performance polyurethane bushings, mounts, and other components for 38 years. In that time, the company has produced a massive catalog of parts that continues to grow every year. Since there's only so much time in a year to develop new products, Energy Suspension needs to carefully choose what projects it focuses on.

The decision to develop a specific part hinges on a number of different factors, but one thing Energy Suspension believes it does best is analyzing the competitive landscape and identifying gaps in the market. "Introducing similar products is not our formula for success," said Jon Burke. "Also, a feature of good product introductions is to lead the market by introducing products that the market is not even aware that it needs yet."

Suspension manufacturers all have unique development methodologies. For Eibach, the process begins with collaboration between the motorsports group and the R&D team.

Energy Suspension's marketing and sales teams gather data on a particular problem or market need and get together with R&D to work on a solution. Once a proposed part or kit is given the green light, the company seeks out a vehicle for measuring and test fitting.

"We can take the vehicle onto our lift to check for the match between our design information and the actual vehicle," said Burke. "The part models are modified and adjusted as more learning about the application becomes available through our vehicle inspections."

Once all the measurements are verified and the team has a viable prototype design, tooling for production, including master molds for the polyurethane parts, is developed, and the first prototypes are cast and assembled. These initial prototypes are measured against the original design before being test fitted. After that, the parts go through a series of grueling durability tests.

A durometer is used on all polymer parts to verify their resilience, and the parts are evaluated on a compression tester or tensile testing apparatus. A specialized load testing device vibrates parts for extended periods of time to test longevity. Oftentimes, Energy Suspension will build a special-purpose device to simulate high stress in a specific situation and get an idea of expected life under those circumstances. For the ultimate torture test, parts are subjected to a 50-ton press to see how they hold up to extreme loads and ascertain the point at which they might fail.

The other half of the testing process happens on the vehicle itself. After getting some seat time with the prototype parts installed, drivers will provide feedback on various factors, including ride and handling; noise, vibration, and harshness (NVH); and anything else they experience behind the wheel. "It's not unusual to encounter user feedback that drives changes in a part or parts of the bushing set," said Burke.

KW AUTOMOTIVE

Stroll through the pits and paddocks at any sports car race in Germany, and it's easy to lose count of the KW logos. That reputation has scored KW some prestigious OEM contracts, with the brand supplying shocks for such potent road cars as the Porsche 911 GT3 RS and Mercedes-AMG GT four-door.

Yet racing is in KW's DNA, so its team works with competitors both at the professional and grassroots levels to develop new products and continue evolving existing ones. The word "evolution" is key for

Development projects are typically chosen based on sales potential. "Introducing similar products is not our formula for success," noted our source at Energy Suspension.

KW, because its designs change constantly based on feedback from the track, its OEM projects, and its customers.

"Sometimes there's a technical evolution based on something that we're up against on a new project, and that's where the innovation starts to happen," said Frank Vasquez, in KW Automotive's Clovis, California, location. "We start to think of a more creative way to approach that problem. If the solution is feasible, then we can look at applying that across the board on new products. As time goes on, those changes start to trickle down to our most common parts.

"One of the important things to point out is we don't stock coilover kits on the shelf," Vasquez continued. "Every kit that is ordered by a customer gets put into the production line and produced specifically for that customer. The benefit of doing it that way is it allows us to be more flexible in those design changes. We get to roll that change out into the new production right away. It guarantees that the customer gets the latest spec, say if the damping profile changed a bit or if the spring rate was updated. All those changes are live in the system, and the product will get built that way."

Given KW's extensive involvement in endurance racing, its dampers go through a great deal of durability testing to prove they can perform over the course of a 6-, 12-, or even 24-hour race.

"When it comes to endurance racing, it's a matter of longevity, service life, and consistency throughout that," said Vasquez. "The teams are looking for parts that are going to work and provide a consistent output from the dampers throughout the extent of that race."

KW has many different stress tests to simulate hard usage over extended periods of time. "That helps us down to a component level evaluate how the product wears or behaves, the changes that the shock may see over time, temperature changes, that sort of thing," said Vasquez. "A lot of it comes with experience as well. If we've been using a certain type of shock technology for a while for an endurance championship, we know what to expect. If we do discover any shortcomings, we can start polishing or improving for the next iteration of that product."

PENSKE RACING SHOCKS

As a longtime supplier and partner of teams in Formula 1, IndyCar, and other top-tier series, Penske Racing Shocks of Reading, Pennsylvania, has earned a reputation for its professional racing suspension. But it also offers shocks for drag racing, dirt late model racing, motocross, and much more. The company has developed shocks for many different applications; and while all of its development draws from its experiences at the top levels of competition, the door also swings both ways.

"Formula 1 is probably at the tip of the spear on everything," said Aaron Lambert. "But from a philosophy standpoint, we try to take all of our technology, whether it's from Formula 1, or sprint cars, or ATVs, and when we're designing, we try to cross-pollinate with other markets. That's where we see a lot of our success. Even though the markets may be drastically different, part of our philosophy is that a lot of our parts all fit together. We might be doing some development for one market, but we're always trying to see how that might relate to another market and give us an advantage there."

"SOMETIMES THERE'S A TECHNICAL EVOLUTION BASED ON SOMETHING THAT WE'RE UP AGAINST ON A NEW PROJECT, AND THAT'S WHERE THE INNOVATION STARTS TO HAPPEN."

Penske also develops shocks for endurance racing. Currently, it's working with teams running cars in the new LMDh prototype class for the 2022 FIA World Endurance Championship and IMSA SportsCar Championship seasons. When developing shocks for those teams, once again Penske relies heavily on its experience in F1.

"From a performance standpoint, we know what types of loads a lot of these new sports cars will be experiencing," said Lambert. "So

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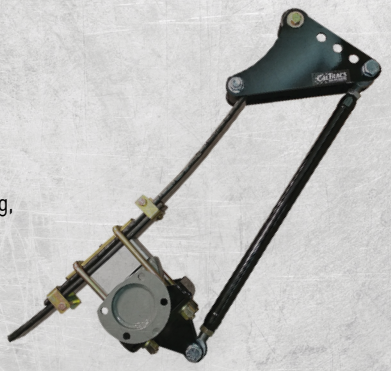

KW AUTOMOTIVE

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For more info: *kwsuspensions.com*

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For more info: *penskeshocks.com*

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For more info: *summitracing.com*

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- Torsion sway bar with end links.
- 100% bolt-on design.
- 9.5% front suspension travel.
- Deaver full spring pack with billet shackle.

For more info: *toptiersuspensions.com*

we can bring in some of our F1 experience, and when they get to testing these cars, hopefully their initial testing is a lot closer to where they want to be."

One big difference between F1 and endurance racing is the level of durability needed for all the parts on a race car that's going to run for a dozen or more hours at a time.

"There's a lot of testing that goes on, not only just from the standpoint of the damper performing but also the environment it's going to live in," said Lambert. "As aero gets more efficient and teams look for savings there, the temperatures get a lot hotter underneath the car, so that means the shocks are getting a lot hotter now. In Formula 1 the car might run for two hours at a certain temperature, whereas in endurance racing the car runs 12 hours, 24 hours in the same conditions."

Constantly pushing 100% for 12 hours or more "really puts all the hardware through the toughest conditions possible," he continued. "We can run simulations and other things here in the shop. We have a lot of different tools to run the shocks for a certain period of time, run them at that temperature, look at the fade, look at what's going to fail on them before it fails on the car, and then replace those parts or design them differently. We just constantly test and evolve to where, hopefully, our part's not the weak link."

QA1

QA1 in Lakeville, Minnesota, makes all kinds of suspension parts for all kinds of vehicles. A remarkable amount of development goes into each part, due to the fact that the company employs what's called a phase gate product development process for every part it makes.

The phase gate process isn't too dissimilar from other product development methods, except that at each phase a decision is made to either kill a project or allow it to proceed to the next phase, hence the "gates." In many cases, customers and racers come to QA1 with a problem, and if the engineering team thinks it can come up with a good solution, then it moves into the six-step phase gate process. Eventually, some concepts are explored, one stands out as a plausible solution, and the process moves forward.

Many suspension manufacturers specialize in particular forms of racing. KW Suspensions focuses largely on endurance-racing cars like this Porsche 911 GT3R.

"After a concept approval we move into a design stage, and that's where it gets really serious," said Chuck Olson. "We have a general idea of what we want the product to look like, but in the design stage we're modeling everything accurately in CAD, and we're getting a lot of data off the vehicles that our product would attach to, so there'd be a lot of measurements taken. We do a lot of laser scanning of chassis and test fittings of products at this stage."

Before a physical prototype is built, a virtual part is put through Finite Element Analysis (FEA) testing. QA1 uses a program called Solidworks, which can run a variety of tests on a part to assess strength, flexibility, or whatever else designers and engineers would want to know about. Immediately after running these tests, the team can make changes on the fly.

Yet the product can't be tested only virtually, according to Olson. Instead, it must be backed up with physical testing to confirm the FEA is correct.

"We have many systems at QA1 that we can use for durability testing," he said. "We have a servo electric test stand that we call the TUV that's our main durability system. It's based on a linear electric actuator that, if cooled properly, can run essentially forever. That's frequently what we'll use. We purchased it for extremely high loads. One of its primary uses is for shock durability, but we found that by specifying the system

Penske Racing Shocks serves markets from ATVs to Formula 1, sharing insight between them. "We try to cross-pollinate with other markets," explained our company source.

correctly, we can use it for sway bars, control arms, components for control arms, cross shafts, you name it. It works great in many applications. We just design some custom fixturing for it. If we want to test a control arm with thousands of pounds of load continuously over two weeks, we have the ability to do it."

> *"IT'S NOT UNUSUAL TO ENCOUNTER USER FEEDBACK THAT DRIVES CHANGES IN A PART OR PARTS OF THE BUSHING SET."*

Shortly after these prototypes go through physical testing, they're sent out to racers to see how they perform in the real world. "Ideally, we're going to get a lot of miles on them," said Olson. "And in many cases, they're racing them. Trying them on the drag strip, trying them on autocross, and road course events, and testing. That's also a big part of the feedback that we get. It's all necessary to really have a well-thought-out product prior to release."

At this stage in the process, it's rare for QA1 to get feedback that requires a major design change. Some of the most useful feedback they do get deals with installation—whether a part was easy to install or the instructions were clear enough.

RE SUSPENSION

Since RE Suspension's founding in 2003, the Mooresville, North Carolina-based company has been a champion for grassroots racers. After hearing about the lack of suspension support his friends were getting at their local tracks, co-founder Jason Enders made it his mission to offer top-level suspension knowledge to everyone, whether a particular race car was born in a garage or in the boardroom of one of the top teams in the industry.

Suspension manufacturers are always looking for gaps in the market. RE Suspension's purpose-built bump stops were created to take advantage of new NASCAR Cup rules.

One key advantage RE Suspension was able to offer was shock testing, and that's in large part thanks to Enders' partner, Kurt Roehrig of Roehrig Engineering, which builds shock dynamometers. Currently, RE Suspension has five Roehrig dynos, including two 5-horsepower crank dynos, two 10-horsepower dynos, and one EMA (Electro Magnetic Actuation) dyno that can reproduce any waveform, download track data from a data logger, and simulate the exact conditions of a race track.

In addition to setting up race cars and fine-tuning suspension systems, RE Suspension manufactures a line of its own parts. Since the company is also a dealer of many of the biggest suspension brands, including Penske Racing Shocks, it tries not to overlap with any existing products when developing parts of its own. "We create products that don't exist, or people don't know they need yet," said Enders. One niche where RE Suspension has thrived is in the performance bump stop market.

When a rule change in the NASCAR Cup series gave teams greater flexibility with their bump stops, Enders saw an opportunity to develop a purpose-built part for the job. He began looking at different materials, like polyurethane foam and solid polyurethane. At the same time, Roehrig had introduced a new top-of-the-line valve spring rater. Together, they beefed up that machine so it could test and measure larger springs,

among other compressible parts like bump stops, with impressive accuracy.

"For a good two years I lived on that advanced spring rater trying to get stops that were more linear, because we figured out that, in the world of bump stops, tires love linearity," he continued. "All the bump stops we had at the time were made out of foam and they were very progressive, so we started trying different shapes and using different materials that were more linear than what we had."

This cycle of researching, designing, and building prototypes, testing those pieces and then ultimately going back to the drawing board would continue for some time, but eventually RE Suspension's hard work paid off.

"We microscoped this thing until there wasn't much left to learn," said Enders. "We figured out where we needed to be and then expanded upon that. It was a lot of R&D, a lot of making stuff and throwing it away and trying different materials and different suppliers for materials until we found something that was good all the way around." PRI

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DEFEATING TURBO LAG

Problems arising from system design, parts selection, and inexperience can lead to performance left on the table—or even the failure of critical components. Here are some of the most common trouble spots seen by turbocharging experts and how they can be resolved.

By Bradley Iger

Whether the weapon of choice is a high-winding four pot or a big displacement V8, turbocharging has become the name of the game when it comes to making big power. Turbo technology has come a long way in recent years and its popularity has increased in turn, but that doesn't mean it's foolproof.

"It can be trickier to work with versus a supercharger, for instance," said Reggie Wynn of Precision Turbo & Engine, Hebron, Indiana. "There are more things that can go wrong along the way, but they're generally simple issues that can be easily corrected. But without knowing what those are when going into it, it might not be so simple."

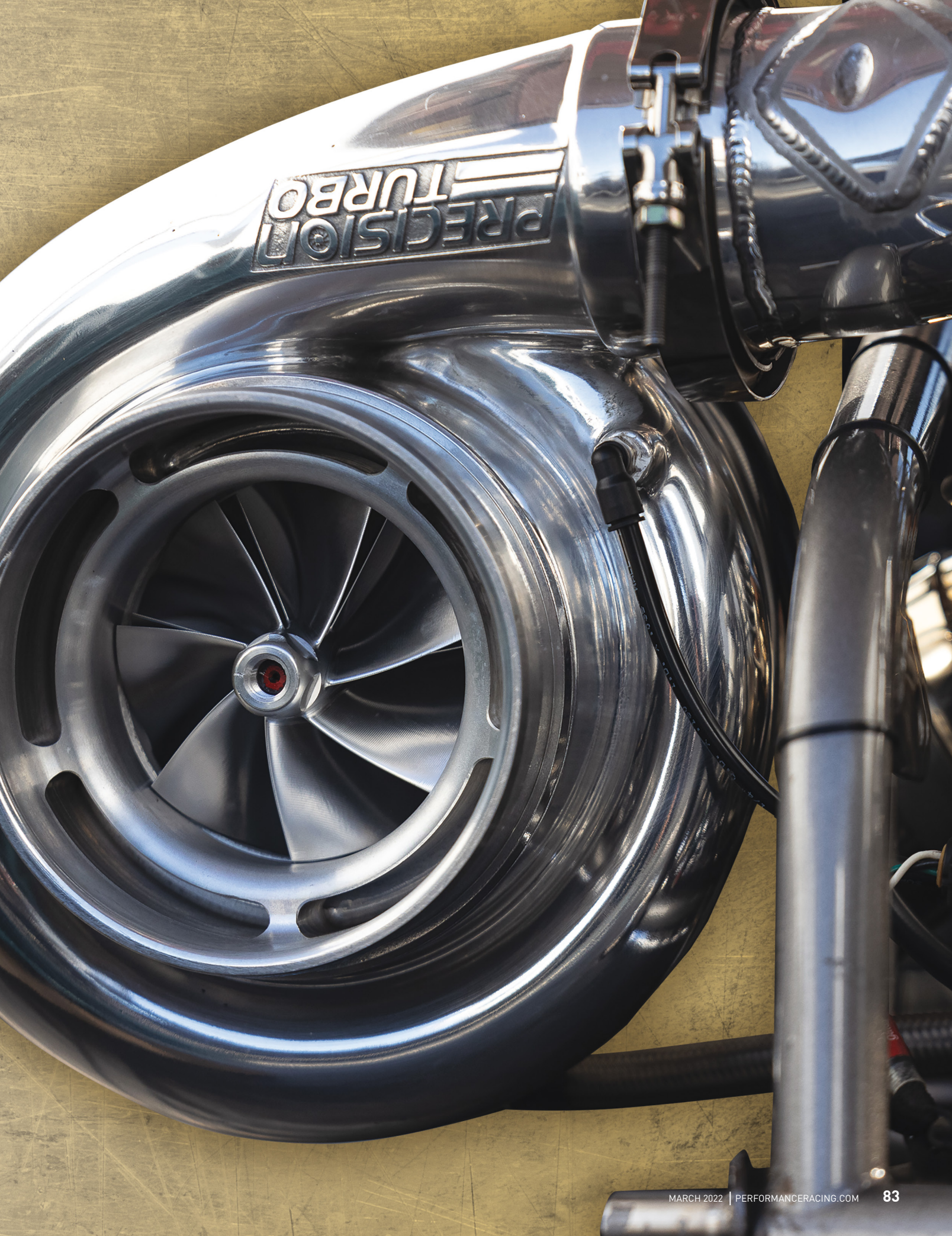
Those issues can be exacerbated by factors that have nothing to do with what's under the hood. "Sometimes it's just pride," Wynn said. "Some people don't want to ask for help, or they're not willing to heed advice from people who've done it before. They might have a lot of experience with other types of engine combinations and assume that what works in one situation will apply to another, but that's not always the case."

Ernie Munoz of Comp Turbo Technology in Pomona, California, pointed out that turbocharging is a very different game when compared to other power adders, and some folks might not know what they're getting into initially. "People get fixated on the horsepower numbers or displacement, but there are a lot of other variables that need to be considered when putting a turbo system together that can affect what kind of power it makes and how reliable it's going to be."

Performance and reliability are the core goals of just about any combination built for competition, and the inherently complex nature of turbocharging means that small problems can have a significant impact on both. Yet as the experts attest, most problems stem from common mistakes that can be easily avoided—provided the racer knows what to look out for.

1. WASTEGATES SHOULDN'T BE AN AFTERTHOUGHT

"From a boost control standpoint, the location and proper mounting of the wastegates is key," said Marty Staggs of Turbosmart, Ontario, California. "All of the wastegate manufacturers provide diagrams and guidance on this, but it often gets overlooked when people are building their headers or designing their systems. A lot of times it's the last thing that gets taken into consideration, so folks will just try to stuff them into any spot where they'll fit. Folks need to take into account the size and location of the wastegates when they're building that system, because otherwise they'll get bit. They should be mounted in the flow path because we need to control that exhaust drive pressure. If the gates aren't installed properly, they will have a hard time controlling the boost."


PRECISION TURBO

Turbochargers are a proven way to achieve spectacular performance, but racers need to consider variables that can affect power and reliability, noted our source at Comp Turbo Technology.

2. AREA OVER RADIUS SIZING

"If the A/R [area/radius] is too tight, it's going to over-spin the turbo, and that causes a lot of failures," said Deena Salenbien of Apex Turbo, Maybee, Michigan. "When it comes to the turbine housing, it's one of the few aspects of the design where the builder has to make a choice. The tighter the A/R—or the smaller the number—the smaller the opening into the turbine housing is, and the quicker the turbo will spool up.

"FROM A BOOST CONTROL STANDPOINT, THE LOCATION AND PROPER MOUNTING OF THE WASTEGATES IS KEY."

But the larger that area is, the more top-end power it will make because it'll flow more air through the scroll of the turbine housing. An A/R that's too tight runs the risk of spinning up the turbo beyond its operating range, and that can potentially damage the turbine or the bearings. In a racing application, where low-rpm engine response isn't a big concern, loosening up the A/R provides some headroom to get a reliable sense of the turbo's desired rpm range. Then tighten up the A/R from there if necessary."

Wynn agreed that a less restrictive housing is ultimately a safer bet. "A compressor cover that's too small will kill the turbo sooner. Keep over-speeding a turbo, and at some point, it's going to fail," he explained. "Make sure that the compressor housing is the right size to match the compressor wheel size. If someone is stuck between two different sizes, I would recommend going with the larger housing. A lot of people will go with the smaller one because of packaging concerns, but the restriction can potentially affect the turbo's longevity."

3. FOREIGN OBJECTS

"If the turbo isn't shielded in some way, that risks causing damage every time the car is run," explained Munoz. "That turbo is spinning very quickly, so it's like a jet engine that will just pull in any kind of debris that it comes across."

Salenbien said problems that can crop up from debris entering the turbo system aren't always immediately obvious. "That could be a foreign object from the road surface, or it could be a situation where something like a

A turbocharger's area/radius (A/R) strongly influences spool-up time, overall power production, and longevity of the turbo, explained our source at Apex Turbo.

"IF THE TURBO ISN'T SHIELDED IN SOME WAY, THAT RISKS DAMAGE EVERY TIME THE CAR IS RUN."

valve seat comes loose and goes through the turbine side," she said. "If that causes a chip, or a blade comes off, it's going to cause an imbalance and that will eventually lead to a bearing failure. It might not show up right away, but in a short amount of time they're going to start seeing a lot of issues. It's probably the biggest reason that turbos come in for repair. Those types of problems can be tough to detect right away, though, so it's important to pull the downpipe off and inspect the turbo regularly. Just spinning it isn't going to indicate whether or not something is damaged."

Wynn said that the best way to avoid foreign object damage is to run a filter or guard of some kind, but he noted that this approach comes with its own compromises. "A filter will protect the turbo against a lot of that, but a lot of racers won't use them because they don't look as nice aesthetically, they restrict airflow to a degree, and they take up more space," he explained. "But if debris gets into the compressor side of the turbo, it's just a matter of time before that turbo is toast."

For those who want to make sure their turbos can live long and healthy lives in racing environments, Munoz recommends dialing in the system with a filter on right from the get-go. "Get a filter that's going to have very high-rpm flow so it can actually hold up in that environment. Otherwise, it becomes a very big restriction. And it would be a good idea to do dyno sessions with the filter on if the plan is to run one," he advised.

Many racers mount turbos based on space considerations, rather than what's optimal for the unit itself. This can cause improper oiling and other problems for the turbocharger.

"ONE OF THE BIGGEST PROBLEMS I SEE IS WITH TURBOS SMOKING, AND THAT GENERALLY HAPPENS BECAUSE OF IMPROPER OIL DRAINING OR SCAVENGING."

4. IMPROPER OILING

"One of the biggest problems I see is with turbos smoking, and that generally happens because of improper oil draining or scavenging," said Staggs. "The oil backs up into the turbo, and that's not good for the system's efficiency or longevity. In those situations, it often ends up pumping oil into the intake, so that can cause problems there as well. Proper draining of the turbo and scavenging of that oil line is critical."

Wynn said that the issue is often caused by mistakes in the design of the plumbing. "I see a lot of folks using too small of a drain line to go back into the engine, and that will cause smoking. You need to use a -10 or larger, depending on the size of your turbo. But the biggest no-no I see in this realm is 90-degree fittings. With that oil being gravity-fed out of the turbo, any abrupt change in direction of the flow is going to cause the oil to back up into the turbocharger. It's better to use two 45-degree fittings to achieve the same goal instead."

Munoz noted that low-mounted turbo systems can see other oiling challenges, too. "Best practice is to mount the turbocharger above the oil pan so it can drain properly and avoid leaking issues," he said. "Some folks chose to mount them really low in the car and run a scavenge pump system to compensate for it, but that can cause serious problems. That pump is trying to replicate gravity drain, and any time it doesn't pull fast enough, it risks causing damage. That's why we recommend air-cooled or oil-less turbochargers in those situations to avoid the issue entirely."

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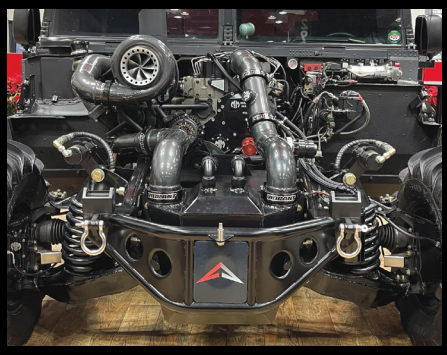
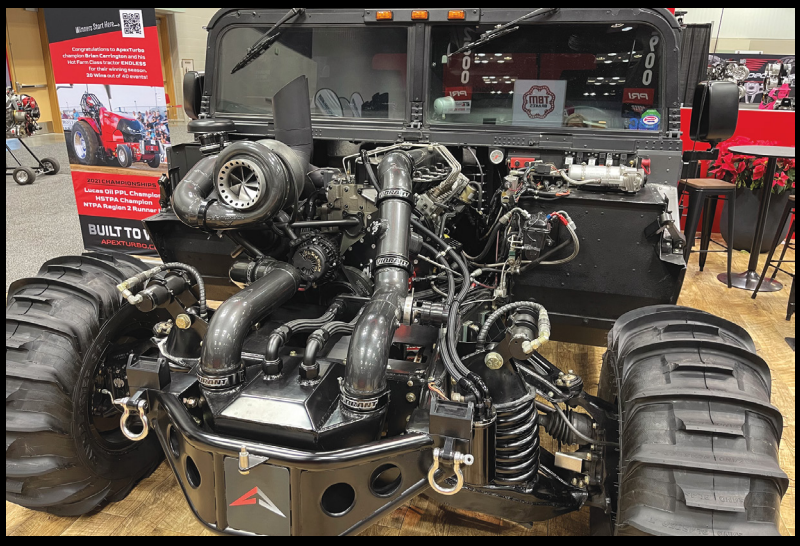
SHOW PIECES

While race product innovation is a 24/7/365 endeavor, no event captures the sum total of these developments quite like the annual PRI Trade Show. Each December, this marketplace of motorsports brings tens of thousands of buyers to the Indiana Convention Center and Lucas Oil Stadium in downtown Indianapolis to survey the latest go-fast parts and discover solutions to help unlock their race programs' performance potential. Front and center at our most recent Show were some dazzling displays of turbo-equipped engines designed to elevate both horsepower and pulses. Here's a closer look at three builds from the Show floor that we found particularly eye-catching.

MOUNTAIN MACHINE

Mountain Machine owner and engine builder Steve Ortner combined an H1 Hummer with a turbocharged 6.7L, 1,500-horsepower Cummins engine that has a highly modified 12-valve cylinder head and a pair of ApexTurbos. The manifold charger is an 88-mm s400 and the big turbo is a custom 110/114 charger with Apex's patented billet center section with triple ball bearings and billet wheel. The rest of the engine features a Hamilton wet race block, Wagler rods, Diamond billet pistons, Farrell Diesel Service 14-mm pump, a competition Fluidampr damper, and several billet parts from Mountain Machine's shop. This truck is primarily run at the Silver Lake Sand Dunes in Mears, Michigan. The custom cut paddles from Duneland Off-Road Center on the Raceline wheels helps it fly through the sand.





CIVETTE LSX

The Civette LSx, owned by Renegade Racing's Thomas West, is a 2,200+ horsepower rear-wheel drive LS-swapped 1996 Honda Civic with a Corvette C5 drivetrain. It features twin Precision Turbo & Engine 76/78 ball bearing turbos with dual wastegates and dual blow-off valves as well as a Nitrous Outlet direct port nitrous system. The entire turbo kit was custom made for the one-of-a-kind car. Top End Fabrication built nearly the whole car, including the chassis, turbo kit, fuel system, etc., and Tommy's Auto Machine & Parts built the engine. The driveline, including the transmission and clutch, was built by Tick Performance while Scott Bowen from In Tune Motor Sports tuned the Civette. West races in Stick Shift Outlaw.

BLUE TURD

Zach Wright's 1995 Ford Taurus SHO features a custom billet block V6 from Bullet Race Engineering that's based off the original Taurus SHO engine. The car has a chassis built by Bill Draghis' Chassisworks, is wired by Ryno Wiring Solutions, and tuned by FuelTech with jazTUNING. It makes 1,400 horsepower with a Precision Turbo & Engine 7285 turbocharger (but will soon have the new 7685). Wright mounted the turbo all the way forward, literally sticking out of the front bumper, for a weight ballast. He's using all the weight and leverage he can to plant the power through the front tires. Blue Turd competes in XFWD (Xtreme Front Wheel Drive), which is open to front wheel drive imports only.

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5. BIGGER ISN'T ALWAYS BETTER

"If what's needed is good response across the rpm range, going with one huge turbo is not going to be the best option," said Wynn. "When the turbo is too large, it's going to take a long time for it to spool up and make power. That might work in certain racing applications, but if the engine is going to operate in a wide rpm range, the better choice is often running two smaller turbos with more boost rather than one bigger one with less boost. But for someone working on a budget and who needs to stick with a single turbo, sizing it to their needs is going to produce better results than just buying the biggest one they can afford."

6. AIMING FOR 1:1

"Typically, the best horsepower results we see happen when the inlet pressures and outlet pressures get close to being the same value," stated Salenbien. "That can be tough to achieve because of the differences in wheel sizes or the rule restrictions in certain

Turbocharging can be "trickier to work with versus a supercharger," noted our source at Precision Turbo & Engine. "But they're generally simple issues that can be easily corrected."

race classes. Racers who run similar sizes for the compressor and turbine will probably never see a 1:1 ratio like that, either. They're always going to see way more turbine pressure than compressor pressure in that situation because the turbine's too small to be able to achieve those kinds of numbers. But to really optimize the system, 1:1 is the target. It could take some trial and error along the way with turbine housing sizes, wheel sizes, and the engine combination itself. Cylinder head flow and camshaft profiles can change that dramatically."

7. BUILD STRATEGICALLY

"There is a lot of, 'monkey see, monkey do' going on out there," explained Turbosmart's Staggs. "People see someone else's turbo setup and assume that it is going to yield the same results for them. But this is not a situation where one size fits all. The system should really be built around what the specific goals are. Just swinging for the fences is not going to provide optimal results. The application, the engine combination, the fuel used—all of these elements factor into how a turbo system should be built to maximize results. Usable power is the real goal here. Four-thousand horsepower isn't worth much if it can't be controlled, so the setup needs to be manageable under the specific circumstances in which the car is used. Given what's available today, we're seeing more and more people who are interested in actually turning down the power to make it more controllable. The guy who is focused on making as much horsepower as possible isn't going to go rounds. The guy to worry about is the one who is dialing it in to be manageable."

Salenbien said the engine combination itself is a crucial component in that equation. "Turbo systems take a lot of unfair blame because they're an easy target when the combination isn't doing what someone wants it to do. But the cylinder head design, the camshaft, the fuel delivery—all of it factors into the end result," he explained. "Racers need to open up a line of communication between their engine builder, their tuner, and their turbocharger manufacturer together to make sure that the build will make not only the performance needed to win, but also the longevity." PRI

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COOLING CARDS

Marketing products that keep race engines at the right temperature involves a diverse promotional strategy that includes social media, shrewd advertising, and trips to the track.

By Mike Magda

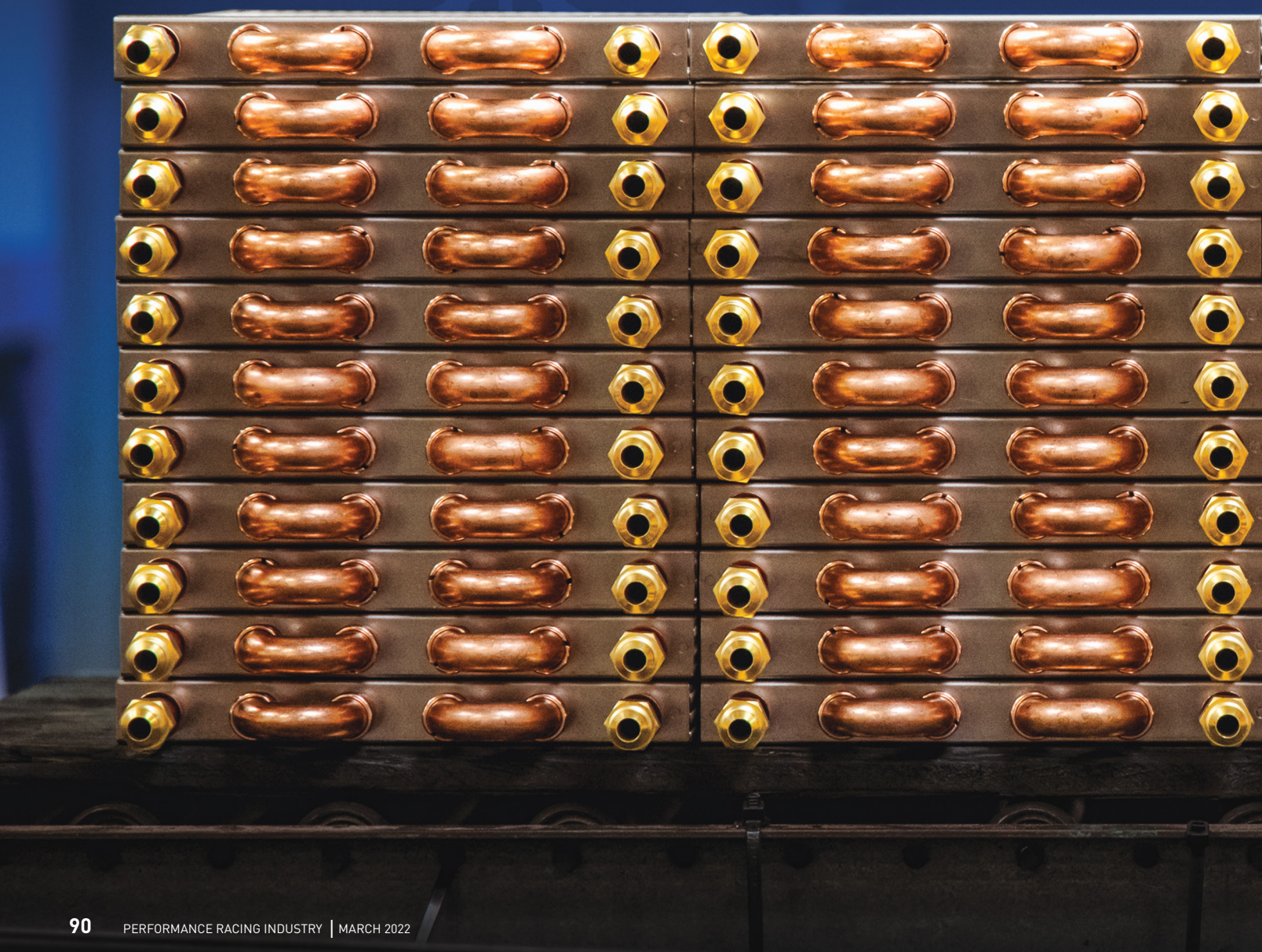
No report about selling automotive racing products can be written today without referencing the impact that COVID-19 is having on the industry. The market segment that manufactures performance cooling equipment is no exception.

From scarce labor to a limited supply chain, the pandemic has also affected marketing strategies that help suppliers get word of current and new products out to the performance community.

"I would say we're in a very interesting, kind of gray area for our marketing at the moment," said Jalen Frye of PWR North America, Indianapolis, Indiana. "When COVID hit us, our production got really backed up. We had an influx of orders and a skeleton crew, so that pushed our lead times out quite a bit."

Frye joined the company's marketing efforts in the summer of 2021 and focused mostly on maintaining the existing sponsorship deals and other motorsports efforts.

"A lot of the sales we've been able to generate on the aftermarket



side have come from either word-of-mouth or social media," added Frye. "We've been fortunate to have our customers tell our story."

It's a similar narrative over at CVR Automotive Racing Products in Arnprior, Ontario, Canada. "CVR has always been a word-of-mouth company, and the racing community has always been our best promotor," said Ron Thomas. "Not only the racers but the distributors understand the quality and have always conveyed that to the customer."

CVR offers a unique modular water pump that will fit a variety of engines, depending on the installation kit. There's a common center unit machined from billet aluminum that supports a 12-volt motor and billet impeller. Depending on the installation kit, the pump will fit a Chevy or Ford small or big block engine. It's even available in different colors.

"We manufacture our water pumps in Canada, and our goal is to design and make as many component parts as possible. When we can't make a particular part, we find the best one on the market, not the cheapest one," explained Thomas, adding that the company's distributor network is vital to its marketing efforts. "CVR has always marketed through our distributors by providing them with the most up-to-date images and information. We rely on their marketing judgment as they know their customers' wants and needs."

THREE DEPENDENT FACTORS

Automotive cooling systems are unique in that there are three separate factors that are dependent upon each other for optimum performance. First, there's the engine, where the heat is generated and absorbed by coolant that flows through the cylinder block and cylinder heads. Next is the radiator, where the coolant disperses the heat, and then there is airflow—which depends on vehicle grille design, fans, and shrouds—that draws that heat from the radiator fins.

While some cooling system manufacturers are testing new marketing methods, many are focused on more essential issues. "We're trying to fulfill all the orders," explained our source at Canton Racing Products.

Based on a sampling of cooling product suppliers, marketing and selling to racers can also be broken down into three factors: promoting social media platforms, building a strong website backed by strategic advertising, and spending time at the races. That is, after getting caught up on all the back orders.

"Marketing efforts haven't changed a lot from [COVID] just because we're trying to fulfill all the orders," said Iann Criscuolo of Canton Racing Products, North Branford, Connecticut. "It's kind of an inverse problem."

Canton has seen growth in model-specific supercharger coolant tanks as well as universal styles. The model-specific tanks are built to stand out from the factory and competitive units.

"We use .100-inch aluminum, and we offer a black powder coat," said Criscuolo. "There's an aesthetic appeal to them along with durability. We do promote those features, but the application is also important, either for their niche or for the certain dimensions that they need to fill. Engine space can be tight, so we build custom tanks."

DIVERSE CATALOG

For the future, Canton is studying the intercooler market, but coolant expansion tanks and supercharger coolant tanks are keeping the company busy, along with oil coolers and other lubrication-related products. In fact, some companies with a broad range of performance products suggest that having a diverse catalog helps market its cooling line.

"I think we have an advantage in not only just supplying them with the universal cooling and heating products, but also showing them that we have more to offer for engines, whether it be brackets and pulleys, ignition products, fuel-injection systems, oil pans," said Ralph Martinez of Top Street Performance, Santa Fe Springs, California. "It really opens up the door for us to show that we can help them."

About 25–30% of Top Street's sales is from cooling products, and much of those come as the warmer months approach. "Spring and summer are really our high-selling months when we see an increase in the cooling category," said Martinez. "That's because the customer's replacing the water pumps or replacing the radiators. And, of course, new fans are the most popular product." There are no new cooling products under development, he added. "Right now, we're just trying to focus on the current products and trying to make them better."

For some cooling suppliers, COVID didn't hamper normal marketing efforts with the exception of important trade shows and racing events that were cancelled in 2020.

"We sell a lot of our products through distributors and on our own website," noted Gary Johnson of FLUIDYNE, Mooresville, North Carolina. "If there's been a change, it's the fact that we haven't had trade shows and we're unable to go to as many races. So that's not a change in our strategy, that's just a change in the result."

For nearly 30 years, FLUIDYNE has been associated with numerous racing series, whether through sponsorships, participating at events, or setting aside contingency money.

"We have a lot of access to the people and products as a result of that sponsorship," said Johnson. "We have awards that we present based on how they do in their races or in the points. We participate with the sanctioning body to give it an opportunity to help build its show. I let the sanctioning body choose how it wants to reward its racers, but it makes sure the racers who use my products have my stickers on."

Following up on conversations from

For nearly 30 years, FLUIDYNE has been associated with numerous racing series, whether through sponsorships, participating at events, or setting aside contingency money. "We have a lot of access to the people and products as a result of that sponsorship," reported our source from FLUIDYNE.

the 2021 PRI Trade Show, future areas of participation could include off-road racing and an expanding dirt-track presence. The company also developed products for the vehicles in the recently launched SRX series. "That certainly opened up our exposure," added Johnson. "A lot of people went to those races."

Many manufacturers are diving deeper into digital marketing. PROFORM is ramping up ads on digital platforms while collaborating with social-media influencers.

MORE CLICKS, MORE LIKES

While companies will get more facetime with racers this year as COVID restrictions ease, the key marketing buzzwords for our sources still seem to be "social media." Marketing departments continue weeding out the many choices on the Internet, including learning about "influencers."

"We do have some influencers," said Ryan Salata of PROFORM, Warren, Michigan. "There are a few professional racers who will test our products. They'll take pictures, some lifestyle-type shots, show how to install it, and provide a couple of additional tech specs. Basically, for the cost of a product, a bunch of marketing gets done for us."

Traditional advertising remains a core component of marketing strategies. Salata said PROFORM is ramping up ads on digital platforms. "In addition to increasing ads, we're running some A-B tests to see how one ad compares to another, and then choosing the best one. We also tweak it from there as time permits."

Even though sales go directly to jobbers and NWDs, PROFORM will market to the end user. The strategy is to promote product categories rather than specific part numbers. "For example, it will be a Slim-Fit radiator ad as opposed to a Camaro radiator ad," noted Salata.

Moroso in Guilford, Connecticut, started offering resale customers more digital information on its products along with those from sister company Competition Engineering, even before COVID-19 prompted many suppliers to rethink their marketing strategies. This move helped the retailers educate their staffs along with customers.

"At present we are working on a revised website that will be more user friendly for our customers to find part numbers and information about them quicker," said Thor Schroeder, noting that new products are promoted based on features that help separate them from the competition. "We'll list the attributes of our newly released products based on the testing that we have done with claims that are based on fact and not speculation."

Citing the company's 50-plus years of experience and a well-known name, Schroeder noted, "There is always the headache of not resting on our laurels and doing better than what we have done in the past. That is always a contributing factor if we are going to bring a product to market—what attributes the customer is expecting of the product and how we write the instructions. Even during the course of the life of the product, the product might get revised based on customer input and/or rules or technology changes."

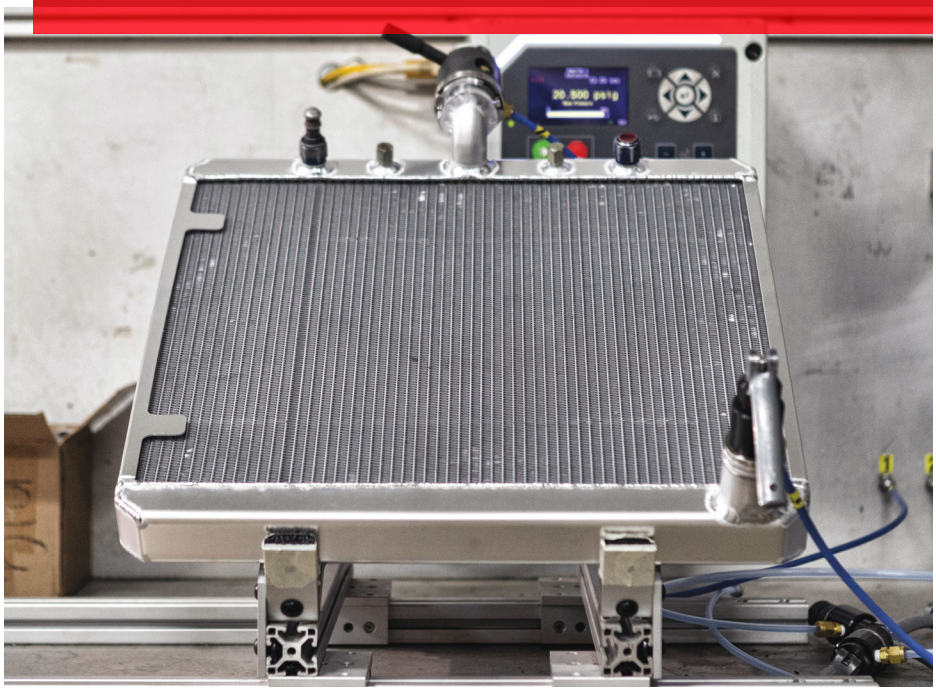
DIRECT COMMUNICATION

For Be Cool Radiators, which is based in Essexville, Michigan, the pandemic prompted the company to improve direct communications with customers along with expanding social media opportunities.

"We set up direct telephone support lines to Be Cool technicians, plus customer builds were featured on YouTube channels and other social media platforms," said Fred Militello, adding that website improvements were also made. "Any novice computer user can navigate. It has turned into a one-stop shop from tech advice to parts ordering."

A key point in Be Cool's marketing push is emphasizing that all engineering, testing, and production is based in the USA, and that the company stands behind its warranties. "Also, we have quick turn-around and special one-off builds for racers," added Militello.

Cooling-system manufacturers are rising to the challenge of designing and building products during the pandemic. At the same time, they're sharpening how they market to the racers they serve.



Marketing in all sectors increasingly emphasizes education. Moroso now promotes products largely through in-depth information provided to retailers and their employees.

Delivering high-quality components is the emphasis found in marketing material from Maradyne High Performance Fans in Cleveland, Ohio. "Our electric engine cooling fans are designed, manufactured, and assembled in company-owned plants where we ensure that only the highest-grade materials are used and strictest manufacturing standards are adhered to," said Jim Kahl. "All of our motors are designed for long-life, durability, and use in harsh environments. These motors perform exceptionally well not only for everyday use, but also in extreme conditions. All of our products are performance tested before they leave our factory to guarantee that they stand up to the most demanding high-performance needs and expectations."

To relay that message, Maradyne communicates with customers through its website and social media channels on Facebook, Instagram, and YouTube. "We work hard to stay current by introducing fresh content and updates regularly, but nothing works better than maintaining close personal contact with our customers," Kahl added.

One of the more interesting marketing efforts in this segment involves PWR, simply because many racers grew up using C&R cooling products and remember that distinctive C&R logo painted on radiators. In 2015, C&R was acquired by PWR Performance Products in Australia, so the rebranding efforts can be delicate.

"It can be a tough transition," said Frye. "People still call wishing they could find C&R racing equipment. And they can, and it's actually better now. But we've done our best in the last couple years to shift people over and let them know what happened and why the name change."

Part of the rebranding involves promoting the R&D facilities and advanced capabilities in Australia, and then reminding customers that every product is made in-house from raw materials.

"They have a wind tunnel in this incredible facility," noted Frye. "A lot of our developed parts start their cycle over there. When the design gets here, we can make a few tweaks for the American market. They know exactly what they're getting because everything is made here in-house."

PWR likes to promote its success with tackling challenges in the drift car market. "They're going 80 to 100 mph sideways, so it's hard to get really good airflow," said Frye. "Those guys who run hot look at the leaders and ask what they're running. They're going to need a specific package, and we're able to offer that. But we also have universal drift packages and universal drag radiators if they don't want to spend a ton of money."

NEW OPPORTUNITIES

Expanding opportunities in performance cooling is keeping the marketing departments busy reaching out to those racers.

"We're trying to expand the powersports business," said Chuck McKaige of Northern Radiator, Willmar, Minnesota. "At SEMA, a major distributor saw a couple of ATV, UTV pieces on display. It seems like it's a little more difficult of a market to break through just based on how often a radiator in a UTV actually fails.

"It's not really new, but it's new to us—in the last several years our diesel product has really caught fire," continued McKaige. "We offer an OE-style radiator, but it's better. The tanks are better, the connection points between the tank and the core are much more secure. We also have a fan-shroud assembly that allows removal of the engine-driven fan, which allows more air movement. We've also introduced a new controller that enables a standard brushed fan to operate like it's a brushless fan."

To help reach these new customers, Northern Radiator put its website on a new platform. "Our website allows people to go in and look at every product that we have, and many of them are application-specific," explained McKaige. "There are some products that are universal, but we have all the dimensions. So, the customer has to know which piece that they really want."

The increasing popularity of turbochargers is motivating Power Cool Systems in Brighton, Michigan, to develop advanced intercooler designs. "We have a couple of drag racing coolers coming," said Earl Lemley. "Everyone wants higher performing coolers in a smaller air space. We've been working on new fin technology and technology internal to the tubes."

As with any technology breakthrough, the company has to get the word out. Power Cool is expanding its social media outreach and redesigning its website. "We're going to make it more of a digital marketplace," said Lemley. "That said, we still value face-to-face interaction, and we really want to listen to the race teams and find out what they want."

Lemley explained that Power Cool's goal is to "educate the racers about our technology," including the company's core. "On the radiator side, we leverage that our parent company, TWI Systems Group, does OE development. We can pass the same thermal cycle and durability testing. Racers don't want to worry about their cooling system. They have other things that they need to do, like going fast." PRI

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moroso.com

Northern Radiator
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MEMBER CHECK-IN

GREG FORNELLI

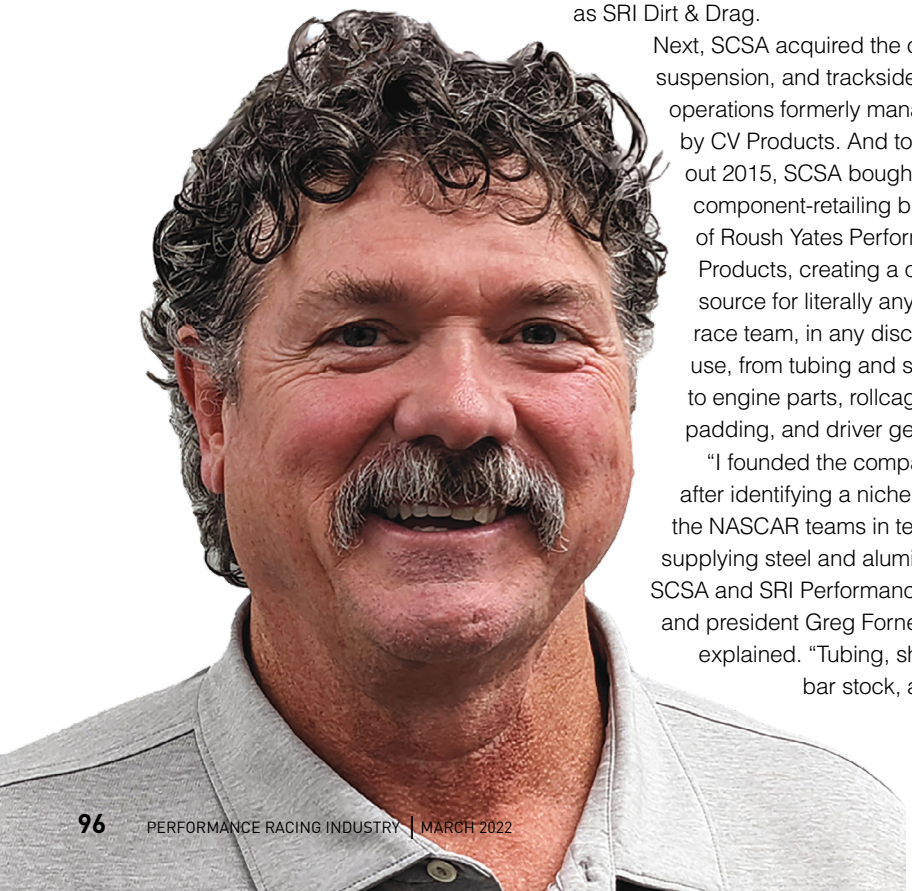
SRI Performance and Stock Car Steel And Aluminum are looking to expand beyond current markets into new race segments and locales.

By Jim Donnelly

The pandemic remains a global challenge to businesses of every stripe, but the emergence of a virus didn't bring innovation to a jerking halt, either in the realm of motorsports or anywhere else. In the ever-briefer offseason, teams are scrambling to get new cars built, and in NASCAR that means creating an entirely new generation of race car. It takes parts, raw materials, ingenuity, and determination. Many of the most basic supplies, particularly in NASCAR country, emerge from the Mooresville, North Carolina, home base of SRI Performance and Stock Car Steel And Aluminum (SCSA).

Founded 25 years ago, SRI Performance and SCSA exist across multiple marketing categories. SCSA's original core business was providing raw and processed metals to fabricators across a broad variety of racing disciplines. Today, it serves its market from locations in both North Carolina and Indiana. Getting the raw material is one element of readying a racing operation for the coming season. Another is outfitting the race car, which this firm can also help accomplish.

Those remaining components are what SRI Performance, as it now exists, is all about. In 2015, SRI Performance purchased TJ's Performance Warehouse of Denver, North Carolina, providing it entrée to supply hard parts to the dirt car and drag racing markets. That part of the business operates as SRI Dirt & Drag.



Next, SCSA acquired the chassis, suspension, and trackside-support operations formerly managed by CV Products. And to close out 2015, SCSA bought the component-retailing business of Roush Yates Performance Products, creating a one-stop source for literally anything a race team, in any discipline, can use, from tubing and sheetmetal to engine parts, rollcage padding, and driver gear.

"I founded the company after identifying a niche with the NASCAR teams in terms of supplying steel and aluminum," SCSA and SRI Performance founder and president Greg Fornelli explained. "Tubing, sheetmetal, bar stock, anything that's used to build a race car. Our roots are in NASCAR, but we've since really diversified into every form of motorsports, and even into industrial accounts. But our bread and butter is motorsports. Dirt racing is probably the single biggest market we touch now, but we also have drag racing, off-road, and marine."

If the firm has a founding, core product, it would have to be the mild steel tubing that SCSA has furnished to NASCAR and elsewhere for decades. The 1.75-inch, .095 thickness tube for rollcages is ground and polished before shipment. SRI Performance is the lead metal supplier to Technique Chassis of Concord, North Carolina, an approved NASCAR contractor, which is supplying center sections, front and rear clips, plus other assemblies for Next Gen applications.

"We've been doing this for 25 years, but before Technique came about 15 years ago, we were selling to individual race teams," Fornelli said.

Adapting to NASCAR's parceling of Next Gen technology has been a priority of late. Beyond that, the CV and Roush Yates acquisitions have given SRI a retail footprint that covers racing components from more than 400 manufacturers. A few of those, Fornelli pointed out, account for about half the parts that go into constructing a Next Gen car, including all tubing. His fundamental business strategy is expanding across all of the motorsports genres now being served.

"We're very strong locally, but we're looking to expand on a national and even, really, an international level," he said. "We'll be doing that through marketing and e-commerce. We're also working to stay ahead of the Next Gen car on the NASCAR side, and all the changes that's bringing.

SRI Performance's Greg Fornelli told us one of his top priorities is "working to stay ahead of the Next Gen car on the NASCAR side, and all the changes that's bringing."

It's important to us—a monumental task—to keep track of what's happening with those parts, while we continue to nurture the dirt racing community, which will represent a huge opportunity to us in the future. From chassis manufacturers in the Midwest to the dirt modifieds in the Northeast, we're going after them. The bigger multi-car teams, like the World of Outlaws guys, buy quite a bit from us currently. We've got a branch in Brownsburg, Indiana, to handle those areas. We're looking for a bigger presence on the West Coast in the next few years."

Citing current supply volatility, Greg Fornelli noted, "If you've got material in stock right now, you're sitting good."

In terms of business discipline and obstacles, Fornelli said manganese supply interruptions from China have made stocking raw aluminum a challenge at times, especially when dirt teams are clamoring to replace body components with painted sheet. "Aluminum's going to continue to rise, and tubing will come down a little. A lot of manufacturers, steel mills, shut down during the pandemic. Then the world's governments flooded so much money into people's hands that there really wasn't a demand stoppage.

"In Q1, Q2, we're going to see the mild steel easing up for sure, a catch-up on the performance parts, but aluminum will be a problem until later in 2022," Fornelli continued. "And I bet that as the next election comes closer, we'll see inflation ease up, too. If you've got material in stock right now, you're sitting good. But not too much inventory, because the prices are at historic highs. It's a very interesting time to be in business. NASCAR was the first major sport to get back in business, and the smaller dirt tracks are exploding now, so I'm very bullish on this industry." PRI

BRAKE KIT SELECTION BY CALCULATION & EXPERIENCE

Although components often look similar across different brands, engineering behind the scenes ensures parts are optimized for the unique challenges of each racing genre.

By Bryan Wood

In racing, brake selection is often follow-the-leader: New competitors pay attention to what the top finishers are using. Some brake manufacturers do the same, so calipers and rotors often look similar across different brands. However, the manufacturers make plenty of engineering and metallurgy calculations behind the scenes before calipers get CNC machined or brake rotors cast.

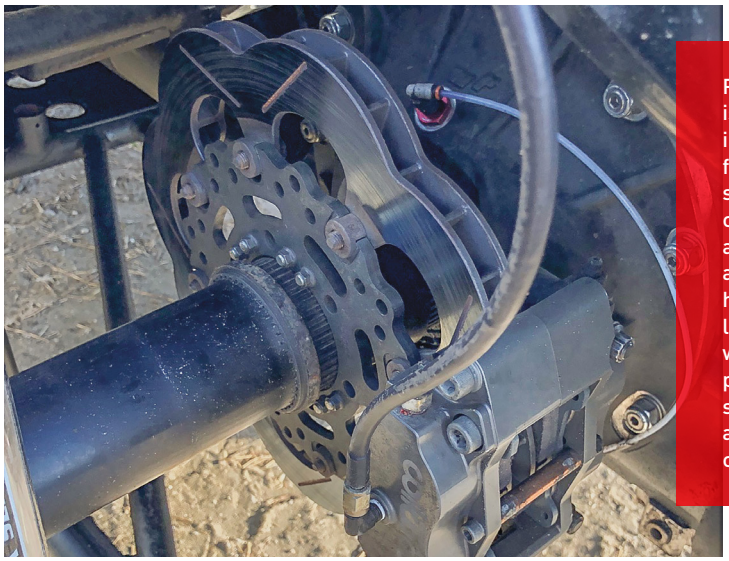
The math involved in the initial planning of a brake system can get long and complicated. Variables involved in figuring front brake torque requirements include the coefficient of friction of the tires (think skinny drag tires versus road-race slicks), radius of the tires, weight of the car, wheelbase, height of the center of gravity, and distance from the front axle to the center of gravity.

Figuring how much brake torque a system can deliver, meanwhile, involves the coefficient of friction between the pads and rotors, rotor radius, and the clamping force of the calipers, which requires even more math involving the master cylinder bore, pedal ratio, caliper piston area, and caliper deflection. Then, engineers must determine the thermal capacity required based on kinetic energy, which is based on weight and speed but varies with the square of speed. A car going 150 mph has four times the energy of one going 75 mph, for example. Kinetic energy increasing by speed squared is one of the major factors pushing brake development.

Another consideration for brake kit selection is wheel size. For example, superspeedway stock cars with 15-inch diameter wheels turn a tremendous amount of kinetic energy into heat, but they don't need to stop much and use brakes more to settle the chassis. NASCAR's Next Generation cars have 18-inch wheels and a rotor that has grown more than 2 inches in diameter to handle increased speed on short tracks and road courses.

Tire grip figures prominently into brake engineering math, which is why dirt track cars and dragsters don't use as serious of a front brake package as a Trans-Am series road racer. With a limited grip surface or narrow tires, brakes that are too strong just lock the wheels too easily. In these cases, the quality is more important than the quantity of the braking, so look for

Bailey Campbell is shown here competing in the 2020 King of the Hammers Ultra4 4400 Unlimited class running a 50/50 brake bias with equal line pressure to all four corners. Wilwood recommends as close to a 50/50 front-to-rear brake bias as possible on these vehicles, so the calipers clamp with equal force.



Pictured here is a single, rear inboard brake kit for lightweight sprint and midget cars. The super alloy rotors on a splined axle have a very low rotating weight and still provide excellent stopping power and thermal capacity.

brakes with good feedback and predictable engagement to allow maximum braking without sudden lockup.

ONE EXAMPLE WITH ULTRA4 4400 CARS

These considerations for finding a proper braking package can be vital for preventing or rectifying race vehicle damage. One example of how brake selection fixed a significant problem was found in the Ultra4 series, the popular 4400 unlimited class that started at King of The Hammers. The locked all-wheel-drive, big tires, and high power of the 4400 cars left a trail of broken metal parts in their early days. Recurring driveshaft yoke failure on Miller Motorsports' rigs was eventually traced to a brake bias setup that, while acceptable for most other forms of racing, proved detrimental in this unique off-road racing class.

Before we dive into that specific instance, though, let's look at the unique needs of off-road racing. Speeds are typically slower (except when they aren't), the grip is limited, weights are higher, the center of gravity and weight transfer are greater, and tire diameters are enormous.

Unlimited Trophy Trucks in Baja can easily hit triple-digit speeds, weigh three tons, and run tires up to 42 inches in diameter. Even with their braking needs lessened by limited grip on dirt, the combination of a high center of gravity, large tires, speed, and weight requires they use brakes that would also be at home on full-bodied GT road race cars. At the other end of the off-road spectrum are the "moon buggy" type rock crawlers, which feature one seat, four massive tires, a big V8, and a ton of articulation.

The needs of Ultra4 Racing 4400 unlimited off-road cars are as extreme as the terrain they compete on, as they combine aspects of Baja open desert racing and rock crawling. These rigs need the power to run triple-digit speeds over rough desert terrain, plus the articulation and torque to crawl up trails made of boulders bigger than the car itself.

With a nearly unlimited choice of chassis, motor, suspension, transmission, and tires, these vehicles feature purpose-built tube-frame chassis, front or mid-engine placement, and V8s comparable in power to those on a NASCAR oval. Most have solid front and rear axles, but more cars are moving to independent front suspension or four-wheel independent suspension. Four-wheel drive is required, and four-wheel steering is common, as are hand-operated cutting brakes for braking on individual corners when the car is balanced on three or fewer wheels. Locking differentials and a locking two-speed transfer case send power to all the wheels when needed. Big 40- or 42-inch diameter tires claw over rocks and climb nearly any obstacle.

These cars run conventional torque converter-based automatic transmissions because the drivers can't spare a foot to operate a clutch. Getting up and over the rock trails with quickness often requires working the brakes and throttle together, with an occasional hand brake applied to one or a pair of wheels. It takes a complicated choreography of brake, throttle, shifter, lockers, and steering to get over these trails quickly.

BALANCED BRAKE BIAS

As power and grip increased, 4400 drivers broke front and rear driveshaft yokes, even those made from specially treated chromoly steel. Off-road engineering experts eventually determined an unexpected cause: the front-to-rear brake bias.

Typically, all street and race cars run with some front brake bias, since weight transfers to the front wheels when decelerating. Unfortunately, that doesn't work for a 4400 car because of the massive engine torque, low gearing (high numerically), huge tires, and locked differentials. With the lockers engaged while crawling, when the brakes try to stop just the front or rear wheels, the engine will quickly find the weakest link in the driveline to break.

There is little weight transfer from braking when climbing over boulders because the car doesn't have much momentum, but the spinning wheels and tires—each weighing more than 100 pounds—do. So to get the rig over the trail, the lockers might send power to all four tires, with only one of them providing any traction.

Unlike in an AWD car, or a 4x4 with an unlocked central differential, the locked

"RACE CAR DEVELOPMENT FEEDS STREET CAR INNOVATIONS, WHICH FEEDS BACK INTO RACING, MAKING BOTH RACE AND STREET CARS HANDLE AND STOP BETTER."

transfer case of a 4400 rig is not designed for the front and rear wheels to spin at different speeds. With the driver modulating the brakes and throttle with both feet, if the brakes are biased, the front wheels can stop while the engine continues to drive the rear. With equal bias, the brakes slow all the wheels down equally, putting the same strain on all parts of the driveline.

Using the same size caliper and rotor front and rear also means carrying fewer spares and allows chassis builders to use similar components all around.

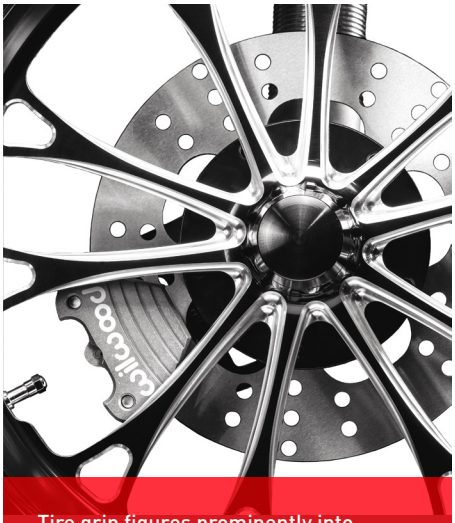
THE HARD PARTS

As tires got bigger and heavier, power increased, and speeds crept up, Ultra4 brakes have evolved to match the car's capabilities. Starting with solid 12-inch rotors and Wilwood Dynalite four-piston calipers, Ultra4 racers (running Wilwood components) moved to DynaPro billet six-piston calipers for more pad area. As speeds and tire sizes climbed, however, Wilwood found the old DynaPro design limiting and introduced DynaPro 6A, a stress-flow forged design with a rigid central bridge for better clamping force. Eventually, more thermal capacity was needed, so Aerolite six-piston calipers with ventilated 14-inch rotors behind 17-inch wheels appeared on many top cars.

Wilwood now recommends as close to a 50/50 front-to-rear brake bias as possible on Ultra4 4400 race cars. Typically, a pair of 3/4- or 7/8-inch bore master cylinders is used up at the cockpit, connected via a balance bar or Tru-Bar bias adjuster to a high ratio (10:1) brake pedal. The bore size can vary based on driver preference, but it is important that both front and rear are the same, so the calipers clamp with equal force. The balance bar is set in the middle but can be fine-tuned as needed.

INNOVATION FEEDS RACING

Race car development feeds street car innovations, which feeds back into racing, making both race and street cars handle and stop better. Every racing genre presents unique problems that street cars may only encounter once in a million miles, if ever. Engineers love figuring out solutions to problems, and motorsports allow them to witness the problems and solutions to them at high speeds.



Tire grip figures prominently into brake engineering math, which is why dragsters don't use as serious a front brake package as, say, a Trans-Am series road racer. The spindle-mount front drag brake kit shown here weighs less than 6 lbs., which avoids overpowering of the available grip of narrow, small contact patch tires.

Racing innovations have even been used in military and aerospace applications. The unique experience of NASCAR stock cars on small-diameter wheels was directly applied to the brakes on legacy US military vehicles as they gained armor and weight. In addition, engineering done by motorsports builders for off-road racing has been applied to NASA space rovers crawling over Mars and the Moon.

Race car development is often incremental and evolutionary, so copying the winning setup of the front runners is an excellent way to get a car set up. That is, until someone leapfrogs the pack with an innovation that sends everyone back to the shop scratching their heads and playing catch-up. PRI

Bryan Wood is the Technical Copywriter at Wilwood Engineering in Camarillo, California, where he works in the marketing department writing product briefs, press releases, and blog posts for its website. He has been a freelance contributor to various auto and motorcycle outlets for more than a decade. He occasionally competes in club-level endurance road racing events.

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ADVOCACY CORNER

Tracking legal, legislative, and regulatory developments impacting the racing and performance industry.

Edited By Laura Pitts

PRI Track Ambassador Tom Deery and the Washington, DC-based advocacy team work continuously to protect race tracks, sanctioning bodies, and motorsports businesses around the nation. This month, we are tracking several initiatives, including details on the new PRI Membership Headquarters, an event to help support motorsports at Wenatchee Valley Super Oval, a gathering of drag race operators, the Bonneville Salt Flats, how one elected official is supporting motorsports businesses, and more.

NEW PRI MEMBERSHIP HQ TO SUPPORT MOTORSPORTS

PRI's recently announced Membership Headquarters in Speedway, Indiana—set to open doors in May ahead of the 106th running of the Indy 500—is already making its impact on motorsports in the region. The 42,500-square-foot building is a critical tool in helping expand PRI Membership and includes spaces dedicated to boosting motorsports businesses and track operators, including a Content Factory for photo and video production, live and virtual educational opportunities, rooms for motorsports gatherings and meetings, and more.

"The new HQ positions the association in the very heart of the racing community within walking distance of the most well-known race track on the planet. Millions of people come to Speedway, USA, every year in search of speed and power. PRI will be right there, helping racers while encouraging the business of racing," PRI President Dr. Jamie Meyer said. "From an advocacy standpoint, we have to be in front of people, sharing information, getting them involved, and growing the PRI Membership. Community events, racing events, membership events—they will all be supported by our PRI Membership team at this new address. See you there."

"Whether it's a meeting of track safety crews or a race team sponsor meeting, we want the HQ to become a toolbox, library, and center where, when you walk in the door, everybody speaks the same language, and you feel welcome," Deery said.

The new HQ will also serve as a meeting space for the Indiana Motorsports State Coalition, a group of race track operators and promoters.

"Each state has its own challenges, and unfortunately, without a coalition, everybody works through their issues on their own," Deery continued. "The goal of state coalitions is to collectively identify, solve, or mitigate issues that may come from the state front, but more importantly, gather a group of like-minded people that can lean on each other for support, ideas, and forward-thinking steps to make sure motorsports thrives."

The building also includes office space for dedicated staff, including PRI Membership Sales Manager Julie Freier.

"We want the new PRI HQ to be a place where drivers, crew, family, enthusiasts, and fans can all unite and support the industry," Freier said. "We will be hiring additional staff and growing our organization to serve our members. This will include introducing new benefits, increasing our outreach, and expanding our membership organization in order to scale up, make an impact, and help build, promote, and protect the racing industry for many years to come."

'SAVE OUR RACECARS NIGHT' COMING TO WENATCHEE VALLEY SUPER OVAL

A night of racing next month will help bring attention to PRI Membership and the "Save Our Racecars" initiative. Set for April 16 at Wenatchee Valley Super Oval—located in East Wenatchee, Washington, and known as the fastest quarter-mile in the Northwest—the event will feature Bump-2-Pass, B-Mod, and Roadrunner classes, as well as a fireworks show.

The event will highlight PRI's Save Our Racecars campaign, a crucial initiative to preserve motorsports in North America and gain grassroots support for the Recognizing the Protection of Motorsports (RPM) Act 2021 (H.R.3281/S.2736). This bipartisan bill protects Americans' right to convert street vehicles into dedicated race cars and clarifies that it is legal to make emissions-related changes to a street vehicle to convert it into a dedicated track vehicle used in motorsports competition. The bill also enshrines in law the racing industry's ability to produce, market, and install parts and equipment that enable racers to compete.

"The event highlights the importance of Congress passing legislation to protect both the right to race and for companies to be able to produce and sell parts that enable racers to compete on the track. It is critically important that the racing community is engaged on policy issues that impact the sport," said Eric Snyder, PRI's Director of Congressional Affairs.

PRI will be in attendance during the event, presented by AVD Motorsports, to promote PRI Membership, which is designed to unite the industry, address challenges and needs, provide support to race tracks and motorsports businesses, and more. For additional information, visit performanceracing.com/membership.

Race tracks across the US are invited to host Save Our Racecars events at their facilities. "We are committed to partnering with all segments of racing and the industry that supports it to protect the future of motorsports," Snyder added. "It's important

that race tracks remind their patrons and racers that they must get registered to vote, and consider where politicians stand on racing issues when casting their ballot on election day."

For more information, contact Deery at prisupport@performanceracing.com.

PRI, SEMA SUPPORT EFFORT TO SAVE BONNEVILLE SALT FLATS

PRI and SEMA welcome the installation of a new water well and weather and hydrologic equipment used for measuring salt growth conditions at the Bonneville Salt Flats. Federal and state funds were released last year to install the monitoring equipment and help increase the volume of salt pumped onto the historic land speed racing venue this year to a total of up to 500,000 tons.

"The Bonneville Salt Flats are hallowed grounds for land speed racing enthusiasts. In addition, many race parts and aftermarket businesses have used Bonneville as testing grounds for their products. Accordingly, SEMA and PRI are leading the fight to save the Bonneville Salt Flats," said Daniel Ingber, PRI/SEMA's Vice President, Government Affairs.

In April 2020, the U.S. Bureau of Land Management (BLM) and Utah Department of Natural Resources (DNR) had signed a Memorandum of Understanding to jointly pursue restoration efforts in a program known as Restore Bonneville. Managed by DNR in conjunction with the BLM and operated by Intrepid Potash, Restore Bonneville is strongly supported by SEMA, PRI, and the Save the Salt Coalition, a collection of companies, organizations, individuals, and land speed racing teams.

Since 1914, hundreds of land speed records have been set and broken in a variety of automotive and motorcycle classes. Speed Week, the marquee event at Bonneville, began in 1949, with scores of racers and thousands of spectators descending on Bonneville in the quest for records.

"Unrivaled in its beauty, the Salt Flats are the crown jewel of natural race courses," Ingber said. "Of the thousands of people who come out to the Salt Flats each year, it's an annual pilgrimage for many that's shared with their fathers and grandfathers. Bonneville is a special place, not only because it's beautiful and is a wonderful place to compete. Racing at Bonneville is about family and working together to achieve speeds that are almost unthinkable. The fight to save Bonneville is all about preserving this remarkable place for young racers and future generations."

"THE FIGHT TO SAVE BONNEVILLE IS ALL ABOUT PRESERVING THIS REMARKABLE PLACE FOR YOUNG RACERS AND FUTURE GENERATIONS."

In the 1960s, the racing venue was over 13 miles in length; but the course is now around eight miles. According to a study by the BLM, the Salt Flats have also shrunk in size from 96,000 acres to about 30,000 acres.

While the bulk of the program funding will come from federal and state appropriations, both industry and the land speed racing community will voluntarily help pay the costs. Financial contributions from the racing community are being accepted at savethesalt.org, a 501(c)(3) organization.

DRAG STRIP OPERATORS OPTIMISTIC OVER 2022

Drag racing track operators expressed optimism ahead of the 2022 race season as they gathered in Quapaw, Oklahoma, for the Dragstrip Operators Meeting & Expo (DOME) in late January. Dozens of drag strip owners and operators, primarily from America's heartland, took part in the meeting that also featured representatives from the NHRA, IHRA, and other sanctions, as well as Tom Deery.

"The big takeaway would be the generally positive outlook going into this season by the track operators. The country's mood is 'let's go racing,'" Deery said. "The basis of the meeting was nuts-and-bolts operations of a facility, which everybody always needs. A big session was on track prep and the advanced ways of managing the surface of your race facility. But mostly, it was a group of like-minded businesses finding solutions to issues."

Hosted by Gerald Kramer, Carl Blanton, and Al Schoenwetter, the fifth annual event featured special guests including Kurt Johnson of Total Venue Concepts, Scott and Laura Gardner of Gardner Race Track Consulting, Joe Trull of Safehold Motorsports Insurance, and Rex Simmermaker of Winlight Bets.

Three days of educational sessions covered topics including track preparation, digital marketing, track insurance, racing promotion, media, track operations, gate software, hiring and retaining employees, and more. The event was rounded out with an SFI Incident Response Training seminar conducted by Ron Connor.

Deery and drag race operators continued the dialogue in Florida during Racing Promotion Monthly's 49th RPM@Daytona Workshops on February 13–15, at the Plaza Resort in Daytona Beach. Details from this gathering will be revealed in next month's Advocacy Corner.

U.S. REP. LATTA VISITS PRI FOUNDING MEMBER CALLIES

Callies Performance Products, a PRI Founding Member based in Fostoria, Ohio, recently hosted U.S. Representative Bob Latta (R-OH) for a tour of the company's headquarters. The event marked Rep. Latta's second time visiting Callies, as the tour provided him an opportunity to interact with the company's employees and watch them manufacture and assemble crankshafts, connecting rods, and camshaft cores.

The Congressman was excited to discuss the most pressing issues facing Callies and the motorsports parts industry, including the RPM Act, tariffs, the ability to hire workers, and federal policy proposals to incentivize electric vehicles. Rep. Latta is a cosponsor of the RPM Act and a strong supporter of the legislation, volunteering to work with House Energy & Commerce Committee leadership to pass the bill.

"With every site visit I have the opportunity to participate in, I always ask if there are any legislative priorities that the companies would like for their Representative to focus on. During my visit at Callies, they emphasized the importance of the Recognizing the Protection of Motorsports Act. I am a proud cosponsor of this bill because it would allow motorsports to legally continue by clarifying that the Clean Air Act permits street vehicles to be converted into dedicated race cars," said Latta.

"We are fortunate to have PRI and SEMA represent manufacturers, engine builders, and racers to protect our source of livelihood," said Heath Norton, Vice President of Callies Performance Products. "Thank you, Rep. Latta, for visiting Callies and for all you are doing to fight to protect manufacturing in America."

Visits like these help lawmakers understand the importance of race parts businesses as an economic driver in many communities. Hosting lawmakers at our Member companies is one of the many advocacy efforts supported by PRI Membership, which is actively working to address challenges and needs, such as providing support for race tracks to prevent them from closing, advocacy for the racing community against current legal threats, and educational programs that help businesses and racers succeed. For more information on PRI Membership, visit performanceracing.com/membership.

For additional information about how to host a legislative representative at your facility, contact Snyder at erics@sema.org.

WV REINTRODUCES BILL TO AID CONSTRUCTION OF MOTORSPORTS COMPLEXES

West Virginia has introduced PRI-supported legislation (S.B. 467) to aid and incentivize the construction of motorsports complexes. The bill was introduced in the previous legislative session but failed to pass prior to adjournment. This version of the bill currently awaits consideration in the Senate Economic Development Committee.

"The bill acknowledges that motorsports represent an important part of preserving the technological achievements and cultural heritage of the United States," said Christian Robinson, Director, State Government Affairs & SEMA PAC.

S.B. 467 recognizes the important economic and civic value that additional motorsports can provide to the state, plus the importance of providing incentives to attract large-scale investment in motorsports entertainment complexes.

The bill would provide tax exemptions for building materials and equipment used in the construction, repair, or improvement of a motorsports entertainment complex.

PRI encourages the racing industry to back this bill by visiting votervoice.net/SEMA/campaigns/91140/respond. PRI

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Learn more about how Performance Racing Political Action Committee protects racing by visiting:

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QUESTIONS ABOUT THE PRI PAC?

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INDUSTRY NEWS

ICMS ANNOUNCES NEW FOUR-DAY RACE TRACK SAFETY PROGRAM

The International Council of Motorsport Sciences (ICMS), which hosts its Annual Congress at the PRI Trade Show in Indianapolis each December, will hold an all-new Race Track Safety Program at Lucas Oil Indianapolis Raceway Park in Brownsburg, Indiana, from March 31–April 3.

Sessions for the event will include certified medical and fire rescue, drag racing track prep, and EV emergencies, plus an online didactic session and test. For more information, visit icmsmotorsportsafety.org.

HOLLEY ACQUIRES FOUR ENTHUSIAST BRANDS

Holley, the platform for performance automotive enthusiasts, has acquired substantially all the assets of Arizona Desert Shocks (ADS), Baer Brakes, Brothers Trucks, and Rocket Racing Wheels.

"These acquisitions are in highly strategic product categories that are powertrain agnostic with applicability to the emerging opportunity in electric vehicles and electric powertrain conversions," said Tom Tomlinson, Holley's president and CEO.

IMSA ACQUIRES HISTORIC SPORTSCAR RACING

The International Motor Sports Association (IMSA) has acquired the Historic Sportscar Racing (HSR) vintage and historic sportscar racing series, known for the HSR Classics events at Daytona International Speedway and Sebring International Raceway.

HSR becomes the eighth racing series sanctioned by IMSA, joining the WeatherTech SportsCar Championship, IMSA Michelin Pilot Challenge, IMSA Prototype Challenge, and its four single-make series.

TRACK ENTERPRISES PURCHASES CHAMPION RACING ASSOCIATION (CRA)

Macon, Illinois-based Track Enterprises, owned by Bob Sargent, has purchased the Champion Racing Association (CRA).

CRA—the Salem, Indiana-based sanctioning body—operates four touring divisions: ARCA/CRA Super Series Powered by JEGS, the JEGS/CRA All-Stars Tour presented by Chevrolet Performance, Van Hoy Oil CRA Street Stocks Powered by JEGS, and the Vore's CRA Late Model Sportsman Powered by JEGS.

Several key staffers will remain with CRA, including former co-owner and Series Director Glenn Luckett, Chief Technical Director Eddie Chew, and Director of Operations/Chief Scorer Greg Wood.

XR ACQUIRES SOUTHERN ALL STAR DIRT RACING SERIES

XR, the dirt track media and production company based in Silver Bay, Minnesota, has announced an agreement to acquire the Southern All Star Dirt Racing Series, one of the nation's longest-running super late model series.

In assuming ownership of the Huntsville, Alabama-based Southern All Star Dirt Racing Series, XR will work with current series personnel to conduct, produce, and promote all races on the current schedule.

BORGWARNER INVESTS IN BATTERY MANAGEMENT SOFTWARE COMPANY

Auburn Hills, Michigan-based BorgWarner has announced its investment in Qnovo, a privately held software and controls company based in Silicon Valley, California.

"With Qnovo's focus on battery health measurement and fast charging, the investment deepens BorgWarner's capacity to further its battery solutions portfolio," according to a company release.

LSI ADDS 24,000 SQ. FT. SHIPPING, DISTRIBUTION HUB

Lubrication Specialties Inc. (LSI)—the manufacturer of Hot Shot's Secret brand of performance additives and oils and custom lubricant solutions based in Mt. Gilead, Ohio—has announced the expansion of its warehouse footprint with the addition of a 24,000-square-foot facility located in Mt. Gilead.

The new distribution and shipping hub will help accommodate the 50-plus SKUs of Hot Shot's Secret products and LSI Chemical products developed and shipped in bulk for international sales.

RACEQUIP SUPER STORE DEBUTS IN MOORESVILLE, NC

RaceQuip and Carolina Racing Supply (CRS) have announced a partnership to bring the all-new RaceQuip Super Store to Mooresville, North Carolina.

As part of the partnership, CRS will devote a large portion of its retail showroom to showcase and sell RaceQuip brand safety equipment and accessories.

XS POWER BATTERIES PURCHASES KNOXVILLE BUILDING WITH PLANS TO EXPAND

XS Power Batteries—based in Knoxville, Tennessee—has purchased a building in Knoxville and is slated to move into the first-floor office space in 2023.

In addition, XS Power Batteries owner Scottie Johnson announced plans to build a nearly 50,000-square-foot facility for manufacturing on the property in 2022. The move is expected to increase the XS Power Batteries workforce from 30 to nearly 100 employees within 18 months.

TECHFORCE, PENSKE UNVEIL TRAVELING STEM CENTER

Penske Truck Leasing has donated a specially equipped 26-foot Freightliner M2 box truck to house and transport a new TechForce Foundation Mobile STEM Career Center.

The Center is a traveling, hands-on exhibit to engage and help youth discover a career path as professional technicians in the transportation and high-performance field.

The STEM Center will offer activities such as pit stop challenges, games with fasteners, a virtual V8 engine, high-tech circuit boards, engine building activities, coding, and more.

GARY CROTTY ELECTED TO FIA COURTS

NASCAR Executive Vice President & Chief Legal Counsel Gary Crotty has been elected by the FIA General Assembly as one of 36 judges to serve on the FIA Courts. A member of the NASCAR Board of Directors, Crotty is the first NASCAR representative to serve in this capacity. Crotty's term, which began on January 1, runs through December 31, 2025.

SRX ANNOUNCES DON HAWK AS CEO

Veteran motorsports executive Don Hawk has been announced as the new CEO for the Superstar Racing Experience (SRX) racing series, which features events in Florida, Virginia, Connecticut, Tennessee, Missouri, and Ohio.

Hawk is responsible for the series' strategy, operations, and business development including media, sales and marketing, personnel, track relationships, rules, safety, international growth, and more.

SUPERCARS ANNOUNCES SHANE HOWARD AS CEO

Supercars has appointed long-serving Chief Operating Officer Shane Howard to replace Sean Seamer as head of the Australia-based racing organization.

"This is an amazing opportunity and I'm very proud to be moving into the chief executive role," Howard said.

NEDRA ELECTS NEW PRESIDENT, VP

The National Electric Drag Racing Association (NEDRA) has elected Allen Thomas as its new president and Lowell Simmons as vice president.

The two officeholders will serve two-year terms that officially began in January.

VP RACING FUELS PROMOTES BEN DOLAN TO VP OF MARKETING

VP Racing Fuels in San Antonio, Texas, has promoted Ben Dolan to vice president of marketing. Prior to joining VP, Dolan was director of Sales and Marketing at holding company UGGM LLC. He has more than 20 years of marketing and sales experience across a broad range of industries.

LAMBORGHINI APPOINTS MAURIZIO REGGIANI AS VICE PRESIDENT OF MOTORSPORTS

Italian automaker Lamborghini has announced Maurizio Reggiani as vice president of motorsports. He will be responsible for the strategic direction of Lamborghini's entire motorsports division, which secured victories in GT championships in recent years.

Lamborghini has also announced Rouven Mohr as chief technical officer.

SRO MOTORSPORTS AMERICA ANNOUNCES STAFF PROMOTIONS, ADDITIONS

SRO Motorsports America—based in Arlington, Nebraska—has announced that Brian Hughes was promoted to VP of operations. Staci Langham was promoted to GM and will oversee Team Relations, GT World Challenge America, and GT America. Robbie Montinola was promoted to VP of marketing communications and business development, while Susan Dunklau was promoted to CFO.

Dean Case, meanwhile, has joined as press officer. Natasha Masterson is now the manager for marketing and business development. Kenzie Manning and Raymond Fong have joined Team Relations, while Mitchell Mefford has joined the Engineering team.

HORIZON BRANDS' 'PROJECT X' ANNOUNCES NEW LEADERSHIP

Project X, the provider of off-road lighting solutions based in Costa Mesa, California, has announced the promotion of Jared Chavez to director of brand development and the addition of Matt Moghaddam and Shawn Bell to the Marketing and Sales leadership teams.

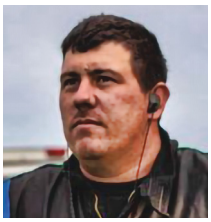
Larry Chen, the renowned automotive photographer and car builder based in Los Angeles, has also joined Horizon Brands as a key ambassador in 2022 and beyond.

LVMS ANNOUNCES KEY HIRES, PROMOTIONS

Las Vegas Motor Speedway has announced key promotions and two additional positions.

Aaron Crowley has been promoted to vice president of sales, and Patrick Lang has been named business development executive. The speedway also hired Jill Frischmann as director of corporate events and business development, and Jose Guerrero as communications manager.

HAGAR HIRED AS NEW TULSA SPEEDWAY OPERATIONS MANAGER


Nathan Hagar

The New Tulsa Speedway co-owners Keith Haney and Todd Martin have announced longtime racer Nathan Hagar as track operations manager of the dirt track in Tulsa, Oklahoma.

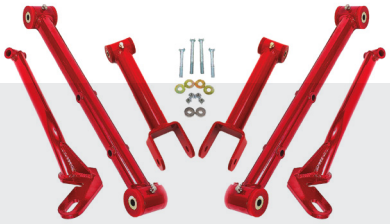
The co-owners have also announced facility enhancements, including new surface clay, configuration changes to turn two, and additional bleachers and updates to the concession stand and bathrooms.

NEW PROMOTERS FOR NEBRASKA'S DAWSON COUNTY RACEWAY

Officials with Dawson County Raceway, the dirt track in Lexington, Nebraska, have announced Bobby and Janelle Lincoln as the new promoters, taking over for Chad Dolan. The Lincolns also own and operate US 30 Speedway in Columbus, Nebraska.

For all the latest motorsports industry news, visit primag.com/industrynews.

RACE SHOP



BMR SUSPENSION

bmrsuspension.com

BMR's Non-Adjustable Rear Suspension Kits for 1978–1987 GM G-Body are designed for launching harder, reducing wheel hop, and adding cornering consistency. Stock stamped steel control arms with soft rubber bushings deflect under load and absorb power instead of transferring it to the tires. Manufactured from heavy-duty DOM steel tubing, the BMR control arms and reinforcement braces provide strength and durability.

Contact: 813-986-9302

COMP CAMS

compcams.com

The Evolution Hydraulic Lifters were created using COMP Cams' patented Hydraulic Cartridge Technology (HCT). They were designed to provide consistent and reliable performance. A combination of a self-contained hydraulic cartridge within a thick wall lifter body and accompanying reduced oil volume that is less affected by oil aeration delivers consistent bleed rates.

Contact: 734-777-1380

DESIGN ENGINEERING, INC.

designengineering.com

Formed sensor covers are made to protect vulnerable sensors, plugs, and wire connectors on off-road, race, or street machines. Lightweight and easy to install, the covers fully encase automotive sensors, acting as a thermal barrier to prevent failures. Featuring a split-top design that makes installation simple, the silver covers are offered in 25-mm and 32-mm sizes to fit a variety of sensors, wire connectors, and plugs.

Contact: 800-264-9472

EDELBROCK

edelbrock.com

The new E-Force Stage 2 supercharger for the 2018–2021 Mustang GT 5.0L Coyote V8 utilizes the high-efficiency Eaton TVS R2650 rotor assembly with a high-twist lobe design along with larger bearings and more robust timing gears. The kit includes a 103-mm throttle body, high-flow 113-mm air intake system, upgraded 50 lb./hr. port fuel injectors, an eight-rib supercharger belt drive, and a plug-and-play fuel pump voltage booster.

Contact: 800-416-8628

HOLLEY

holley.com

Holley EFI's new Benchtop Test Harness is designed for benchtop testing, updating firmware, and setting up HP, Dominator, Terminator X, Terminator X Max, and Sniper ECUs, as well as Holley digital dashes. The harness has pre-terminated connectors for the following sensor inputs: Can, Crank, Cam, TPS, Input #1, P1A, Main Power, and Sniper EFI connectors for a Sniper main harness. Also included is a power switch for quick setup in the workplace.

Contact: 866-464-6553

JENVEY DYNAMICS

jenvey.co.uk

Completely designed and manufactured in-house by Jenvey, the new Porsche Air Cooled Heritage Kits are a natural progression to the DCOE Heritage Throttle Bodies. Jenvey offers the Porsche Heritage Throttle Body kits for the two-bolt engine with 35-mm and 39-mm port sizes married to a 42-mm and 45-mm throttle body, respectively. This covers the early 911s up to the 3.0L SC and 3.2 Carrera.

Contact: +44 (0)1746 768810

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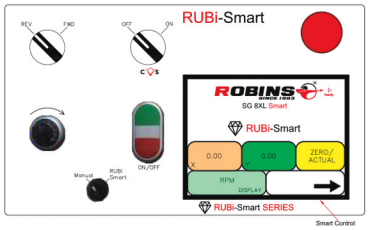

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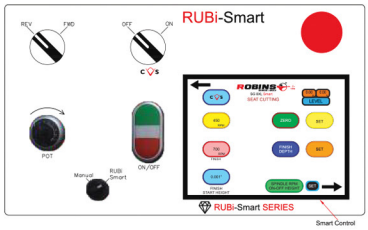
Inventors of Spring-Free Tooling
(US Patent)



SG8 XL-Smart with Cummins ISX 24 Valve Cylinder head

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JRi SHOCKS

jrishocks.com

The CD5 Double-Adjustable Compression Reservoir has a smaller, streamlined design and incorporates a low- and high-speed adjuster with more than 50 clicks of intuitive adjustment capabilities. The needle-and-jet-style low-speed adjuster controls handling and vehicle body motion (roll and pitch). The high-speed adjuster improves high-frequency/low-amplitude response, which increases tire grip. Two reservoir lengths are available depending on the nitrogen volume requirements.

Contact: 704-660-8346

LUCAS OIL PRODUCTS

lucasoil.com

Lucas Sure Start Premium Starting Fluid is a 50% ether blend. It helps to start stubborn engines in cold weather, saves batteries, and contains upper cylinder head lubricant. It's to be used in diesel motor vehicles and non-road engines.

Contact: 800-342-2512

MAHLE MOTORSPORT

mahlemotorsports.com

The 4032 alloy Ford EcoBoost 2.3L PowerPak Plus Piston kit is designed for heavy-duty applications. The 4032 alloy option adds strength, but also allows for a tighter piston-to-wall clearance. This kit is loaded with value-added features for reliable power production for any 2.3L EcoBoost engine.

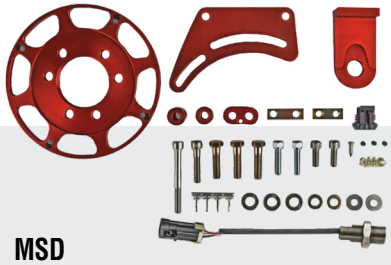
Contact: 888-255-1942

MOROSO

moroso.com

The Ultra 40 Ignition Wire Set is designed to be used with Moroso's Coil Mount Brackets that accept GM LS2 and later coil packs. The set is constructed out of Moroso ULTRA 40, 8-mm diameter ignition wire with 40 ohms of resistance per foot. Each wire is terminated with heavy-duty, high-temperature, easy-pull/positive engagement spark plug boots and on the other end with matching coil boots.

Contact: 203-453-6571



MSD

holley.com/brands/msd

The MSD Ford Coyote Crank trigger is available with a Hall-Effect sensor, making it an accurate way to trigger an EFI. The kit is now available with an adjustable pointer with a 12-degree range of movement for finding the precise timing. The kit installs easily and uses rigid aluminum mounting bracketry and stainless hardware that will not flex and cause timing fluctuations. Powerful magnets are embedded in a 3/8-inch thick 6061-T6 aluminum trigger wheel that will send an EFI a clean signal for every firing.

Contact: 866-464-6553

SKUNK2

skunk2.com

Skunk2's K Series Ultra Lightweight Magnesium Valve Cover is cast from Magnesium Alloy. It features a low-profile design for additional hood clearance, relocated mounting bolt locations for cleaner symmetry, raw magnesium finish, two -10 AN vent ports (plugs included), one -08 AN PCV port with cleanable filter (barb fitting included), and includes a specialized dipstick, low profile oil cap, and low-profile mounting bolt kit.

Contact: 951-808-9888

SNOW PERFORMANCE

nitrousexpress.com

The High Flow Billet Fuel Pressure Regulator features anodized billet aluminum internal components, a Fluorosilicone-coated Nomex diaphragm, and a silicon nitride ceramic ball that will not corrode, making this regulator safe for any type of fuel. Other characteristics include a corrosion-resistant spring and a black-anodized CNC-machined aluminum body.

Contact: 888-463-2781

SUMMIT RACING

summitracing.com

The Coolant Crossover Delete Kit converts the LS factory four-corner coolant crossover system to a two-corner system by blocking off the steam ports in the rear of the cylinder heads. That creates clearance for intake manifolds, eliminates unnecessary plumbing, and adds more firewall clearance for engine swaps in tight engine compartments. The kit includes two billet aluminum block-off plugs, sealing O-rings, and bolts, and doesn't require removal of the cylinder heads to install.

Contact: 800-230-3030

TTV RACING

ttvracing.com

The TTV-R Race Clutch accepts torque loads of over 1,000 lb./ft. The radial webbed design transfers the diaphragming loads directly to the cover fixings for a positive and predictable release that minimizes the lost travel issues of other clutches. This allows the use of a smaller diameter master cylinder for greater modulation. The triple and twin plate versions for circuit use feature an eight-button sintered friction plate.

Contact: +44 (0)1473 730996

WILWOOD

wilwood.com

Wilwood has released a new DOT 5.1 rated Hi-Temp 570 racing brake fluid. The lower viscosity fluid was specifically formulated to allow modern ABS, stability control, and brake-based limited-slip systems to react faster. It retains the 570 degrees F dry boiling point and other features of the previous DOT 3 fluid, and remains resistant to aeration and foaming for an improved pedal feel.

Contact: 805-388-1188

PERFORMANCE INDUSTRY REPS

PERFORMANCE INDUSTRY REPS

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AD INDEX

SOCIAL STATUS

A closer look at how racing and performance industry members track their winning strategies on Facebook, Instagram, YouTube, and more.

It's safe to say that most businesses today understand the importance and effectiveness of social marketing. And they can discover exactly how successful it is (or isn't) through social media analytics.

"Social media is the most effective way for a business to get their message across to a large audience, especially an audience that is already loyal to your brand and willing to listen to your messaging," explained Kevin Parlett, multimedia manager at VP Racing Fuels, San Antonio, Texas. "Being able to track that interaction and growth is more important than any other single marketing entity we have when trying to push out a new product or inform about an existing one."

Social media analytics involves collecting data from various social media platforms and evaluating it to make decisions regarding what content to post and when to post it, among other factors. As a business, examining social media data is imperative, and there are various tools available to assist with that.

"Analyzing social media metrics is the best way to understand the impact that your social channels are having and the best way to improve them," noted Edward Xu, director of marketing at HP Tuners, Buffalo Grove, Illinois. "When developing your social media strategy, agreeing upon a goal and deciding which metrics to track are critical to being able to measure how successful your efforts have been."

To gather basic metrics, HP Tuners relies on native tools such as Facebook and Instagram Insights. "Another very useful tool that has great social media analytics reporting features is Iconosquare," Xu noted. "We initially subscribed to it for its post scheduling options, but it's a great resource to see best performing posts, follower growth and demographics, and like/reach/impression history."

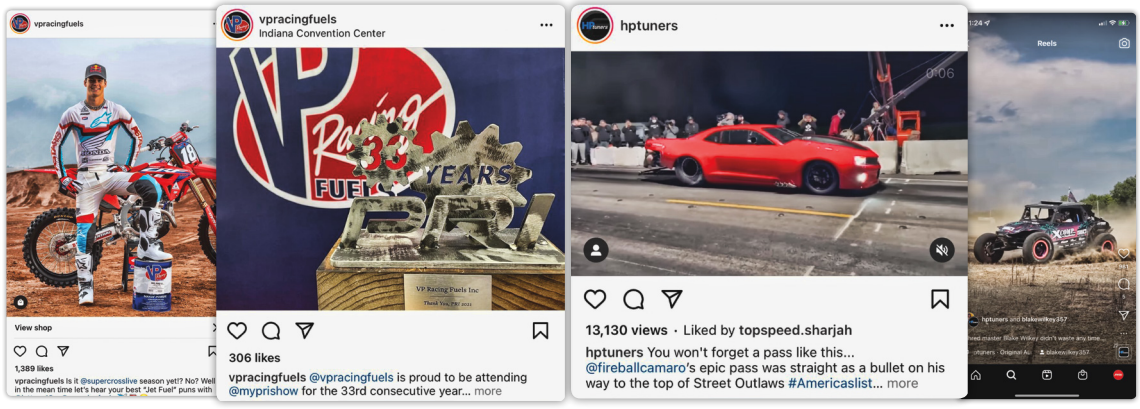
Added Parlett: "Beyond basic stats provided by the social platforms, we use Hookit to track our individual athletes and even the race series we sponsor to gauge how often they post about us, the quality of post in regards to our brand specifically, and of course, the engagement of the post with their audience. Hookit tracks mentions, tags, hashtags, and more impressively, it scans photos and video for your company logo, ensuring that all the stats reported are specific to content that matters to your brand."

Once you have the tools to gather the right data, which metrics are most important to focus on? "Simply put, it's all about the engagement," Parlett explained. "The more likely the content is to create a conversation with the audience, the more likely you are to get them clicking through to a website and hopefully a sale. Views and followers are great, but from a business standpoint, none of that is worthwhile in creating sales if your audience isn't engaged in the content being pushed on their feed. Tracking engagements is a quick way to see what content works and doesn't work with your audience segments, or even specific product categories."

Xu mentioned that important metrics will vary depending on the main goals of a business, whether it's general brand awareness or driving conversions, for example. "That being said, engagement is one of those metrics that is consistently important across different business goals and platforms. Without interaction and feedback from your audience, your social media content isn't accomplishing anything at all.

"Engagement can be measured by comments, shares, likes, and more; it varies depending on platform," he continued. "Impressions and reach are numbers that typically look very impressive, but beyond building more brand awareness, [they] don't usually help with driving substantial results. There are so many metrics out there and they absolutely vary by platform. For example, on YouTube, view count is obviously important to monitor, but audience retention and view time are equally—if not more—important."

It should be noted that there are several other equally effective tools available beyond those mentioned here, so do some research and find what works best for your company. Then you can start analyzing those metrics to ensure you're truly utilizing social media in a way that benefits your business. PRI



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