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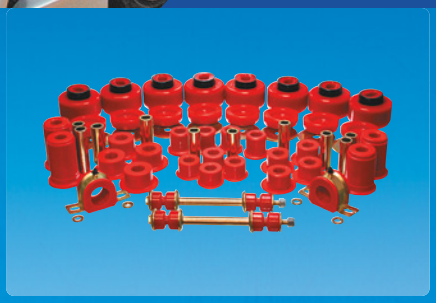

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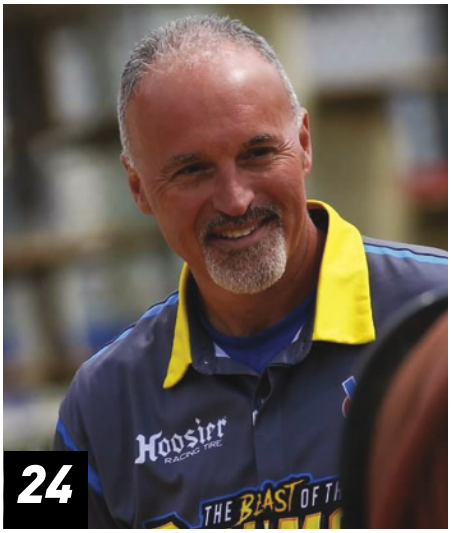

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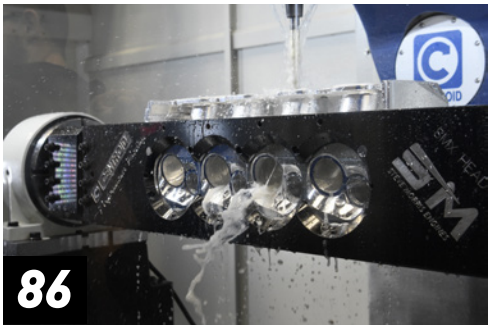

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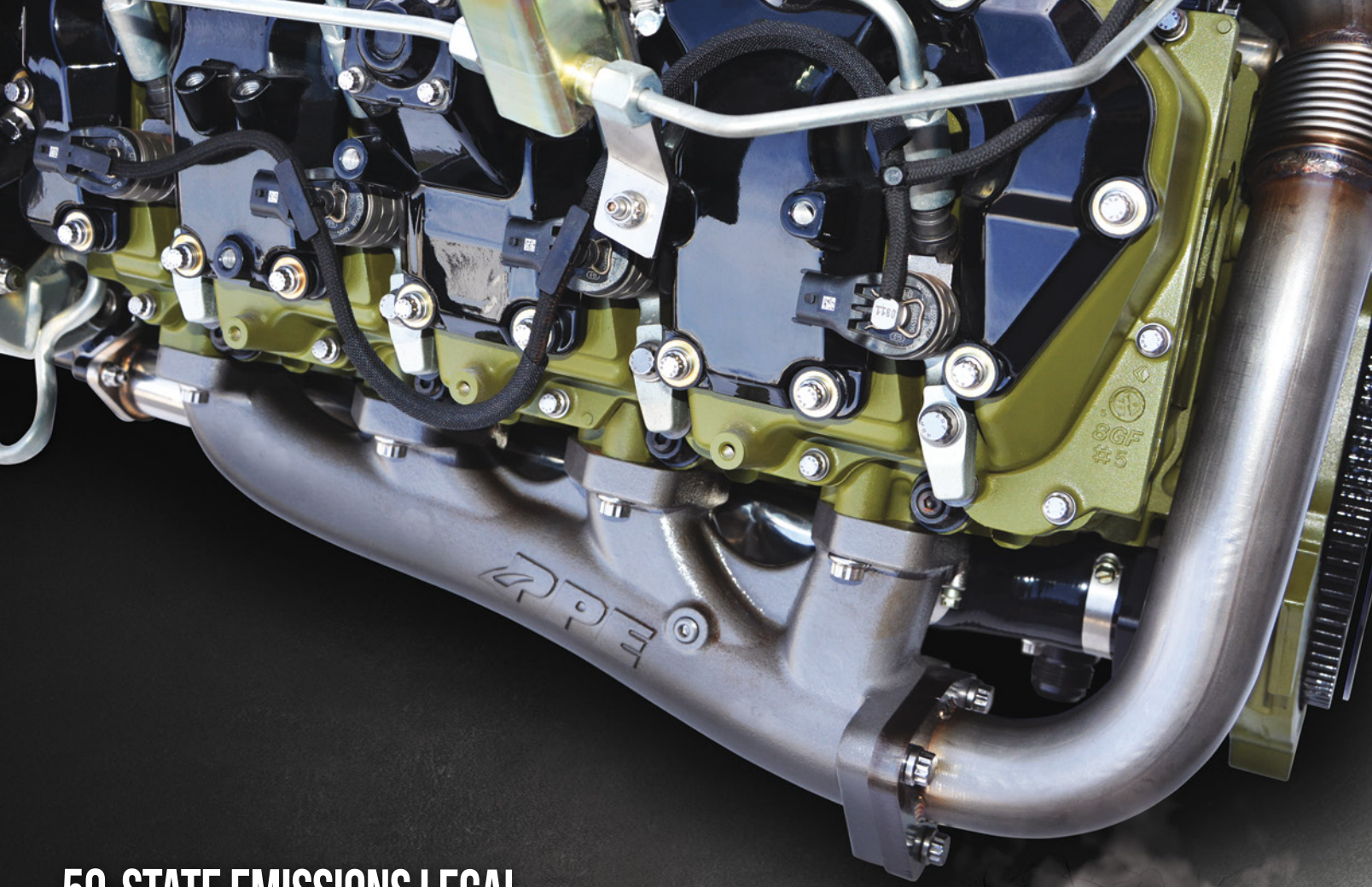

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FROM THE EDITOR

DAN SCHECHNER
dans@performanceracing.com

Couple of things I think ahead of this month's NHRA Camping World Drag Racing Series season opener in Gainesville:

1) I THINK THAT ALL CONTENT CREATORS aren't—for lack of a better term—created equal. And this month's Special Report by contributor Steve Statham, titled "More Than Just Pretty Faces," makes that clear in revealing the skills and capabilities possessed by some of motorsports' most visible and influential social media personalities. Obviously, there's value in looking good on camera, but for every TikTok or Instagram "star" whose connection to their audience is only skin deep, there exists a handful of truly dedicated—and talented—craftsmen and women of substance. Beginning on page 32, Statham's piece provides a behind-the-scenes look at the paths of David Patterson, Skye Romanoff, Chelsea VanCleave and Blake Wilkey, and how each has leveraged their passion for racing into powerful platforms to achieve a variety of different objectives. Based on the West Coast, Romanoff heads up the California Rallycross Association while getting her hands dirty underneath a WRX (among other race vehicles) that takes a healthy dose of abuse across punishing terrain, as evidenced via her Instagram page at blancoracingwrx_05. But there's yet another purpose behind the presentation: "What I try to do for content, I like to show other people—especially other women because I'm a really big promoter of women in this industry—that they can do it as well. So they're seeing me do a brake job, or I re-do my coilovers and get an alignment, and they see me doing it hands-on personally. Then they feel like they have the capability of doing it themselves," Romanoff explained. "Not only can I do my own work, and I try to promote that, but I also try to show other girls that I'm doing my own work, and I'm going out to the track the next day. So it shows that it's doable."

2) I THINK ANY GRASSROOTS ROAD racer who's serious about his or her program could benefit from the insights offered in our feature "Drag vs. Downforce," which begins on page 46. For the piece, author Drew Hardin connected with several of the industry's leading fabrication and engineering shops to discuss the latest developments and cutting-edge solutions for some of the quickest Supras, FRS's, GR86s, S2000s, Corvettes and more on track today. What these innovators are devising, and achieving, is nothing short of remarkable. Take the team at LYFE Motorsport, whose recent aero adjustments for its time attack GT-R resulted in a 4-second gain around a 2-plus mile road course. "We bolted on four seconds with the same power level," Cole Powelson told us, "and that was pretty true to every circuit we went to after that." Elsewhere, seconds were shaved off a 2004 Cobra's Global Time Attack run when Caliber Customs' Matthew Lambrecht "changed the design to where the diffuser had a curvature to it as opposed to having just a flat angle to further minimize the [air] delamination.... I maxed it out with the splitter, underbelly, diffuser, and not a wing but just a rear spoiler." Granted, I'm not winning the Nobel Prize in Mathematics anytime soon, but I am fairly certain that in road race, time attack, autocross, hill climb, etc., subtraction in lap times is typically a very good thing. PRI

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FEATURED VEHICLES

From the Salt Flats of Bonneville to the autocross course, race trucks are producing big power and clocking impressive times and finishes across some grueling proving grounds.

1993 TOYOTA X-CAB PICKUP

SCOTT BIRDSALL | SANTA ROSA, CALIFORNIA

RACE SERIES/CLASS: Bonneville Speed Week, Modified Mini/Midsize pickup

ENGINE: 3.0-liter Toyota 2JZ-GTE inline six-cylinder built by ALC Racing Engines in Santa Rosa, California

CAR: Built by Scott Birdsall/Chuckles Garage

FEATURES: 1,300 hp using all Brian Crower internals; 88-mm Garrett Motion G55-1950 turbocharger; will run on methanol, E85, or gasoline, which will qualify it for attempting several records on the salt; fuel delivery is handled by Radium Engineering components; engine and system controls are handled by Haltech; tubing, fittings, fuel, and fluid lines are Vibrant Performance; Amsoil lubricants will be used throughout.

FACTS: The livery on the truck is a nod to Ivan "Ironman" Stewart's Trophy Truck from the same era.

1974 CHEVROLET BLAZER

DAVID CARROLL | MORGAN HILL, CALIFORNIA

RACE SERIES/CLASS: Ultimate Street Car Challenge, Goodguys AutoCross, NMCA WEST Auto-X, Holley LS Fest

ENGINE: Chevrolet GEN V LT L83 5.3 (stock internals for now) featuring twin 56-mm turbochargers

CAR: Built by David Carroll and the NorCal Garage team

FEATURES: No Limit suspension, Viking Performance coilovers, Wilwood Disc Brakes, Ron Davis Racing radiator, full mandrel bent MagnaFlow exhaust, Falken RT660 tires, Jongbloed Racing wheels

FACTS: Carroll finished first in the GTT (truck) class for the Ultimate Street Car Invitational during the 2022 SEMA Show, where he competed against 13 other trucks. He also took first place in GTT during the Ultimate Street Car Challenge at Sonoma Raceway, as well as first at Utah Motorsports Campus, and won several Goodguys autocross events in the truck class, among other accomplishments.

ASK THE EXPERTS

HOW TO MAXIMIZE CONTINGENCY PROGRAMS

Getting the most from these racer rewards goes far beyond placing a decal on the car.

By Drew Hardin

On one level, a successful contingency program is about the racers, "keeping race cars at race tracks and putting on a high level of entertainment for the fans," said Carson Becker-Gramm of IMCA, Vinton, Iowa. From the program sponsor's point of view, "the whole point is to drive customers to their place of business and make sure those certificates are being redeemed. Then, hopefully, they can grow a longtime customer."

The benefit to a sponsor can go beyond sales. Contingency programs enable QA1 in Lakeville, Minnesota, "to go to the next step in building relationships with the racers," said Dave Kass. "Those relationships can give us opportunities for product improvement and give us real-world feedback from guys using our products in race cars. We are constantly looking for new problems to solve, but we can only do so much internally without putting parts on a race car. So we see great value in these programs."

How, then, can contingency sponsors optimize their programs to get the "great value" Kass described?

NOT TOO CONTINGENT

"One thing we like to be very careful about is making sure these programs aren't too contingent for the racer," said Becker-Gramm.

For example, if a sponsor is "something like a parts warehouse, the racer can buy whatever they want" with the contingency award, he said. "One of our great marketing partners, Speedway Motors, has so many different products that they're almost universally allowed. Those certificates seem to have a higher redemption rate because there are so many different options for the driver to purchase."

A manufacturer with a more specific component line, however, should be aware of "all the different divisions" that a sanctioning body has "and the different rules in those divisions. Not all the products that XYZ Company may carry are allowed in that driver's division." Narrowing contingency choices too much "makes it more difficult" for the racer to redeem the award.

Compounding the difficulty are the terms sometimes set on the awards, Becker-Gramm added. If a product discount requires a minimum purchase, "say for example that a $100 certificate is off the purchase of $500 or more, a grassroots driver then has to weigh their budget, not just the racing budget but also their personal budget and anything that may affect their racing budget" in deciding to redeem the certificate. It would be better, he said, to structure the contingency award more like a gift card. "A $10 Starbucks gift card isn't contingent on you spending $100 at Starbucks to use it."

The Contingency Connection Racer Rewards program serves as "a middleman between sponsors and race tracks," said Jackie Ressa. It ensures sponsors' contingency awards reach grassroots racers, like Aaron Guinn, across the country.

"THE PROGRAM IS MORE EFFECTIVE WHEN TRACK OWNERS ALLOW THE AWARDS TO TRICKLE DOWN THROUGH THE RANKS TO AS MANY RACERS AS POSSIBLE."

IMCA, Becker-Gramm explained, works to "make sure the sponsor does have a great redemption rate, so we're going to do all we can to put together a program with the sponsor to drive customers to their business."

IS CASH KING?

Cash contingency awards give racers the ultimate flexibility to spend the award as they choose, but cash isn't always the best option for the sponsor. QA1 offers cash and award certificates in its programs, Kass said, depending on the racing series. With a cash award, though, "we don't know where the cash is going to be used. We have no direct line to correlate where the award is being redeemed." QA1's contingency certificates are serialized, "so we can see if they are being redeemed at a speed shop or through a direct purchase through QA1. That helps us to track the certificate and helps us understand those channels and what the certificate is being redeemed against."

SPREAD THE WEALTH

One way contingency sponsors can drive more racers to their businesses is to expand their awards beyond race winners. "We've done that in quite a few instances," Kass said, "granting awards for the fastest 60-foot time at a drag strip, or the fastest lap of the night at a circle track, or whoever passed the most cars that night. Everybody has a chance at something like that.

"THOSE RELATIONSHIPS CAN GIVE US OPPORTUNITIES FOR PRODUCT IMPROVEMENT AND GIVE US REAL-WORLD FEEDBACK FROM GUYS USING OUR PRODUCTS IN RACE CARS."

"Front-runners night-in and night-out can be more accustomed to seeing contingency payouts or other forms of sponsorship," Kass continued, "so someone new to the sport, or trying to navigate their way through the pack, may be just as, if not more, deserving of recognition."

"The Racer Rewards contingency book doesn't necessarily always go to the winner of an event because the track owners want to spread the wealth and pay as many racers as they can," observed Jackie Ressa of Contingency Connection, Kingsport, Tennessee. "They might give it to the number-five finisher or the number-10 finisher. Some tracks may present the Racer Rewards book as a hard-luck award to somebody who went out in the first round. The program is more effective when track owners allow the awards to trickle down through the ranks to as many racers as possible."

Becker-Gramm sees the "spread the wealth" concept as a shift in how some sponsors think about contingency awards. "It's gone from sponsors saying, 'I want it to go to the champion,' to, 'Hey, how can we support everybody?' What we see are a lot of very happy racers as you get further down the ranks. If they're handed a $50 certificate, it goes a long way to keeping them coming back to the track."

THE CONTINGENCY CONNECTION MODEL

For 30 years, Contingency Connection has served as "a middleman between sponsors and race tracks" delivering national contingency awards to local race tracks. "We're a marketing arm for manufacturers allowing them to be where they cannot always be—at local, grassroots race tracks nationwide."

Instead of individual award certificates, the Contingency Connection provides 50 Racer Rewards Books full of manufacturer product certificates—about $4,000 worth of discounts in each—to tracks enrolled in the program. Ressa said there are 40–50 tracks enrolled across the country, representing about 1,500 events annually and reaching some 18,000 racers weekly.

"We deliver a $100,000 contingency program to each member track," Ressa said. "Track operators love it because we connect them with national manufacturers. Manufacturers love it because it's an inexpensive way to reach the huge target market of grassroots end-users. Racers love it because we help them pay their racing expenses so they can race more often. It's a win-win-win for everybody involved." PRI

Tracks enrolled in the Contingency Connection Racer Rewards program receive books with manufacturer product certificates. "The contingency book doesn't necessarily always go to the winner of an event," Jackie Ressa said. "Track owners want to spread the wealth and pay as many racers as they can."

SOURCES

Contingency Connection
contingencyconnection.com

IMCA
imca.com

QA1
qa1.net

STOP DOING THAT...DO THIS INSTEAD

IMPROPER CARB TUNING

Avoid leaving power on the table by following these tips from two of the industry's leading authorities on carburetor performance.

By Bradley Iger

Although the technology has been around for well over a century, maximizing the efficiency of a carbureted setup is still a bit of a dark art. There's a wide range of factors that can have a significant effect on the end result, and that makes it all-too-easy to give up horsepower without even knowing it. Fortunately for us (and you, dear reader), the sorcerers at Braswell Carburetion and Get'M Performance have some simple tuning advice that can assist you in retrieving those missing ponies.

MIND YOUR ALCOHOL

"Over time, floats will often start to get heavy—particularly if you're running alcohol," said Trevor Wiggins of Get'M Performance, Alvaton, Kentucky. "Certain fuels will cause this more than others. If a carburetor hasn't been looked over in three or four years, and it's in certain types of fuel, the floats will make the motor run like it's really fat."

Wiggins said this issue typically comes down to deferred maintenance, so the easiest way to prevent it is to simply have the carburetor gone through by a specialist in regular intervals. Those intervals should be measured by time rather than by the number of passes or the operating hours that the engine has seen. "With stuff like Q16 and X14, the fuels have become a lot more volatile in recent years. They don't contain as much lead as they used to, and they're eating up nitrophyl floats as a result."

Get'M Performance weighs the floats on its carburetors and marks the reading on a spec sheet before the part is sent out. That allows easy comparison of the measurements if a carburetor comes back to the shop for a refresh.

He noted that Get'M Performance weighs the floats on its carburetors and marks the reading down on a spec sheet before the part is sent out to a customer. That allows easy comparison of the measurements if a carburetor comes back to the shop for a refresh down the road. "If a float is, say, 128 grams when it goes out, and it's up to 135 grams when it comes back, we know that it needs to be replaced."

SLOW THE FLOW

"The biggest issue we see is folks running too much fuel pressure for the application," said Dave Braswell of Braswell Carburetion, Tucson, Arizona. "There's a misconception that you have to run like eight or nine pounds of fuel pressure to keep the engine properly fed, but with most of our stuff we just put larger needles and seats in. There are very few carburetors that we make for gasoline that run more than 6 1/2 pounds of fuel pressure, maybe seven at the most."

Braswell pointed out that lower fuel pressures can improve the quality of the fuel in the bowl, which will improve the carburetor's efficiency in turn and likely free up some power in the process. "If you put a nozzle on a hose and spray water into a bucket under pressure, you're going to end up with all this aerated water. But if you just pour water out of the end of the hose into the bucket, the water will be fine. The same concept applies here."

Determining the proper fuel pressure and needle and seat configuration for a given

Braswell Carburetion will often run two—and sometimes three—high speed bleeds on its motorsports carburetors to balance fuel pressure and volume. "We started doing that in Pro Stock racing in the 1990s, and we've carried it over to Competition Eliminator and even the dirt track stuff," said Dave Braswell.

combination typically comes down to horsepower levels and the needs of the application, he said. "Over-fueling will cause the engine to go overly rich at higher rpm. It doesn't allow the fuel level to drop in the bowl, so the emulsion system on the carburetor can't function properly. Of course, if you're running in a racing format where it's wide-open throttle all the time, you're going to need more fuel pressure than you would if you're on and off the throttle a lot. You get to fill the bowls when you lift."

To dial in this balance, Braswell will often run two high-speed bleeds on its hardcore motorsports carburetors. "We started doing that in Pro Stock racing in the 1990s, and we've carried it over to Competition Eliminator and even the dirt track stuff. In some scenarios we'll even use three high-speed bleeds—we call them five-circuit carburetors. Splitting the emulsion system into two or three sections allows you to more precisely control the fueling by addressing those sections individually."

ONE SETUP DOES NOT FIT ALL

"Another big mistake we see is people assuming that a carburetor that worked great in one application will work great in another without some changes," said Wiggins. "They end up wondering why this setup that was awesome in their drag car isn't working well in their pulling truck."

In order for a carburetor that was originally tuned for one racing discipline to work properly somewhere else, it needs to be configured for the specific demands of that new discipline.

"It's something we see a lot when people buy used carburetors—people will buy something without really knowing what it's set up for," Wiggins said. "We build a throttle stop carburetor very differently than, say, a nitrous carburetor. We want to be as application-specific as we can be. In truck and tractor pulling, the fuel curve is going to spike up really high and then go down rather than come up, and that's not what the engine is going to see in a drag racing application. Even the fuel curve for a carburetor being used in eighth-mile racing is going to be different than one being used in quarter-mile racing. So it needs to be looked at by someone who knows how to make those adjustments. It's usually not as easy as changing a jet, and there can be situations where other parts need to be installed or swapped out in order to really get it where it needs to be." PRI

SOURCES

Braswell Carburetion
braswell.com

Get'M Performance
getmgarage.com

EDITORS' CHOICE

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

TALON CRATE ENGINE

HONDA PERFORMANCE DEVELOPMENT

hpd.honda.com

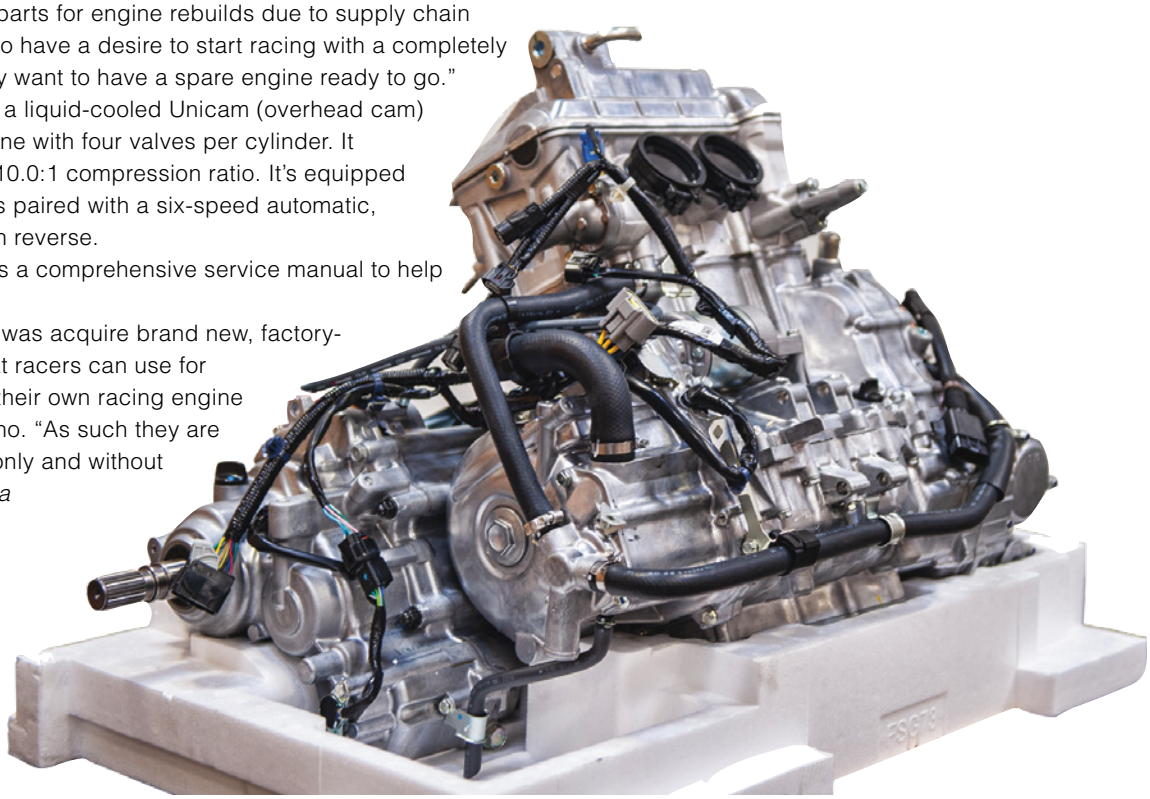
The same engine that the Honda off-road factory race team used to win the UTV Stock NA class at the 2022 King of the Hammers is now available as a crate engine.

"The intention of this engine offering is to provide a source for new engine assemblies to Talon racers," explained Andrew Salzano of Honda Performance Development (HPD), Santa Clarita, California. "HPD pursued sourcing of these factory stock engines because we heard from Talon racers that it has been difficult to find replacement parts for engine rebuilds due to supply chain challenges. Some racers also have a desire to start racing with a completely new and fresh engine or may want to have a spare engine ready to go."

The Talon crate offering is a liquid-cooled Unicam (overhead cam) parallel-twin four-stroke engine with four valves per cylinder. It displaces 999cc and has a 10.0:1 compression ratio. It's equipped with an electric starter and is paired with a six-speed automatic, dual-clutch transmission with reverse.

Included with the engine is a comprehensive service manual to help with the installation.

"What we were able to do was acquire brand new, factory-built stock Talon engines that racers can use for direct replacement or to do their own racing engine development," added Salzano. "As such they are offered for competition use only and without any warranty." *—Mike Magda*



SUPERCHARGER BELT

DAYCO

daycoaftermarket.com

Dayco in Roseville, Michigan, is now offering relief to Factory Super Stock racers who have problems keeping the supercharger belt in place on their late-model cars. Designed for extreme-duty use, these belts have been engineered with a proprietary EPDM construction using aramid fibers. They are available with eight or 10 ribs, depending on the application.

Dayco engineers partnered with Watson Racing and Chris Duncan Racing to develop a belt suited for racing.

"We worked closely with the Dayco tech guys this year, testing their new supercharger belt, and the results have been incredible," said Chuck Watson II, driver of the 2019 Cobra Jet Mustang that won the NMCA Factory Super Cars championship. "The belt's design is definitely better than what we used previously. We noticed a huge difference under boost conditions because the belt was able to keep its grip."

Some of the popular applications include Ford Mustang GT500, Chevy Camaro ZL1, Dodge Challenger Demon, Ford Lightning, and Chevy Corvette Z06. The belt also enhances under-hood aesthetics with an imprinted Dayco racing logo.

In addition to the supercharger belt, Dayco brought an 8-mm blower belt to the racing circuit this past year. It features high-strength Teflon coated teeth for cogged drive pulleys and a carbon cord construction. It comes in multiple lengths and 50-, 75-, and 84-mm widths. *—Mike Magda*

AUTOMATED LOAD-CONTROL VALVE

YOURDYNO

yourdyno.com

Engine builders seeking more consistency and repeatability out of their dynamometers should take a look at the automated load-control valves and complementary software now available from YourDyno in Nesbru, Norway. The valves are offered in 1.00-, 1.25-, and 2.00-inch sizes to fit most popular water brakes.

"An effective automated load control setup is essential for water brakes and takes the human out of loading your engine consistently, run after run," said Kevin Hamilton.

Coupled with the valve is a special water brake control mode called Load Control. This algorithm allows the engine to accelerate faster where it is strong and less where it is weaker.

"This allows for a more natural sweep through the rpm range, compared with traditional PID control," noted Hamilton. "This natural sweep is more repeatable and much less likely to oscillate, in particular with engines with an abrupt torque curve."

The valve is constructed from stainless steel and is designed to work even in harsh environments. It includes a fast-reacting servo driver and the load-control software.

"Installation is simple. We offer the option of a female NPT-style connector or a hose-nipple style. Either of these would be spliced into your existing plumbing, or you could use metal or PVC for a new install. Electronics are plug-and-play, and we do include detailed installation instructions," added Hamilton. *—Mike Magda*

UPGRADED IRS COMPONENTS

MARK WILLIAMS ENTERPRISES

markwilliams.com

When vintage racers running C2 and C3 Corvettes were having reliability problems with the independent rear suspensions, they asked Mark Williams Enterprises (MW) in Louisville, Colorado, for help.

"Our task was to beef up the components wherever possible," said Mark Williams.

These Vettes came with 17-spline inboard yoke shafts that were prone to failure under stress. The MW replacements have a stronger, 30-spline design and are CNC machined from 300M steel. Other enhancements include axle hub kits, a pinion yoke, and 1350 series half-shafts.

"Carl Greatches of ACG Enterprises, a well-known SVRA prep shop, installed the MW components in his team cars, and they are winning races with no problems," reported Williams. "Other racers have noticed and are coming aboard. We have also developed upgrades for Jaguar, Viper, and Pantera IRS drivelines."

Another of the Corvette upgrades involves the ring-gear carrier for the positraction unit. Under racing conditions, the cast-iron carrier will crack and last only a few races.

"We resolved the problem by making the short stub axles out of aircraft-alloy forgings and upgrading to the 30-spline tooth count," explained Williams. "The original carrier was made of a cast-iron material, which is common at about 40,000-pound tensile strength. We produced a new carrier from a billet bar that is heat-treated to more than 230,000-pound strength." *—Mike Magda*

EXTRA-TALL CLEANABLE OIL FILTER

SYSTEM 1 FILTRATION PRODUCTS

system1filters.com

Racers can now opt for an extra-tall oil filter from System 1 Filtration Products in Tulare, California. The new model measures 7.750 inches in length and 3.750 inches in diameter. The reusable, cleanable filter is equipped with a 35-micron stainless-steel element that provides excellent filtration for up to 20W-50 oil viscosities while offering unrestricted flow.

"The primary benefit is that the engine oil can easily be examined and potential problems nipped in the bud," explained Mark Mittel. "The stainless-steel mesh filter elements are cleanable, eliminating ongoing replacement costs. A typical oval track racer might use two replaceable filters in a weekend. It adds up quickly. A System 1 cleanable filter eliminates these ongoing expenses."

The filter case is machined from billet aluminum and black anodized. The system is sealed with O-rings. Fittings are available for all popular applications, including metric.

"There are many race teams that have been relying on System 1 products for quite some time. They include Kalitta Motorsports in drag racing, the McMillin Racing clan in off-road, plus pulling teams like Midnight Motorsports. They are very popular among modified racers, too," said Mittel. "In addition to its drag racing roots, System 1 filtration systems are employed by off-road racers, tractor pullers, in various oval track venues, endurance racing, and marine applications." *—Mike Magda*

RACE BEARINGS FOR CAN-AM X3

KING ENGINE BEARINGS

kingbearings.com

King Engine Bearings in Livingston, New Jersey, has designed the new Can-Am X3 bearings specifically for off-road applications.

"High-performance Polaris and Can Am engines needed a stronger bearing to keep up with the added horsepower and torque," explained Ron Sledge. "OE-style bearings were simply not good enough."

King Engine Bearings was approached by rod and crankshaft supplier Brian Crower to produce race-ready bearings. Utilizing King's pMaxKote polymer layer construction, the bearings are more suited to high loads and will resist seizure.

"The Polaris and Can-Am racing bearings feature pMaxKote bearing material and will take the heavy loading while also providing extra lubrication and conformability," said Sledge. "This product is also offered in undersizes, so expensive crankshafts can be salvaged."

Sledge said testing with more than 200 installed units in Polaris engines has not shown any signs of wear. So far, feedback is not available from the relatively new Can-Am applications.

"We are expecting similar results as the Polaris," added Sledge. *—Mike Magda*

5.3L LS1 ENFORCER CYLINDER HEADS

AIR FLOW RESEARCH (AFR)

airflowresearch.com

The new AFR LS1 Enforcer cylinder head is a budget-friendly design with 210cc intake port volume and 2.000/1.570 valves sizes.

"This item can apply to a few different forms of racing and classes, such as grudge, no-prep, autocross, drifting, and more," said Tim Torrecarion of Air Flow Research, Valencia, California. "It was designed for the small-bore (3.780-inch) LS enthusiast, specifically the 5.3- and 4.8-liter engines."

The Enforcer features AFR's permanent mold "as-cast" technology on the intake runner, exhaust port, and combustion chamber surfaces. This allows for accurate and repeatable port location and flow performance. The valves are set at 15 degrees, and the deck thickness is .425-inch. The cylinder head comes with a 66cc combustion chamber, and the intake and exhaust ports are in the stock location so that typical intake manifolds and exhaust headers will fit.

Other features include competition five-angle valve job, PAC 1.290-inch valve springs (140 pounds on the seat) and seven-degree chromoly retainers. The head is cast from A356 aluminum.

"There are not a lot of options when it comes to cylinder heads for the customer that is starting with a Vortec 5300 engine," said Torrecarion. "Based upon flow numbers, this head can support 530 horsepower, normally aspirated. With a power adder it will be closer to 1,000 horsepower." *—Mike Magda*

FAST MOVERS

A look at some of the country's in-demand motorsports products and services by region and racing segment, from coast to coast.

Edited by Laura Pitts

Motorsports retailers and service providers are constantly tracking the hottest parts and trends to give their customers a competitive edge. For the latest on which products and services are moving the retail needle, we present the following sales snapshot from shops across the US.

ATLANTA SPEEDWERKS

Atlanta Speedwerks in Gainesville, Georgia, is a road racing retailer that also provides driver coaching, track prep and support, and car building services for customers running in the American Endurance Racing (AER), ChampCar Endurance Series, International Motor Sports Association (IMSA), National Auto Sport Association (NASA), Porsche Club of America (PCA), Sports Car Club of America (SCCA), and World Racing League.

Its fast-moving products include the (appropriately named) F.A.S.T. cool suit shirts designed with more than 50 feet of water tubing for equal cooling zones and maximum coverage, which is ideal for endurance competition. In addition, the company has also been focused on Porsche PDK transmission repair, specifically the transmission position sensor.

"We're one of only a handful of shops that can repair Porsche transmissions," said Todd Lamb. "We market [our business] through advertising in the PCA magazine and sponsoring local track day events at Road Atlanta and Atlanta Motorsports Park."

DRAG CARTEL INDUSTRIES

Drag Cartel Industries in Simi Valley, California, is an import drag race retailer specializing in parts for street weekend warriors. Its popular offerings, including Honda AWD conversion kits and Elite drag race coilovers, were described as "unique to the market, proven on and off the track, and USA-manufactured."

Its customers, who are located throughout the US and internationally, according to Jeremy Lookofsky, also enjoy its DC-OG Series camshaft combo and Supertech spring combo, which are also included in its street/strip CNC head and camshaft kit.

RACE PART SOLUTIONS

Twin turbo customers "love" Race Part Solutions' billet intake merge, which is an aluminum piece that merges two charge pipes into one without the need for precision cuts and complicated sizing. Designed for any engine combination running twin turbos, they are available in different sizes and configurations.

"[The billet intake merges] take the guesswork out and save a ton of fabrication time, plus they look amazing and are made in-house here in the USA," said Wade McGowan of the Maysville, Georgia-based company. "We released them last year, and they have been a consistent seller since they hit our shelves. We have sold these all over the world to go on everything from drag cars to street cars, and [even] boats and more."

RM RACING LUBRICANTS

When asked what its best moving product was, Richard Matthie of RM Racing Lubricants, with locations in Niagara Falls, New York, and Welland, Ontario, Canada, immediately pointed us to Maxima Racing Oil's Performance Straight-Weight 50 WT racing oil.

"We've been selling that line for four years now, and it's extremely popular with our drag racing customers," Matthie said. "Different from competing products, it has two distinct zinc formulas, the first activated when the racer starts the car. That provides protection when the engine parts are cold. The second formula kicks in at the normal operating temperature, therefore giving engine protection from start to finish. Drag racers like it…and the first zinc formulation makes a big difference."

In addition, Maxima's Cool-Aide Concentrate is a hit with its dirt track racing customers, thanks to its cooling properties during multi-lap events. "It gets more popular every year," Matthie said.

RM Racing Lubricants' customers run the gamut of competitors—from all segments of racing—across Canada and the US. Marketing involves word of mouth, social media advertising, and advertisements in print motorsports publications.

"One other big part of our marketing plan is sponsorships," Matthie said. "RM sponsors multiple teams and race series, like Ian Hill's Canada Heads Up Drag Race series." PRI

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NEWLY APPOINTED

BILL LUPINOS

The FASTRAK series gets a new VP who loves dirt racing so much that he bought a track in Kentucky.

By Jim Koscs

Bill Lupinos turned a lifetime of dirt racing fandom into a new career when he left a marketing position with PepsiCo after 16 years to buy Richmond Raceway in Richmond, Kentucky, in early 2018. This past December, he added to his racing portfolio by joining FASTRAK Companies International LLC as company vice president.

Lupinos works remotely from Kentucky and regularly visits the FASTRAK corporate office in Georgia. Meanwhile, Bill, his wife Stacy, and sons Adam and Aaron do everything at the track, from grading to running the concession stand, adding a powerful component to what has traditionally been a family sport. He has also owned and operated a FASTRAK Heart of America Ultimate Super Late Model (USLM) franchise for the last three years, as well as a successful super stock series.

FASTRAK founder and owner Stan Lester will remain involved on a limited basis, consulting for the company and working on additional marketing to increase purses and point funds. Lupinos is optimistic for FASTRAK's future, and recently shared his thoughts with PRI.

> *"KNOWING THE BEHIND-THE-SCENES OPERATIONS OF A DIRT TRACK IS A HUGE BENEFIT FOR ME."*

PRI: You obviously love dirt racing. How did that start for you?
Lupinos: I've been a huge dirt racing fan my entire life. I started attending Lebanon Valley Speedway [in West Lebanon, New York] at five years old, since my dad was a scorer. They frequently gave me odd jobs to do as a kid. I then helped with a big block modified team in my teenage years.
PRI: You come from a solid marketing background. Can you tell us how you got into the racing industry?
Lupinos: When the Chilled Direct Store Delivery division of PepsiCo was being dissolved, I had the choice of early retirement or an unknown position within Pepsi. At the time, I saw on Facebook that Richmond Raceway was for sale. We looked into it, made a visit on our way from Seattle, where we were living at the time, to the 2017 World Finals, and decided to buy it. We closed that December, moved to Kentucky in February 2018, and started racing in April.
PRI: What do you see as the immediate and long-term marketing needs to fill for FASTRAK Racing?

BILL LUPINOS

TITLE:
Vice President

ORGANIZATION:
FASTRAK Companies International LLC

HOMETOWN:
Richmond, Kentucky

FAST FACT:
Lupinos is currently living at his track, Richmond Raceway. "If I look out my front door, it's the pit gate."

Lupinos: Communication and availability are huge. Customers need to know you are there for them at any time. I just started in December and do not have any specific plans in place yet.
PRI: How does your role as track owner help you when negotiating deals and working with other track owners for FASTRAK and the USLM Series?
Lupinos: Knowing the behind-the-scenes operations of a dirt track is a huge benefit for me. I know exactly how easy it is to lose a lot of money on any given night. I can relate to all aspects that go into putting on a race, from concessions to track prep and staffing. Just as at the track, I'll be watching costs on everything and changing suppliers when needed.
PRI: What's the biggest challenge facing race tracks and series today?
Lupinos: The economy, availability of parts and tires, and live streaming.
PRI: With live streaming an issue, do you have ideas for 2023 to bring more people out to the track, such as special events and promotions or non-race activities?
Lupinos: Yes. We need to make the experience, food, midway activities, and racing all better. That will make more locals want to come.
PRI: What is one recent mistake you learned from?
Lupinos: Paying way too much attention to social media and the hatred many so-called race fans like to post.

"I USE SOCIAL MEDIA TO PROMOTE, BUT I'VE STOPPED USING IT IN A PERSONAL WAY."

PRI: Have you found a way to balance the need to use social media with the way you deal with haters and trolls?

Lupinos: I use social media to promote, but I've stopped using it in a personal way. I don't read everything that I did before. When it's a troll on my page, such as the guy telling me I couldn't run a lemonade stand, I just delete and block instead of arguing.

[Editor's note: Lupinos previously turned social media lemons into business lemonade. When he took over Richmond Raceway, some wrote, "Go back to New York. The damn Yankees need to leave." In response, Lupinos named a late September race "The Damn Yankees 50," which marked its fourth year in 2022.]

PRI: What is the best piece of advice you have received?

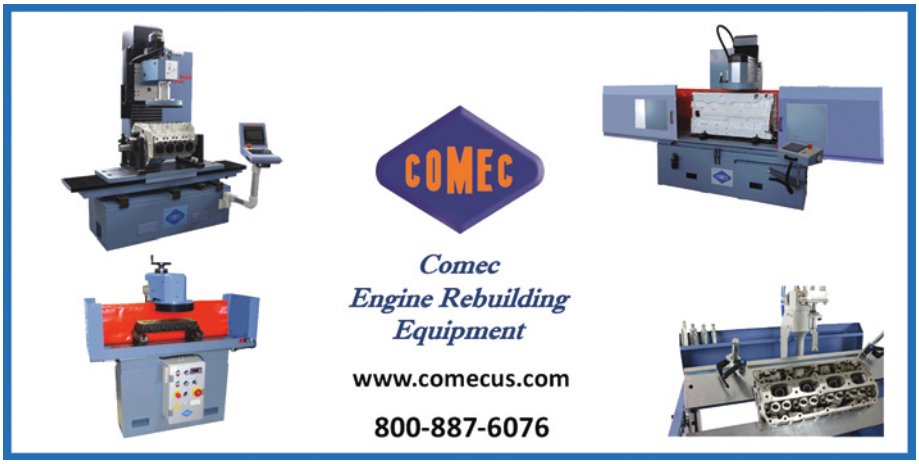
Lupinos: Just be yourself and do you.

PRI: If you could have a conversation with anyone in racing, who would that be and what would you ask?

Lupinos: Tony Stewart. I'd love to know how he makes Eldora Speedway so great.

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

Lupinos: My family. Richmond Raceway is a 100% family-run facility. The four of us do everything leading up to race day. They have sacrificed a lot for my dream. PRI



INDUSTRY INSIGHTS

CHUCK WATSON II

Collaborating closely with Ford engineers, Watson Racing has become a preeminent force within the Mustang brand. This second-generation entrepreneur provides a glimpse of what is to come (more electrification) and how he is addressing some of the most critical challenges to motorsports head-on.

By Jeff Zurschmeide

Chuck Watson II was born to race and develop performance parts. He's the second generation of Watson Engineering, which was founded in 1981 by his father Chuck Watson Sr., and ultimately, Watson Racing. Because the family home and shop are close to Dearborn, Michigan, Ford Motor Company and the Mustang were the natural choice for the Watsons.

The younger Watson started drag racing as soon as he had a driver's license, and he went into the family business. As a result, he's been one of the leading aftermarket Mustang developers and builders over the past 40 years. He's seen the Mustang progress through five generations of the pony car and now looking toward electrification. Since 1987, Watson Engineering has worked with Ford Performance Racing on custom and production parts design. Watson is responsible for development on Ford Performance vehicles including the 2016 Cobra Jet, the Mustang S197 and S550, and the Boss 302 R/S.

"I'VE GOT LIFELONG FRIENDS THAT I WOULD'VE NEVER MET IF I DIDN'T GO TO A RACE TRACK."

Watson Racing is primarily associated with the drag racing world, but it also creates road racing Mustangs for the NASA (National Auto Sport Association) Spec Iron class, has worked with GT World Challenge America racing teams as well, and currently supports racing cars and performance products for GM and Mopar brands as well as Ford.

The senior Watson passed away in 2021, but not before getting back into racing personally after a long hiatus. To honor his father, Watson II went all-out and won a 2022 NMCA Holley EFI Factory Super Cars championship in the family's supercharged Cobra Jet. We caught up with Watson II to talk about the future of Mustang racing, electrification, and his father's legacy.

PRI: When you started in 1981, it was all Fox Body Mustangs. How has the Mustang business changed over the years?
Watson: You know, for us it really hasn't changed. We've had parts in the Ford Racing catalog all the way to 1981. We've been manufacturing Mustang aftermarket parts, and the first couple things they purchased were a set of the shorty headers and the H-pipe that had the catalyst delete. Both of those pieces were ours. There's a lot of people who probably don't know that.

PRI: What do you think are some of the greatest challenges to racing today? Then, what do you think we can do as an industry to help overcome those challenges?
Watson: There are two things. Number one, you've got electrification, which is coming. That's obviously a concern. Then the other concern is what's been happening over the last couple of years with race tracks starting to dwindle away. That's pretty concerning and scary.

[To reverse that trend] just look at what's happened this past season. I think the participation numbers were up. I was at a number of races where they had record crowds. So I think that part's good. The concern is subdivisions and stuff that are moving in next to race tracks. These are tracks that have been there for 50-plus years. They were out in the middle of nowhere, but the next thing you know there are subdivisions going in next door. Look at what's going on right now with the Freedom Factory down in Bradenton, Florida. They're going to put up a 4,500-home development right next door to the strip, and that scares me. I love that track, but I don't know what's going to happen five years from now.

I'm located here in Brownstown, Michigan, and Detroit Dragway was literally a thousand feet away. I watched it happen there. It was kind of in the middle of nowhere, and next thing you know, these houses go in, and they built a [golf] driving range across the street. I mean, who builds a driving range across the street from a drag strip? But they did it. And they were successful in shutting the track down. So like I said, that scares me.

With its location close to Dearborn, Watson Engineering and Watson Racing have a close relationship with Ford. But Watson Racing "works on all three domestic brands," said Chuck Watson II. "I don't want people to think that we're only Mustangs."

"The sheer horsepower numbers that we're seeing out of these little motors is unheard of," Chuck Watson II said. "It's not just us and Ford; everybody's doing it." Photo courtesy of Evan J. Smith.

PRI: Ford just revealed the next generation of the Mustang at the Detroit Auto Show, but there's also the Mustang Mach-E that's looking like the future of the Mustang. Are you going to pivot your business and work with electrics or stick with what you've been doing?

Watson: We're going to pursue it. We're going to do both. A lot of the work that we do for Ford is prototype work. So we're working on things that are two, three years out. That's the direction that they're headed in, and we're going to stay the course and focus on it. Obviously, there's not a need for exhaust systems and headers and things of that nature, but there are other brackets and other components on the vehicle that we're very capable of making. We have to put food on the table, so of course we're going to chase it.

PRI: How do you keep your knowledge current? Presumably, you're already working with next-generation Mustang?

Watson: There are some things I can't speak about, but I've got three of them here right now. We're actively working on some cool projects they've got coming down the pipe.

PRI: Do you get a lot of information from Ford engineers, or do they just hand you the car and let you figure it out?

"A LOT OF THE WORK THAT WE DO FOR FORD IS PROTOTYPE WORK. SO WE'RE WORKING ON THINGS THAT ARE TWO, THREE YEARS OUT."

Watson: We collaborate and work hand-in-hand directly with the Ford engineers, which makes it nice. We're also tied into their design system. So pretty much all of the vehicles that are out there, we have access to them. It's pretty nice!

PRI: What do you think are the most important innovations in motorsports in the last few years, and what makes them important?

Watson: I think the sheer horsepower numbers that we're seeing out of these little motors is unheard of. My car is 327 cubic inches, and we're pushing 1,500 horsepower out of it. It's not just us and Ford; everybody's doing it. Everything is behind that, engine design and tuning.

PRI: Who do you look to for inspiration?

Watson: To this day, I still look to my father. Unfortunately, I lost him in 2021, but there's not a day goes by that I don't think about him. That man taught me a lot.

PRI: You won a championship in his honor this year. What's the story behind that?

Watson: We raced a lot back in the late 1980s to early 1990s. Then I went to college, started a family, and had small kids. So I

In tribute to his late father, Chuck Watson II won the 2022 NMCA Holley EFI Factory Super Cars championship in the family's supercharged Cobra Jet. "There's not a day goes by that I don't think about him. That man taught me a lot," Watson said. Photo courtesy of Evan J. Smith.

just had different priorities. But now that my kids are grown, we got back into it. How we got back into it was that I surprised my father. Behind his back, I cloned him a 2014 Cobra Jet. He had no idea because we were building Cobra Jets at the time. It took me about a year to do it on the down-low. One day he stopped by the shop, and I walked him out and showed him the car. He said, "Wow, this is nice." He sat in it and started it, and he said it was pretty cool. And I said, "Yeah, this is yours." He was like, "What?!"

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MAHLE

Watson Engineering and Watson Racing employ about 400 people. Chuck Watson II believes the key to managing an organization of that size is "taking care of your people. I feel we are very generous to our people."

That was the only time I ever stumped him in my life. I thought at that time we were done racing. So I thought he was just going to take it and put it in his collection. But he looked at me and says, "Hell, no!"

He said, "We're going drag racing." It's kind of neat that by doing that, I guess I gave him the bug back, and we've been all over it since then. This (past) year I just had all my stars lined up.

PRI: What do you think is better about racing today than when you started?

Watson: For me, I think it's equally exciting today as it was back then. I think today maybe it's a little bit more exciting just by the numbers. The ETs and the miles per hour that we're running now, no one would have thought possible in the 1970s or 1980s. I think that amps it up a little bit. For me, it's just exciting to be at the race track, with what you're witnessing and the relationships that you create. I've got lifelong friends that I would've never met if I didn't go to a race track. So I'm thankful for that.

PRI: Conversely, what if anything is worse today about racing than it was back then?

Watson: I don't think anything is worse. The only negative I can think of is just what's happening today with losing tracks. Back in the 1970s and 1980s, tracks were opening up, and you didn't hear about tracks closing. No one really seemed to complain about them, where today it just seems there's more people complaining about noise than there were back then.

PRI: As you look back on your career to date, what gives you the most pride so far?

Watson: Starting Watson Racing was a pretty cool deal. I started going to the PRI Show when it was still in Orlando. I went for three or four years looking at parts and I thought, "Wow, we could make that." I would come home and share it with my father, and he said, "We don't have time for all that."

So the next year I got my dad a ticket. We walked into the Show, and we didn't make it probably 20 feet. I'll never forget it; he hit me in the shoulder with his hand and said, "Chuck, we can make that, we can make that."

I said, "That's what I've been trying to tell you for the past three or four years!" Ultimately that's really the inspiration for how Watson Racing was created.

PRI: What do you think we can do, industry-wide, to help carry on the passion for racing to the next generation?

Watson: Boy, that's a tough question there. I have a brother who doesn't do what I do. To him a car is just transportation. It's just something that I had a passion for when I was a little kid, watching my dad do stuff. He used to take us for hot laps around the neighborhood, and my friends would enjoy that, so we had some really good times growing up. I think it's hard to teach. It's something that people just have to experience. I'm a little afraid that the youth of today is not as interested as we were back when we were their age.

PRI: How do you market new products and services?

Watson: When Watson Racing was first started, we obviously had a reputation as Watson Engineering. We had a number of racers both in drag racing and in road racing that we sponsored to get our name out there. We did that for a number of years, and we've scaled back since then. When we started racing for ourselves again, we took those dollars that we used to use on sponsorships to support what we're doing on our own.

PRI: Has moving into the Internet age really changed anything for your business? Maybe in the way that you deal with customers or how customers find you?

"WE COLLABORATE AND WORK HAND-IN-HAND DIRECTLY WITH THE FORD ENGINEERS."

Watson: It certainly has. We were more of a manufacturing company, but when we moved into racing, we needed a storefront. With Facebook and Twitter and all the social media outlets, of course you've got to be tapped into that to keep up with the Joneses.

PRI: Watson Engineering and Watson Racing are not a one-man show. You have about 400 employees now. What do you think are the keys to effective leadership and management of an organization of that size?

Watson: It's taking care of your people. I feel that we are very generous to our people, and we have a lot of people who have been with us for many years. It's just about mutual respect. We have phenomenal, talented people. You'll catch 'em singing out loud, or every now and again I'll walk out there and see someone dancing or something. It's just great to see happy employees.

PRI: What do you think is the most important technical development for your business over the last five to 10 years?

"WE HAVE A LOT OF PEOPLE WHO HAVE BEEN WITH US FOR MANY YEARS. IT'S JUST ABOUT MUTUAL RESPECT."

Watson: Obviously, it's the equipment. That is really what makes or breaks you. We've got some real state-of-the-art stuff. For example, we have eight three-axis laser cutters. Each has a material tower with a dozen shelves, and you can stack 5,000 pounds of sheetmetal on each shelf. You can put different thicknesses on each shelf. There's a vacuum conveyor that comes over, picks the sheet up, drops it onto the laser, so there's already a sheet that's being cut, and then it reloads another sheet, and then the decks change. So it's just constantly cutting.

We've also got a bunch of CNC machines and mandrel tube benders. So it's technology that really gets you there. All that is stuff that you used to do by hand. It would take you about an hour to cut something out, and now we can do it in about 12 seconds.

PRI: Are you using 3D printing at all?

Watson: We use it a little. I bought a prototype machine, and it has come in very handy. We've used it for a number of things. I'd say we're dabbling in it. We're not neck deep into it yet, but we do have the technology. We also have a laser etching machine. If you look at the 2018 Cobra Jets, on the quarter windows we engraved "Cobra Jet" in their special font.

PRI: Anything else to say?

Watson: I do want to make it clear that although we specialize in Mustangs, we work on all three domestic brands. I don't want people to think that we're only Mustangs. PRI

SPECIAL REPORT

MORE THAN JUST PRETTY FACES

THESE CONTENT CREATORS AND INFLUENCERS CAN ALSO RACE... AND BUILD ENGINES... AND FABRICATE.... DISCOVER HOW THEY ARE USING THEIR PLATFORMS TO EXPAND MOTORSPORTS' REACH IN THE DIGITAL AGE.

By Steve Statham

Racing fans of a certain age may remember when media outlets for motorsports content was, shall we say, limited. Fans wanting news, commentary, or behind-the-scenes profiles were limited to obscure cable TV channels, racing-oriented print publications, or the annual network broadcast of the Indianapolis 500. Fans with an interest in more grassroots racing classes were left in the dark unless they attended the races themselves.

That world is now barely a speck in the rearview mirror, and a new generation is at the wheel.

The case can be made that we are living in a golden age of motorsports content. Thanks to independent creators on social media platforms, there is an almost unending stream of racing coverage, how-to videos, thrilling ride-alongs, and real-time event commentary. Some of it may be forgettable, but a lot of it is genuinely entertaining, informative, and well-made. Many of these social media entrepreneurs have built enormous followings and large fan bases.

The preferred term currently for these story tellers is content creators, and they are also sometimes referred to as influencers, although that term has picked up some baggage in recent years. Whatever they prefer to be called, these independent content creators are increasingly prominent in the motorsports arena.

FOLLOWS AND LIKES

There is more to being a social media star than simply being telegenic and easy on the eyes, although a natural likability definitely helps. The most successful social media influencers often come across as people that would be fun to hang out with.

But, as with anything, the hard work is what separates the successful from the wannabes. Besides the effort that goes into video production, many of these content creators are very hands-on with the car building and racing aspects of their craft. Some have carved out a living from their various platforms, while others juggle their social media gigs with their day jobs.

The content creators we spoke with all took different paths to arriving at their current platforms and levels of influence. Some set out from the beginning to make a living at video production and merchandise sales, but for others, the content creation platforms grew organically from a love of racing.

Skye Romanoff is president of the California Rallycross Association, and her exploits in rallycross competition and car building have earned her 100,000 followers on Instagram. She also participated on panel discussions and was a Featured Product Award judge at the 2022 PRI Trade Show.

"I FLEW 165,000 MILES LAST YEAR FOR CONTENT."

"I worked for Subaru in college," she said. "I was a sales associate at Subaru, and one of the techs there did rallycross regionally in California. He invited me to check it out. He said, 'Just bring your helmet along, and let's go out and have a fun day.' I showed up with a helmet, and I hopped in and out of everyone's cars and just got hooked."

For Romanoff, the growth of her Instagram audience caught her by surprise. "I started my Instagram three-and-a-half years ago, and it turned into this. I wasn't expecting any of it. I just wanted to post fun pictures and then it kind of blew up."

Skye Romanoff's exploits in rallycross competition and car building have earned her 100,000 Instagram followers. "There's not a lot of rally drivers, let alone women rally drivers. I feel like that helps," she said.

Blake Wilkey produces off-road focused content for his 248,000 followers on Instagram and the 76,000-plus subscribers to his Shreddy Lyfe YouTube channel. He also markets his own Shreddy Lyfe lifestyle merchandise. For him, it was a successful car build that lit the match for his social media platforms. "After building my first Bug called the OG Shark, I had friends that were into media. With it being a very unique build—a 700-hp Bug that would wheelie and take big jumps—it was a no brainer to show the world my creation," he said.

The world definitely noticed, to the tune of more than 3-million views on a viral video titled Urban Assault! Sadly for Wilkey, local law enforcement noticed some of the more exuberant displays too, but after paying his debt to society, he bounced back. "Once it gained a lot of traction and people were into it, the ball just kept rolling from there, and doors opened up since it was receiving a ton of exposure."

David Patterson has built an empire around his That Dude in Blue brand, with 1.23-million subscribers to his YouTube channel, 633,000 followers to his ThatDudeInBlue Facebook page, and merchandising outlets for T-shirts, hoodies, and car care products. For him, video production was the original lure, and the car content came later.

He received a video camera for Christmas in his formative teen years and taught himself how to edit. It was the early days of YouTube, and Patterson got his head turned by Star Wars fan films, which inspired him to learn how to animate videos. His first viral video was a homemade light saber fight.

Patterson decided to pursue a career making movies and went to film school. His actual exposure to the film business, however, left him disillusioned. But he was still determined to create content, and fortunately fell in with the car culture in and around Virginia Beach, Virginia.

"I met a really good community down there, got really into cars. I don't come from a car family, but I've always had a little bit of a bug. At the time, going to these car events, I started watching car content on YouTube. This was very early automotive YouTube," he said. The often clumsy nature of those early automotive videos inspired him to dive in. "I realized I could totally do that content. I knew I could because I had the skillset for it."

His breakthrough came as he was about to trade in his 2006 Mustang GT for a 2013 Mustang GT. He decided to do a practice video using his older car. "I ordered a windshield suction cup and did some reading on how to make a car video and just went out there and tried it. I uploaded myself 'reviewing' my own car and put it up. In a week it got 25,000–30,000 views, and I decided, 'I need to be doing this instead.'"

Chelsea VanCleave is steadily building a following on Instagram. She arrived on the social media scene after a lifetime of racing influence, beginning at a young age with Jr. Dragsters. "When I was in my mid-20s, that was when Instagram started to get bigger, and I was building an engine at the time,"

Blake Wilkey grew up racing motocross and saw racing on four wheels as "a good transition for future opportunities. Bugs always drew me in since my mother had a picture of us in a Bug when I was a baby."

she said. “I just started posting little things like progress on my engine, little things I was doing, and that kind of grew a little bit of a following for me. And it’s just progressed.”

RACE DAYS

The content creators in our sample are not just keyboard racers. Most have racing backgrounds, and all of them spend as much time on track as they can. “I grew up racing motocross from the time I was 11 until I was 20 years old,” Wilkey said. “Growing up, I always wanted something with four wheels to race off-road, as well as seeing that as being a good transition for future opportunities. Bugs always drew me in since my mother had a picture of us in a Bug when I was a baby. Since then, I have raced in Polaris UTVs, stock Volkswagen Bugs, in the Class 11 I called the Slug Shark, with my new Trophy Truck Bug named Jaws, a few fun races in Megalodon, as well as partnered up with racers in multiple other classes.”

VanCleave was on track when she was still in elementary school. As a teenager she earned her license in Super Comp Dragster. “I’ve been in drag racing since I was eight,” she said. “I was a fan even way before then. I was a big racing fan growing up, whether it was NASCAR, IndyCar, monster trucks, drag racing, pretty much anything that went fast, as a little kid I thought that was super cool.”

That led her to the nuts-and-bolts side of racing—eventually. “When I was younger, I had no interest in working on cars. I was like, ‘I’m not the mechanic, I’m just the driver.’ And my dad snapped that out of me so quickly.” She later went to school at University of Northwestern Ohio. “I got my Automotive High Performance degree, so I was working on my own stuff, trying to work on race teams.”

“Rallycross is my main,” Romanoff said. “We have an event about once a month. The season is generally March to beginning of December. I do track days and time trials in a different car. I work with a group called Lightspeed, and they host events at Laguna Seca, Sonoma, Thunderhill, and Buttonwillow. In exchange for promotions that help them grow, they give me free track days. I’ll also be doing that four or five times a year.”

Patterson has sampled several forms of motorsports, although he never raced in competitive classes. He regularly attends driving schools to keep his skills sharp. “I typically do as many racing schools as I can a year. I do lots of drifting now. I do ice drifting a lot. In two weeks, I’m flying up to Minnesota, and we go on frozen lakes and train that way, which is great for car control skills. The ice drifting has helped me with circuit racing, it’s helped me with drag racing, it’s helped me with autocross, it’s helped with everything. If you get out of control you don’t panic, you just stay relaxed and make sure you’re good.

“I’ve done autocross, basic track days,” he continued. “Road Atlanta is my home track, 15 minutes from my house so I’m there all the time. The most competitive stuff I’ve done is against other YouTubers, which is pretty funny. I did MotorTrend’s Roadkill Nights last year. That was really intense. We only had 23 days to build a car, and I’m pretty sure my hair turned gray from it.”

Chelsea VanCleave began racing in Junior Dragsters. "Pretty much anything that went fast, as a little kid I thought that was super cool," she said. Her current project is a 2009 Drag Pak Challenger she plans to race in brackets or stock classes.

HANDS ON

Although it's possible to run a successful motorsports oriented-platform without do-it-yourself car building skills, that's the hard way, and our sources had definite mechanical strengths. "I'd say my strengths revolve around creativity and fabrication," Wilkey said. "I'm kind of a jack of all trades, managing so many hats from fabrication, prep work, activations, media projects, etc. There's a lot that goes into my program, and I do have a few friends that come and help out from time to time, which I'm thankful for."

VanCleave likes the V8-building side of the sport. "I really love to build engines. I used to work for BES Racing Engines when I lived in Ohio. I had so much fun building my own engine," she said. "To build an engine, and to see it on the dyno, to see it pull the power it did…I had pretty low hopes. I wanted a cool bracket engine, and it ended up making 923 hp on the dyno. I felt so successful at that moment in time."

She has since moved to North Carolina, where her current project is a 2009 Drag Pak Challenger with 6.1 HEMI that she plans to race in brackets or stock classes. "It's a good project car. It's not a fixer-upper, it just needs to be completed." She took it to Bagshaw Hotrod Fabrication locally in North Carolina and had them put a cage in it. "It's pretty much a full-blown car now. We have the brakes on it, I've got wheels and tires." VanCleave also has a stock 2019 Challenger R/T Scat Pack 1320 that she takes to the local eighth-mile drag strip for occasional passes to stay sharp.

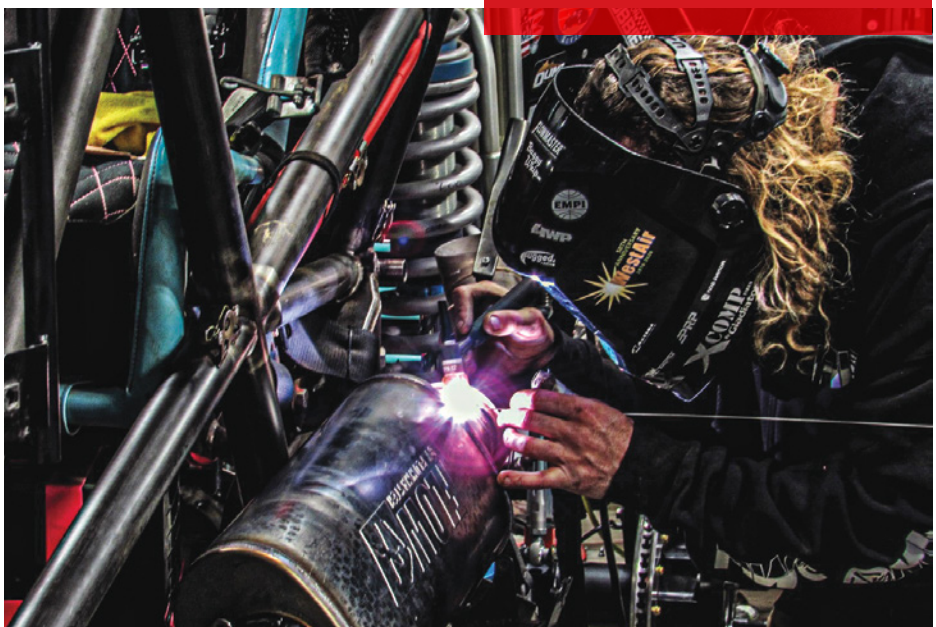
Patterson is not a mechanic by nature, but in building his platforms he has leveraged opportunities to build skills. "On my channel I've made it clear that I came from a very non-automotive home," Patterson said. "It was really tough. When I first did my 2J240, you can just see how awful I am at working on cars. This is 2015 or so. And my commenters are telling me, 'Hey David, try holding the wrench this way,' or 'Try doing it this way.' And I'm like, 'Thanks guys, I know you are low-key insulting me, but it's okay, I'm learning,'" he said with a laugh.

"Cosmetics is probably what I'm best at. When it comes to the fine details, I really enjoy doing subtle cosmetic mods, and paint and body work. That's what I'm better at. If I had to choose a strength, it's definitely in the cosmetic or aesthetic avenue.

"I think that's the biggest thing in my journey, just to accept what you're good at," Patterson continued. "When people are really good at something, I try to highlight their skillset when they do help me."

Patterson may not be doing all the wrenching, but he has plenty of work to keep him busy maintaining his platforms. "When I meet people, I think the biggest thing they are surprised about is that I still do everything by myself. As a business decision, I will be fully honest, it makes no sense. I really stress myself out. I do all the scheduling. I fly a lot. I flew 165,000

"My strengths revolve around creativity and fabrication," Blake Wilkey said. "I'm kind of a jack of all trades, managing so many hats from fabrication, prep work, activations, media projects, etc."



miles last year for content. That means I'm filming, flying, editing, scheduling, talking to companies, talking to people who want their cars filmed, scheduling SEMA or PRI, or wherever we go. It's really important to have time management when it comes to this."

MOTIVATIONS

Our sources were building social media brands for the love of the content creation, but they also saw it as a way to inspire others, and to build a bridge to an actual racing career.

"Being a woman in this industry, it's just automatically going to get a little more attention than yet another guy. As bad as that sounds, it's true," Romanoff said. "What I try to do for content, I like to show other people—especially other women because I'm a really big promoter of women in this industry—that they can do it as well. So they're seeing me do a brake job, or I re-do my coilovers and get an alignment, and they see me doing it hands-on personally. Then they feel like they have the capability of doing it themselves. Not only can I do my own work, and I try to promote that, but I also try to show other girls that I'm doing my own work, and I'm going out to the track the next day. So it shows that it's doable."

"IT'S REALLY IMPORTANT TO HAVE TIME MANAGEMENT WHEN IT COMES TO THIS."

For Patterson, the freedom that comes with being an independent creator is the major draw. "Even after 11 years of doing That Dude in Blue, it's the one thing that would be extremely hard to give up," he said. "It's more stressful work sometimes, but you also don't give up any control. If you have a creative vision, you just go do it. You don't have to ask a higher-up; you don't have to ask a producer or a studio. You just go, 'All right, I'm going to go film this thing now. We're going to get it done.' That was a big problem for me when I did my short stint in the traditional film industry—there was a lot of 'hurry up and wait.'"

Another motivation we heard expressed was to try to help the motorsports community grow, and these creators are using their influence to move the needle. "A really cool thing, the cars and coffee down here in Atlanta is called Caffeine and Octane. It is massive," Patterson said. "I've collaborated with them quite a bit, and they've let me hold my own drift events at a race track down here that they bought. It's called Caffeine and Octane Lanier Raceway. I had this idea of super affordable drift events for the masses here in the Southeast. It's one thing to go to a drift event, it's another thing to feel welcomed by the community. We wanted to have a drift event that any skill level would not be scared to do. There are two separate drift events. They have a drift night every other Friday for $100 a pop to drift for six or seven hours. It's super affordable when it comes to motorsports.

"Lanier has been really fantastic. I think the best thing I'd love to learn right now is to make motorsports—with my platform—even more accessible for more people," he said. Using his platform, he was able to spur growth quickly for the Friday drift events.

Only 15 drivers showed up for the first one, but after Patterson filmed it and showed how fun it was, two months later they had 85 drivers. "We went from 200 spectators to about 1,000 or so. Which is really great because that's what pays the bills."

For Romanoff, her position as president of the California Rallycross Association, along with the other board members, represents a new direction, binding together the previous smaller regional organizations.

"Rallycross is definitely a grassroots motorsports community. We wanted to bring everyone together who runs events in California because in order for us to grow, we all need to work together as a team, as a community," she said. "I know a lot of rallycross people in California, I know all the organizers, so I ended up basically reaching out to all of them saying we should join together. I have sponsors for my events that I host, and I wanted to share all of my sponsor codes with the community."

"I like to show other people—especially other women because I'm a really big promoter of women in this industry—that they can do it as well," Skye Romanoff said. "They see me doing it personally, then they feel like they have the capability of doing it themselves."

Expanding sponsorship opportunities is another key to the sport's growth. "Diode Dynamics, EBC Brakes, and CoolShirt Systems are not only personal sponsors, but they actually sponsored each of my events in 2022," she said. "I was able to get thousands of dollars' worth of product to raffle off to competitors at each event. This is the first time this has been done in the series, and it brings in more people to the events. Also, prizes are raffled off, regardless of podium status, so every driver has a chance in winning. It's worked out great!"

The next steps might be taking Romanoff nationwide. "Some other people and organizers in other states ended up hearing what I was doing, and they reached out," she

"THE BEST THING I'D LOVE TO LEARN RIGHT NOW IS TO MAKE MOTORSPORTS—WITH MY PLATFORM—EVEN MORE ACCESSIBLE FOR MORE PEOPLE."

said. "I was on an SCCA town hall meeting, and I mentioned what I was doing, and I had people reach out to me from Nebraska, Detroit, and Texas. We're actually kind of doing this at a national level and banding together. We're coming together as one big community to promote our sport."

FUTURE GOALS

While all of our content creator sources were proud of their accomplishments, they have dreams to climb higher up the racing ladder and continue to build their platforms. "I would really like to expand into rally, drift, or 4x4 extreme crawling scenes," Wilkey said. "We build everything here in-house, so with that being said, it takes a lot of time and planning to do it right. We definitely have those forms of motorsports on the radar, and whenever we're around it, we ask questions to expand our knowledge for when we do take the plunge."

Romanoff likes racing in the dirt and has her sights set on the top levels of the sport. "I really want to get into Trophy Trucks. It's a dream of mine. I really want to get into driving the trucks in the snow, on the dirt. I think it would be an absolute blast," she said.

VanCleave's racing aspirations have navigated a few chicanes along the way, but looking ahead, she has eyes on team ownership and plenty of track time. "I think being a female in racing, in motorsports in general, is big. You have so many strong females in this industry now. It makes a huge difference," she said. "Long-term, I would love to stay in racing. I never thought, at 30, I would still be involved in racing as much as I am. But I want to own a full-blown race team long-term. I want me and my dad to race with each other, against each other. I want to keep going up."

Patterson has found his niche, and it's never dull. "It's an ever-learning experience. I'm going to accept that my strength is to be in front of a camera and talk about history, talk about cars and how fun they are to drive, and then painstakingly make my way through to not pinching a head gasket." PRI

SOURCES

David Patterson, That Dude in Blue
youtube.com/@ThatDudeinBlue/featured

Skye Romanoff
instagram.com/blancoracingwrx_05/

Chelsea VanCleave
instagram.com/chels_vancleave/

Blake Wilkey
shreddylyfe.com

ON A

FROM THE ENTRY-LEVEL RANKS TO PREMIER ROAD RACE EVENTS ACROSS AMERICA, CAR COUNTS HAVE REBOUNDED TO—OR EVEN EXCEEDED—PRE-PANDEMIC LEVELS. HERE'S HOW THE MOMENTUM WILL CARRY OVER INTO 2023.

By Jim Donnelly

A good thing has been happening to road racing in North America, almost—but not quite—under people's noses. It's been getting bigger. And the growth has been happening at every level. Much of the attention understandably is commanded by IMSA, whose WeatherTech SportsCar Championship is coming off a banner year. A full 61-car grid appeared at the 2023 season-opening Rolex 24 at Daytona, which was also the debut race for IMSA's new, ultra-tech GTP class. And don't forget that the United States will host three Formula 1 races annually, with the blowout success of the Miami Grand Prix in 2022 and the highly anticipated 2023 round on the new street circuit in Las Vegas joining the hugely successful US Grand Prix at the Circuit of the Americas (COTA).

ROLL

Road racing in North America is happily healthy at all levels, with series of all sorts reporting expanded interest from competitors, sponsors, and tracks. There's pronounced momentum and opportunities for racers just learning their craft or for those with experience hoping to move on to higher plateaus of the sport. PRI Magazine interviewed some of the players in North American road-course competition, who discussed their recent successes and predicted still better times to come.

TRANS AM

The historic series for small sedans made some history of its own in 2022, with an overall record season capped by its outing at COTA in Texas, which drew 81 entries, the highest of any Trans Am event ever. The series is fully owned by Parella Motorsports Holdings, and John Clagett said the COTA success was buttressed by the race being the finale of Trans Am's national championship, plus the culmination of its Western title chase. Clagett squarely laid the credit for the upswing at Trans Am's TA2 class, which adapts stock car technology to a road racing environment, with a strong base of both chassis and engine providers.

"Overall, both the national and Western series had record car counts this [past] season," Clagett said. "I would say that the overall amazing class of TA2 is in and of itself creating a record number of average entries, probably averaging more than 40 cars in at least half the races for TA2."

Clagett said the origins of the class date back to the demise of the onetime ASA series for short-track stock cars. TA2 uses stock-car type chassis built by suppliers M1 Fabrication, Howe Racing Enterprises, and Mike Cope Race Cars, and bodies now largely furnished by Five Star and Howe for the Ford Mustangs, Chevrolet Camaros, and Dodge Challengers now eligible for TA2 competition. Seven suppliers furnish engines, including the TA2 Choice engine, a modified Chevrolet design that can be used in any body style.

"WE REALLY FOCUS ON A FRIENDLY ENVIRONMENT THAT FEELS LIKE A HOME AWAY FROM HOME."

"We developed the TA2 Choice engine over the last two to three years," Clagett explained. "It was a cheaper engine, and that has been the passage that has really accelerated the growth. It's a really attractive way to keep the TA2 package affordable. That's been number one in fueling our growth, our ability to manage costs with inflation and parts availability." That, in turn, has positioned TA2 as a step up the ladder from Mazda club racing, and has made the series attractive to NASCAR drivers looking to hone their left-and-right skills, with alumni ranging from Christopher Bell to Sam Mayer and Ty Dillon.

Trans Am enjoyed record car counts in 2022 in both its national and Western series. "The overall amazing class of TA2 is in and of itself creating a record number of average entries, probably averaging more than 40 cars in at least half the races for TA2," explained John Clagett.

For 2023, Trans Am is eyeing new venues including World Wide Technology Raceway outside St. Louis and NOLA Motorsports Park in Louisiana, with the goal of keeping the schedule at around 11 to 13 events that most team budgets can handle. "We try to achieve very limited rules changes. We don't want people to have to buy new cars because of some kind of homologation rules," Clagett said. "Clearly, our goal is to nail down a major title sponsor. We really focus on a friendly environment that feels like a home away from home. People have said that about Trans Am for 40 years. The one thing that we aren't is the showcase where manufacturers show up and spend a tremendous amount of money. That's not where we are at this point, nor is it where we want to be. Factory works teams have an expiration date. When they go away, you're in a rebuilding mode. We love manufacturers to be involved on a marketing level, and to participate in our events, but stop short of wanting factory works teams."

USF PRO CHAMPIONSHIPS

This traditional feeder system that points to Indianapolis exists across three series: USF Juniors, USF2000, and USF Pro 2000, all under Andersen Promotions in Palmetto, Florida. Rob Howden said that "for 2023, our numbers look really good right now," assigning much of the credit to USF's use of a shared tub fabricated by Tatuus, based in Italy, across all its competition classes. Those include the Juniors, which will be going to a new Tatuus-produced race car in 2023, the JR23, supplanting the existing Ligier F4 chassis that USF had been using. It's considered an intermediate step for one of USF's key sources of competitors, drivers coming out of karting.

"USF2000 is so competitive that it's a big leap for people coming out of karting," Howden said. "One of our key components for 2023 is that we have a really good technical platform across all our cars. The same tub is the beauty. The competition was so tough that we started the Juniors for 2022, where the drivers can learn our culture and procedures, and what we demand in terms of driver quality and driver racecraft. Maybe 30% of the Juniors drivers will move up to USF2000. The new cars in our other classes, with the shared tub, have helped us to build our momentum."

SRO Motorsports America presents GT-style races across a broad array of categories and car types. More than 200 drivers participated in SRO Motorsports America races in 2022, "all seeking high-value experiences to feed their motorsports passion," said Greg Gill.

SRO MOTORSPORTS AMERICA

Presenting GT-style races across a broad array of categories and car types, and looking to bounce back from pandemic woes, SRO Motorsports America in Austin,

Texas, attracted more than 200 drivers in 2022, “all seeking high-value experiences to feed their motorsports passion,” Greg Gill said. “Ticket sales were up in all markets, as our fans had the desire to do more outdoors, and sports car racing offered a relatable motorsports experience. Mother Nature was a challenge this past year, with rain at several events hurting the walk-up attendance—that’s always a risk with any outdoor sporting event. But being road racers, the show must go on, and we raced.”

SRO has more than a dozen separate series in Europe and North America, for both GT and production-based classes. “We’ve worked hard to be consistent in series regulations and format, establishing strong series identities for teams and drivers,” Gill explained. ”This makes it easier for our teams to develop their own multi-year plans. We also benefit from great long-term partners like Pirelli, Fanatec, AWS, Skip Barber, and CrowdStrike. Our industry-leading global eSports programs continue to grow visibility in a younger demographic, bringing new fans to the track.”

Gill made a special point to credit SRO’s strong social-media presence on YouTube, Facebook, and Twitch with introducing its myriad classes to both new fans and potential competitors, especially women. “Our enhanced content creation has been focused on video driving social engagement,” he said. “Our paddock is diverse in terms of both hardware and people. I believe we have more women racing with us than any other professional road racing series in North America.”

The SRO Motorsports paddock is diverse in terms of both hardware and people. “I believe we have more women racing with us than any other professional road racing series in North America,” Greg Gill said.

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With fixed entry fees and race payouts, the USTCC markets itself as a cost-effective way to go racing. "Our niche is kind of in the middle from club racing to full-blown pro," explained Ali Arsham.

SRO closed out 2022 with a visit to a new venue, NOLA Motorsports Park, with Gill calling it a highly positive experience and looking for a repeat performance there in 2023. The biggest news for the coming season is Toyota's selection of SRO to manage its all-new North American GR Cup for production-based GR86 race cars. In other technology news, SRO will welcome three new GT3 platforms for 2023: the Ferrari 296 GTE, Lamborghini Huracán GT3 Evo, and the Porsche 911 GT3 R.

"The GR Cup will be an amazing talent showcase for aspiring pro racers," Gill said. "We'll increase our big weekends to a massive 10 races, including five doubleheaders. We are expanding our eSports offerings and will have enhanced event experiences with additional fan activities. Our teams are also excited about our return to COTA in Austin this May. If you love GT and touring car racing, either as a participant or a fan, SRO is where you want to be."

US TOURING CAR CHAMPIONSHIP

Before he decided to run a road racing sanctioning group, Ali Arsham was an amateur racer himself, who quickly learned the hard way that racing costs money, regardless of the competition level. Arsham is now the managing director of the United States Touring Car Championship (USTCC), based in Napa, California, which markets itself as a way for aspiring drivers to race without going bankrupt, having fixed entry fees and race payouts for the majority of its classes. "Our niche is kind of in the middle from club racing to full-blown pro," he explained. "They're using us to train on the way up, or else they used to do racing at a higher level and now want to do something a little lower key."

> *"ONE OF OUR KEY COMPONENTS FOR 2023 IS THAT WE HAVE A REALLY GOOD TECHNICAL PLATFORM ACROSS ALL OUR CARS."*

Arsham said USTCC averaged around 40 cars at each of its North American events in 2022, and he expects a major incentive to help that number further in 2023. Previously, USTCC had a partnership with a European series that allowed the USTCC champion to win a test in Europe, a program that eventually faded away. Arsham said it's going to be back for 2023, with a significant, and positive, twist: The USTCC champion will get an opportunity to actually race—not just test—at either Zandvoort, the Nürburgring, or at Spa, three landmark European circuits. As he put it, "If you told me I'd get to go race there at those places for free, I'd be jumping up and down."

USTCC has West Coast and, more recently, East Coast divisions, with the western contingent having experienced a very successful doubleheader weekend with IndyCar in 2022 at WeatherTech Raceway Laguna Seca that the group hopes to repeat. "It was pretty incredible and attracted a lot of attention," Arsham said, adding that new partnerships also present positive possibilities for 2023.

Arsham cited a tire partnership with Hankook Tire, and "we also have a partnership with Kenwood, which provides TV cameras for in-car coverage. This [past] year, we had two championships decided by less than five points, and we're now adjusting our point structure because you can now get points for extracurricular activities: If you do press releases about your team, for instance, you get extra points. In our series your return on investment is much better. We allow data acquisition on board, which is not that expensive, it's just the convenience factor."

NATIONAL AUTO SPORT ASSOCIATION

Not every form of road racing involves fender-rubbing competition, and a look at the numbers helps explain the success of the National Auto Sport Association. In 2022, the group had more than 20,000 members who racked up 300-plus track days at 47 tracks, across 18 racing series and eight time-trial classes. NASA, as it calls itself, literally has a branch of road racing for practically everyone, starting with its spec series for the Mazda Miata and climbing through other spec series for the Nissan Z and several vintage BMW platforms, just for openers.

As NASA's Brett Becker said, "It all starts with Spec Mazda, which is as popular as it's ever been. That's a function of the car and the Mazda support as much as NASA's active promotion. One of our efforts is the

Membership in NASA "grew by about 10% in 2022, and we expect the same kind of growth for 2023," said Brett Becker. NASA sanctions several spec series for its racers, including Spec Mazda, "which is as popular as it's ever been."

"THEY'RE USING US TO TRAIN ON THE WAY UP, OR ELSE THEY USED TO DO RACING AT A HIGHER LEVEL AND NOW WANT TO DO SOMETHING A LITTLE LOWER KEY."

Teen Mazda Challenge. It's open to drivers aged 13–20. You have to be no older than 20 at the beginning of the season. We've had drivers as young as 13 come into the series and move to MX-5 Cup Shootout. We've had some dirt drivers come in through Teen Mazda Challenge. Basically, it gets them in a real car, and a very good car, for the same money as they were participating in karting. It's growing organically."

Echoing others, Becker said that all signs indicate a continuation of growth for NASA going forward. "Our membership grew by about 10% in 2022, and we expect the same kind of growth for 2023. We are emerging from the COVID lockdowns, and there's a surge in popularity of what we're doing, now going back to pre-COVID levels. Attendance is very solid. It's healthy.

"We think road racing, overall, is looking pretty good, certainly in the upper-level series," Becker continued. "Anyone coming in has to start somewhere, and NASA is happy to provide them with a way to start. Our sponsorship is an ongoing effort. We added three new national partners in 2022: Hagerty, Yokohama Tire, and Lifeline Fire Systems. In terms of rules, we are sort of just doing some housekeeping to keep classes fair and keep our competitors happy. We also now have a program with Toyota Gazoo Racing. When you buy a Supra, Toyota pays for a yearlong membership with NASA and one free track day. You also get 50% off your second day of instruction. For 2023, the program has been extended to the Toyota GR86, and to the new GR Corolla as well." PRI

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"Everybody knows the reason Formula 1 cars are so fast is because of their aerodynamics," observed Paul Lucas of Verus Engineering, Indianapolis, Indiana. "Aerodynamics is a huge part of those teams. It's the foundation of the cars. If you don't get the aerodynamics right, you're not going to be a top-level car that year."

Road race drivers—and by extension racers in time attack, at Pikes Peak, and in other road-course events—tend to be Formula 1 fans, Lucas said, which exposes them to wind-cheating principles they can explore and modify for their own cars.

"A lot of times, they know the aero makes them faster, but they don't know why, and they don't know what kind of aero," said Lucas. "That's what drives them to us to get a better understanding of what they need and how to go faster with it."

"The most challenging part of aerodynamics is not building the aero, but getting the car to work around it," said Cole Powelson of LYFE Motorsport, Salt Lake City, Utah. "You have your car on aero and your car off aero. At low speeds, say below 60 mph, you have a pretty generic car, but beyond that your car is changing exponentially as the speeds increase."

When the LYFE Motorsport crew sorted out the aero on its time attack Nissan GT-R, "it was worth four seconds around a standard 2–2.5-mile road course circuit. We bolted on four seconds with the same power level, and that was pretty true to every circuit we went to after that."

DRAG vs. DOWNFORCE

AS IN SO MANY MOTORSPORTS, AERODYNAMIC TRENDS ARE TRICKLING DOWN FROM THE HIGHEST PROFESSIONAL TIERS TO THE GRASSROOTS, BUT NONE MORE SO THAN IN ROAD RACING.

By Drew Hardin

Photo courtesy of LYFE Motorsport

Given the potential for lap time improvements, it's no wonder road racers at every level are seeking the ideal aerodynamic profile for their cars.

TRENDS IN DEVELOPMENT

Getting to that ideal profile seems to be going in two directions. One takes advantage of increases in computing power.

"We do a lot of CFD [computational fluid dynamics] work which, when we started, was pretty rare in our industry," Lucas said. "I wouldn't say it's rare now. There are quite a few companies that offer services similar to what we do. A lot of that comes from the fact that computers have gotten significantly more powerful. A computer that an average person can buy today can run a full car analysis in CFD. Ten to 15 years ago that wasn't the case. You would need servers and things like that. We use servers so we can turn around things quicker, but you can get it done with your average gaming PC today. That's a big driving factor of moving that kind of technology more into the mainstream."

"In an age where information is more readily available, we're starting to see more trickle down from the motorsports side," said Kelvin Yong of Evasive Motorsports, Cerritos, California. "3D printing and accessibility to CAD and modeling type software is much easier now. You see it more in the DIY track day side. People are starting to experiment more with things they might see on an LMP or GT3 car,

At Caliber Customs, building a custom aerodynamics package begins "by figuring out the rake of car," said Matthew Lambrecht. "We want to have a certain amount of rake front to rear, as that helps with creating the downforce."

trying to emulate that and see if it works."

"The state-of-the-art processes that we incorporate in our R&D, manufacturing, and prototyping processes—we have a three-axis and five-axis CNC—allow us to create different types of molds or mill out different types of molds to make more complex shapes possible, rather than just a generic airfoil shape or generic splitter shape," explained Caleb Sok of Sayber Design, South El Monte, California. "We can get pretty clever with the five-axis, and we do basic CFD on the CAD program."

At the "higher, higher end" of the competition hierarchy, machine learning will become more commonplace, Lucas said. "CFD creates a lot of data, and machine learning is great at taking a lot of data and making sense of it. It's a lot more difficult for humans to do that. We're really good at coming up with creative solutions, but looking at large chunks of data and coming to a conclusion is much more difficult for the human. Machine learning takes that on, simplifies it, and figures out those kinds of things better. I'm not sure when that will come, if that's five, 10, 15 years down the road, but machine learning will be there."

The second approach to aerodynamic design is less computer-centric. "Nothing beats trying it on the track," Sok said. "When we were testing different airfoils on my Supra, we took all the airfoils to Buttonwillow [Raceway Park], set up our front splitter and our rear wing, went out and did two hot laps, came in, switched the airfoil, and did two more laps to see what the times were and how the car was doing. This way I can confidently tell our customers, 'This is what I experienced, and this is what I would recommend for what you're trying to do.' You can do all the computer testing that you want, but especially if the customer has the same car, they feel like they can trust me."

"We don't really use CFD," said Matthew Lambrecht of Caliber Customs, Madera, California. "We do have our own CNC table, and we design 2D parts on that, like uprights for a wing or even canards. We're not experts when you compare us to higher levels of racing, but we understand the basic principles of how these parts are supposed to work, how the canards are supposed to create turbulence along the side of the car in order to prevent spill over to the underbelly, for example. We visualize how it should work, put them on there, hope they work, and go out and test them. If it works, awesome. If not, we start making adjustments."

"THE MOST CHALLENGING PART OF AERODYNAMICS IS NOT BUILDING THE AERO BUT GETTING THE CAR TO WORK AROUND IT."

BESTSELLERS

At Verus Engineering, which sells both fully custom and off-the-shelf aero pieces, "the biggest thing for us is rear wings," said Lucas. "The bang-for-the-buck is really there. Some other products may be fairly reasonably priced, but the average person might not feel the benefit immediately. A rear wing is a huge one that you immediately feel. It can immediately make you faster on track. Some racers, especially amateurs, like a little bit more rear bias on the aero balance, and the rear wing gives them that. A lot of people really like the way they look, so that's an added benefit."

Evasive Motorsports, the US distributor for Japan's Voltex aero components, sells "a fair number of wide-body kits, some full aero kits for the Honda S2000 and Toyota FRS, but the wing is still the top seller," said Yong. In his experience, a lot of customers will "throw a wing on and then come back to us and say, 'We need better balance.' Aerodynamic balance is more than just the wing, no matter what car you're driving. A lot of people will start with a wing and end up asking for more: a front splitter, canards. If they decide they want to go really deep, they'll go for the whole package of fenders, underbody, hood, things like that."

(Widebody fenders are more about tire fitment than aerodynamics, Yong reported. "The S2000 is really small, so fitting a 280- or 300-width tire is going to be really hard" without them.)

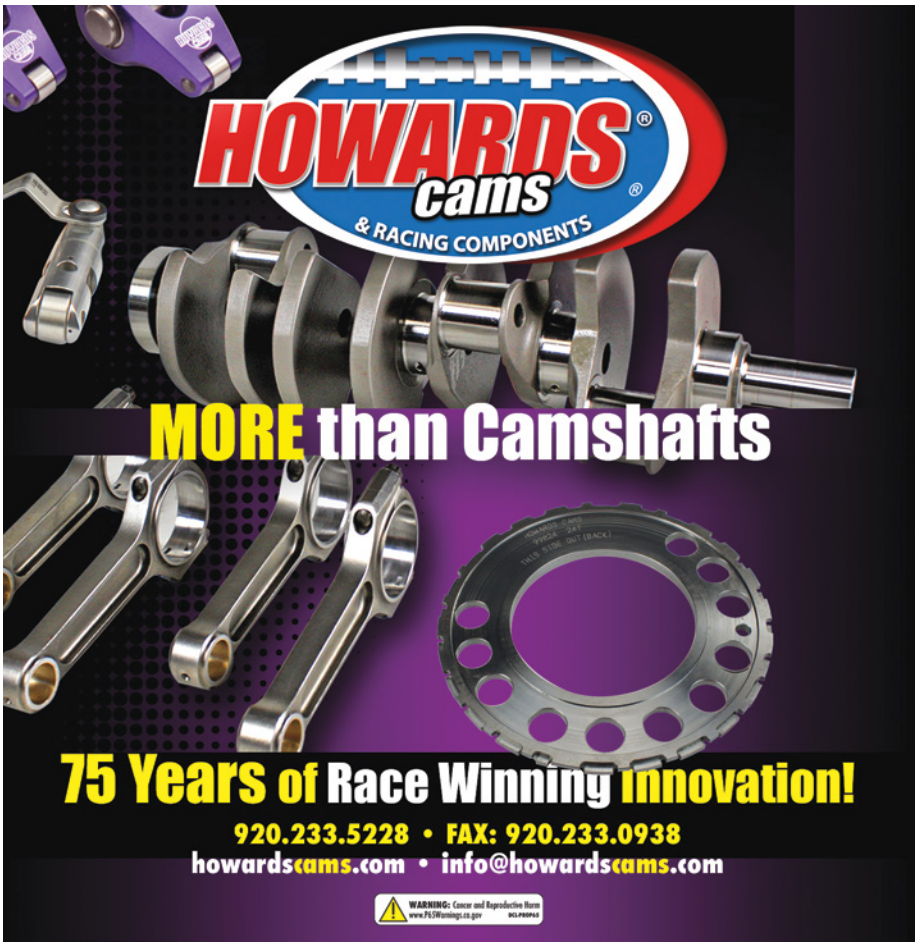
Sayber Design, which concentrates on Toyota GR Supra and GR86 models, offers "a general aero package—front splitter, rear wing—mainly for club level, time attack, track days, local challenges," said Sok. "That's what clients usually look for when they start seriously tracking and want more downforce."

At last year's SEMA Show, Sayber Design introduced a "full aero widebody kit for the GR86," Sok said. "Because we knew the GR86 is a lightweight car with not too much power from the factory, we developed an entirely new, ultra-low drag package for it. We knew the client was taking it to Global Time Attack, and we didn't want to add a giant wing that had a lot of drag to slow the car down. So we developed a new, ultra-low-drag airfoil profile, paired with a splitter to balance out the rearend."

"You have to do the whole package to optimize the whole aero," Lambrecht said. "If you add just the rear wing, you're going to get some downforce, but you're only going to get it in the rear, and you're going to create lift in the front from the teeter-totter factor."

Lambrecht recalled a twin-turbo Corvette Caliber Customs built for a customer, with "nothing extravagant as far as aero goes, just a basic AJ Hartman front splitter with our underbelly and an AJ Hartman rear diffuser and wing. We were able to maintain low speed on the Riverside turn at Buttonwillow of 118 mph. That is not a super light car—it's 3,100 pounds—and I've never seen anyone maintain that as a low speed around that turn. It's not necessarily about

"Our bread and butter is making stuff for the average person who tracks their car on the weekends," said Paul Lucas of Verus Engineering, "but we also do custom applications." Verus engineered the custom aerodynamic components for Hoonigan Racing's Hoonipigasus Porsche.



Sayber Design recently debuted a full widebody kit for Toyota's GR86 that Caleb Sok describes as an "entirely new, ultra-low drag package" for the lightweight car. "We didn't want to add a giant wing that had a lot of drag to slow the car down," he said.

having massive aero, it's more about getting something that's all going to work together."

Where you will see "huge aero" is at Pikes Peak, Lambrecht said. For racing there, the aerodynamics "are designed more for the top of the hill at 14,000 feet. The air is so much thinner up there, you need that big aero. Normal size aero just isn't going to get the job done at that elevation. At the bottom of the hill they probably have too much drag to be optimal. But it's a balancing act, drag versus downforce. The car would probably be faster with less downforce, but they have to compromise so it still has something going on at the top of the hill."

SPLITTER EVOLUTION

"Minus the rear wing, 80% of the total downforce of the car is dictated by what happens at the nose," Powelson said. "Air coming across the front of the car is clean air, it's predictable. You now have just raw air you're shoving through the car to perform different functions and go different places. So controlling the clean air at the front—so critical to the total downforce of the car and the aero efficiency—is a big priority for us."

One of the "coolest innovations" he's seen in the past few years "is called an infinity wing. It takes a traditional front splitter with end plates on it and makes the splitter a dual element, to where you have a wing element above your splitter with an air gap underneath. That can achieve similar downforce levels with less drag."

"In motorsports and the racing team space, everyone knows you want a splitter with a diffuser to optimize front-end downforce," explained Sok. "In the time attack space, I've seen a lot of customers looking for splitters with diffusers incorporated into them. And I'm seeing more and more regular, club-level customers looking for those diffusers."

But, he added, it can be challenging to incorporate a splitter with a diffuser into a factory car. "A lot of these cars are turbocharged, which means they have a lot of coolers up front. Those extra coolers tend to block any free real estate we might have to incorporate a diffuser."

Several years ago, Lambrecht was experimenting with the design of the front splitter/diffuser on his 2004 Cobra. "I changed the design to where the diffuser had a curvature to it as opposed to having just a flat angle to further minimize the [air] delamination. That's when I was running a street class in Global Time Attack with a 200-treadwear, 285-width tire. I maxed it out with the splitter, underbelly, diffuser, and not a wing but just a rear spoiler. At the next event I ended up going three seconds faster. How much of that was aero related I couldn't tell you for sure, but it definitely went faster after doing that adjustment to the car."

In addition to getting the splitter design right, another challenge is properly making and mounting it. "Some of these cars can do 180 mph, so it's not uncommon to have a front splitter making 2,000 pounds of downforce at speed," said Lucas. "You're talking about basically hanging half a car off the end of a splitter, so you need to be able to make that strong, and the mounting provision is very, very critical."

Common materials for building a front splitter range from plywood at the DIY end to fiberglass, Alumalite, and carbon fiber. After a wreck Powelson had at Pikes Peak caused by a broken splitter, LYFE Motorsport now builds the GT-R's splitter from carbon fiber with steel tubing inside of it. "I was stuck between two things: trying to make it light as possible, but we're also going to ram this 3,500-pound car into the ground repeatedly for a week on this hill climb. It's nice to have it light weight, but I am erring on the side of strength."

After a wreck at the Pikes Peak International Hill Climb caused by a broken splitter, LYFE Motorsport now builds the splitter for its GT-R from carbon fiber with steel tubing inside of it. "It's nice to have it light weight, but I am erring on the side of strength," said Cole Powelson.

THE BELLY OF THE BEAST

Underbelly pans are a "big thing" for Caliber Customs, Lambrecht said. "We build full flat floors so we can optimize the operation of diffusers and splitters. When we get everything to work together, getting the diffuser to feed up toward the rear wing, to evacuate the air underneath the car, that really does tie everything together."

All of the flat floors Caliber Customs builds are "custom designed from scratch," Lambrecht explained. "We start off by figuring out the rake of car. We want to have a certain amount of rake front to rear, as that helps with creating the downforce. Once we do that, we have to take into account control arms, transaxles, differentials. We ideally want to hit a certain rake to create the maximum downforce without having delamination of the airflow, but sometimes we can't hit that without having obstructions, like a transaxle or a differential. Then you have to take into account whether the trade-off is worth it. Do we want to hit that optimum rake angle, or are we going to lower it down a little bit to prevent turbulence and delamination?"

"A COMPUTER THAT AN AVERAGE PERSON CAN BUY TODAY CAN RUN A FULL CAR ANALYSIS IN CFD."

Like Lambrecht, Powelson sees ride height and rake as among "the biggest changes we can make aerodynamically. You can tweak the little wing elements, remove little elements here and there, but ride height and rake dramatically change the performance of the car on a well-done system. If you want to change the center of pressure, if you want to change total downforce and total drag, there's way more adjustment in ride height and rake than there is in just trimming out a single wing element on the rear wing."

A flat floor "can add a lot of complications," Lambrecht admitted. "In time attack it isn't as bad because we're trying

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In November 2022, Evasive Motorsports set the Honda S2000 record at Buttonwillow Raceway Park using a Voltex time attack aero package. "That kit is made specifically for racing only," said Tony Kwan. "You can't drive it on the street because it produces so much downforce."

to do just one lap, but we do this setup on endurance cars as well, and it's a matter of figuring out heat management. We can't have any stagnant air around hot parts, because it will just expand until it starts damaging stuff." One solution he has found is adding NACA ducts to the floor "to keep the airflow moving."

AERODYNAMICS AND ENGINE POWER

The general trend to more power in race cars is "good and bad" in its effect on aerodynamics, Yong said. "When you have a ton of power you can get a little bit lazy. Drag isn't as big of a deal; you can power through it. With 1,200 horsepower drag doesn't matter. The trick is to get the right amount of power and downforce, rather than just sledgehammering your way to the podium with 2,000 horsepower and 3,000 pounds of downforce. The challenge is getting a very efficient package, where power and grip are all in the right window."

As an example of that, in November 2022, Evasive Motorsports set the Honda S2000 record at Buttonwillow (a 1:41.20 lap with Dai Yoshihara at the wheel) using a Voltex time attack aero package. "That kit is made specifically for racing only," said Evasive's Tony Kwan. "You can't drive it on the street because it produces so much downforce. It has a big wing, big splitter, and a complete flat underbelly." Initial tests with the kit were done when the S2000 was producing "around 400" horsepower, Kwan said, "and it was almost too much downforce for the car." A new turbocharger setup raised power to 640, and now "the power is actually utilizing the downforce, working in tandem. It's more balanced now and it's working great."

Higher power levels require additional cooling, and the right aero can help there, too. "Aerodynamics plays a big part in heat management, not just downforce," Lambrecht said. At Caliber Customs, "we often box in radiators so any air that enters the grille has to go through the radiator. We also make extractor vents. As soon as the engine bay becomes a high-pressure zone, it doesn't matter how big your grille is—if you can't extract the air from the engine bay, it's not going to let any more air in. Adding something simple like a Gurney flap at the leading edge of the vent has a profound effect on the amount of air you're able to pass through the radiator, intercooler, oil cooler, and parts like that."

A MATTER OF BALANCE

"Aerodynamic balance is key to making people go faster," said Lucas. "If you get the aerodynamic balance off, it either makes the car push, or you can have a driver who is very uncomfortable in the car because the back end wants to step out. You need to be able to level the kit out, so it's balanced for

"Aerodynamics plays a big part in heat management, not just downforce," Matthew Lambrecht said. Caliber Customs often builds custom boxes around the radiator "so any air that enters the grille has to go through the radiator."

who is going to drive the car. That's where a lot of our custom work will come in—fine-tuning the higher downforce kit specifically for that end user."

"My biggest piece of advice for people who want to do serious aerodynamic development is get with an engineer or aerodynamicist and have something professionally designed," said Powelson. "It is the best money we've spent on our program. Do it once for your car and your configuration, and it's the gift that keeps on giving. But it has to be specific to your car, your tire, your track width. Everything is so critical for the entire aero package to work together." PRI

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POWER STATIONS

By Bradley Iger

Photo courtesy of NASA

AS MORE AND MORE BATTERY-POWERED VEHICLES ENTER THE AUTOMOTIVE MARKET, RACERS ARE STARTING TO FIGURE OUT WHERE THE BOURGEONING TECHNOLOGY CAN SHINE IN ROAD RACING DISCIPLINES. NOW ROAD COURSES AND SANCTIONING BODIES ARE RESPONDING IN TURN.

With the auto industry's EV ramp-up well underway, increasing numbers of racers and enthusiasts are bringing battery-powered vehicles to road courses across the country. Although we probably won't see car counts high enough to warrant initiatives like a production-based EV spec series for some time, the rising presence of this new technology at high-performance driving events (HPDEs) and other track events presents an opportunity for organizers, and many are responding in-turn.

"Attendance and demand have definitely grown over the past few years," said Steven Sewell of Lime Rock Park, Lakeville, Connecticut. "There is a clear need to accommodate both the racers and the consumers who're embracing BEVs (battery electric vehicles), and our goal is just that. We want to stay current."

But as this gradual transition unfolds, tracks and sanctioning bodies are tasked with finding a way to support this new tech in a meaningful way that's also pragmatic and financially viable. While the fluidity of the situation makes this challenging, a general strategy is beginning to take shape.

BUTTONWILLOW RACEWAY PARK

Les Phillips of Buttonwillow Raceway Park (BRP) in Buttonwillow, California, told us that he's seen a perceptible increase in EV entries at Buttonwillow events over the past few years. "Right now, it's less on the racing side and more focused on track days. But there are some regulars who're starting to pop up, and they tend to bring a following with them."

Considering the fact that the vast majority of performance-tuned production EVs have been introduced over the past five years or so, it makes sense that most drivers would gravitate toward high-performance driving events that cater to street cars, but EVs are finding niches in competition as well. "We've seen a really fast Tesla Model S Plaid at time attack events here—I believe it's the same car that ran at Pikes Peak. We're starting to see a few of them at time trial competitions," Phillips said.

Then there are the EVs that are being used to transport racers and spectators to and from the track, as well as the ones that are

As part of a facility expansion program, Buttonwillow Raceway Park partnered with Tesla to install 16 Supercharger stations at the track. Les Phillips has noted an uptick in EV entries—primarily for track day events—so the stations will serve them as well as the EVs that transport participants and spectators to and from the track.

simply passing by while heading through central California. To support these vehicles, Buttonwillow partnered with Tesla to install 16 Supercharger stations at the track.

"Things have been pretty busy here; we ran 335 days last year," said Phillips. "To meet the demand, we're building a second, 2.5-mile road course at the facility with a 9,000-square-foot tower, garages, and everything else that comes with that. We're putting in 32 more RV spaces as well. And as part of this expansion process, we also added those Supercharger stations."

Phillips said that Tesla covered the majority of the costs associated with the installation of the Supercharger stations, so that kept the track's financial burden to a minimum. The caveat is that Tesla's Supercharger network is exclusive to the automaker's vehicles, which means owners of EVs made by other brands cannot use the system. While the RV park can provide charging capability to any EV owner, the rate is limited to the speeds that a traditional 120-volt outlet can deliver, so those folks would need to be posted up at the outlet for significant amounts of time in order to add a meaningful amount of charge to their vehicles. When asked about whether Buttonwillow plans to install universal level 2 EV chargers in the future, Phillips said it largely boils down to the potential for return on investment.

"We'd like to do that, but we'll have to see what the cost looks like when we reach a point where it looks like that is needed," Phillips responded. "At the moment we have to react to the demand that we're seeing."

VIRGINIA INTERNATIONAL RACEWAY

"It has become very common to see EVs show up for HPDE weekends," said Kerrigan Smith of Virginia International Raceway, Alton, Virginia. "They're showing up often enough that awareness is building in general."

Smith said that part of that awareness has come from a concerted push by OEMs like Porsche, who partnered with the facility to install a pair of 19.2 kW level 2 chargers at the track. "Porsche wants to make sure its customers are taken care of, and that's especially important for a performance brand to have that capability at various race tracks. We worked with them to provide that infrastructure here."

Smith said that series like Formula E and IMSA are currently leading the way in terms of best practices when it comes to EV training and overall safety. "There's a lot of conversation happening right now regarding what the race tracks need to do to build our infrastructure around supporting this technology," Smith explained. "Our first responders go through training every year at VIR, and we've added electric vehicle response into that program. But the industry has also gotten ahead of itself in some ways, so we're often looking to Formula E and IMSA's [hybrid-powered] GTP-class racing for insight in this realm."

Beyond charging capability and safety considerations, Smith said that VIR is upgrading other elements of the facility in anticipation of EV growth in the marketplace. "We're currently assessing what our long-term needs are as part of the expansion that we're currently doing. Updating our fiber lines and improving the Wi-Fi infrastructure are part of that master plan. We want to accommodate the person who is waiting—either for their run group to be called, or for their vehicle to charge. And we expect there to be a greater need for that as time goes on," Smith added.

LIME ROCK PARK

Lime Rock Park installed its first EV chargers in 2018 with direct OEM support. While EV participation at HPDE and other track day-style events is rising, Sewell pointed out that the strongest demand is currently coming from the OEMs themselves. "That mainly stems from things like dealer days and media launches, but it's also about supporting their customers. When we installed those pedestals in 2018, one of the requests from the OEMs was that they needed to be available to the public. For them, it's as much about expanding their

Steven Sewell noted that demand for EV infrastructure at Lime Rock Park has come largely from automakers: "When we installed those pedestals in 2018, one of [the OEMs'] requests was that they needed to be available to the public. For them, it's as much about expanding their charging network as it is about specifically supporting cars that are at the track."

charging network as it is about specifically supporting cars that are at the track."

Lime Rock installed the charging stations between the facility's autocross course and the main track. "That was a conscious decision," said Sewell. "We wanted to make sure access was convenient for the general consumer during our major spectator events while also being easy for the folks who're using their EVs on our race courses."

A second group of chargers was installed in 2021 with manufacturer support as well. Sewell said that the current focus is accommodating consumers, and that largely comes from the needs of OEMs. "EVs are high on the radars of many tracks right now, but everyone's approaching it a little bit differently. Wholesale electric vehicle racing would be a significant infrastructure investment for a facility, and that's still a bit of a moving target. For Lime Rock, the OEM presence is a big factor right now. If we can accommodate those programs here—particularly for vehicle launches—it becomes an important part of our business model."

NATIONAL AUTO SPORT ASSOCIATION

Although the vast majority of EVs are getting track time at time attack events and HPDEs, Brett Becker of National Auto Sport Association (NASA) in Las Vegas, Nevada, noted that the technology is now making its way into general wheel-to-wheel competition. "A few months ago, a company called Scalar Performance reached out to NASA about developing an electric race car, and we've been working with them to find a home for it within our Super Touring category," he said.

Based on the Toyota GR86, Scalar's car offers roughly 330 horsepower and 345 pound-feet of torque from a bespoke electric powertrain that was designed for motorsports use. With a curb weight of 3,040 pounds and the ability to run at race pace for 45 minutes at a time, the EV should be able to give the Corvettes and 911s in the ST classes a serious run for their money.

NASA has also seen enough interest from EV racers to justify the creation of a bespoke class in its Time Trials category with TTEV. Becker expects interest stemming from this burgeoning automotive segment to maintain its rising trajectory in the coming years, and that tracks will adapt based on the perceived demand.

The vast majority of EVs at NASA events are in time attack events and HPDEs, but NASA has seen enough interest from EV racers to justify the creation of a bespoke TTEV class in its Time Trials category. "Right now, it's still an emerging technology," said Brett Becker, "and it's emerging as quickly as the technology and the economics will allow."

"The market is beginning to flood with electric options, and with race tracks being the businesses that they are, I think you are going to see them offering more places to plug in EVs in much the same way that you would at an airport or a shopping center," Becker explained. "Many of these tracks have RV parks, so they have a lot of the infrastructure in the ground already. If they charge for the electricity, that's another potential revenue stream for them. At this point, the cars are starting to creep in, and I expect that to continue. But right now, it's still an emerging technology, and it's emerging as quickly as the technology and the economics will allow." PRI

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BUSINESS PROFILE

LEGACY MOTORWORKS

SPECIALIZING IN A GROWING GRASSROOTS CATEGORY, THIS NORTHERN CALIFORNIA-BASED SHOP BUILDS CARS WITH A NO-FRILLS FOCUS ON SPEED WHILE EARNING RESPECT AS ACTIVE, KNOWLEDGEABLE, AND ALWAYS-HELPFUL MEMBERS OF THE SPEC E46 COMMUNITY.

By John F. Katz

Spec E46 is a fast-growing class in grassroots road racing, and Legacy Motorworks of Elk Grove, California, has carved out a niche as a specialist builder. "We're sought out for our E46s in particular," reported Peter Jones, who co-owns Legacy with his wife Lauren. "We field quite a few of the Spec E46 cars in NASA's NorCal and SoCal regions. We have also sold cars on the East Coast and in the Pacific Northwest, and they all have done well in their fields. Two of the top three cars at the 2022 Nationals were Legacy Motorworks E46s." The 2022 NorCal and SoCal class champions were both Legacy customers, also.

Jones readily links the company's success to that of the class, which in turn rides on the substantial bang-for-the-hard-earned-buck provided by the E46 platform. (For those not familiar with BMW insider-speak, E46 refers to the generation of "3-Series" sedans produced for model years 2001–2005, and to coupes for 2001–2006.) In Legacy's first effort at the 25 Hours of Thunderhill, in 2021, Jones' team finished third in class and eighth overall, bettered only by other E46s and Prototype-class cars.

Jones had just returned from another eighth overall (and fourth in class) at the 2022 event when we spoke in mid-December. "We beat ourselves with a couple of penalties," he admitted. "But we still finished in front of a lot of teams that were more heavily funded, with much faster cars. They also had professional drivers and professional crews. They ran in classes that allowed them to take four tires per stop, and more fuel from faster fueling systems. But the E46 is easier on tires, brakes, and fuel; it is fast enough, without burning up parts."

So it's hardly surprising that the Spec E46 class "is absolutely growing. In three years, the SoCal field has expanded from three cars to 18–24, depending on the weekend. Once you get three cars on the track, other folks see that the racing is very tight, and yet very appealing from a cost standpoint." Car counts in the NorCal region are similar and have been "solid for a while."

Peter and Lauren Jones grew Legacy Motorworks "very organically, with trackside support, helping other racers improve their cars and excel," Peter Jones said.

Legacy builds six to eight cars per year, and currently maintains six more. "We are fortunate that the class allows for so many garage builds," Jones commented, "because at some point those folks realize that they can handle most, but not all of it. And that's when they come to us."

Jones believes that one of Legacy's best business decisions was to "start very organically, with trackside support, helping other racers improve their cars and excel. I will give you my setup, I will sell you my car, because I'm happy to race you in a car that I was racing the weekend before. If you beat me, you beat me. I have no problem with that whatsoever. That's what really put us on the map as legitimate builders. People appreciate the fact they can buy one of our cars and turn the same lap times as any member of our team."

Jones has definitely gone to some lengths to assist his fellow racers. "Some folks had come down from the Pacific Northwest, which is about a 14-hour tow. We'd never run with them previously, but when they lost a motor on Friday, we sent them back to our shop, where our daughter met them and pointed them to a motor we had on a stand. We loaned them our engine hoist and we helped them put the motor in their car. They got back on the track, raced the whole weekend—and I believe they finished on-podium in front of us."

FASTER, NOT FANCIER

Like many others in this industry, Jones "grew up around motorsports," racing shifter karts "for quite a few years" before he "got into motorcycles." He was road racing a Honda RC51 and an Aprilia RSV4 when he married Lauren Buffington, whose father and brother, Phil Sr. and Phil Jr., raced four-wheeled BMWs. "My father-in-law pushed me to get off the motorcycle, and to get into something with a cage. It took a while for me to explore that option, but after a pretty good off on the motorcycle, I decided to explore it a little further."

The Buffingtons campaigned an E36 (1992–1998), but Jones decided that "there were some interesting aspects to the E46. The availability of parts, with newer and better technology" made it "a better jumping-off point."

More fundamentally, perhaps, Jones was intrigued by the Spec concept, "which allows an individual to build out of their garage—that included myself, initially—to a spec level with the exact same components as every other competitor. That really turns it into a driver-on-driver race." Build quality might vary, and could make a car more or less reliable, "or simply prettier to look at. But those things don't make you faster."

Building strictly to go faster, and eschewing what only looks faster, became Legacy's mantra. "Our builds are not necessarily 'no expense spared,'" Jones noted, "but they are 'no stone unturned.' That's what sets us apart. We strip the cars down to the bare tub and build them back up very efficiently, spending money on things that make them faster, and not all the bells and whistles that might make you feel like you are in a Formula 1 car, but that aren't making your car any faster than the one next to you. I look at other cars in the paddock, and they have buttons on the steering wheel to start the car, and buttons to turn it off. We've also built cars with buttons on the steering wheel, and with cool-looking data-acquisition dashes, but we try not to spend money frivolously." Legacy customers know

"We field quite a few of the Spec E46 cars in NASA's NorCal and SoCal regions," Peter Jones said, "and all have done well in their fields." The 2022 NorCal and SoCal class champions were both Legacy customers.

exactly what they are buying. "We've always been honest and open about our product," Jones added.

THE LEGACY

Significantly, Jones listed the "founding members" of Legacy Motorworks as Lauren and himself; his father, Tom Jones; and Lauren's brother Phil Buffington; but he could not point to a definitive founding date. "I just gradually allowed my passion to turn into a business. It started out trackside, helping fellow racers. And because I showed up prepared and was taking care of my own cars and performing very well, people started asking me for help and assistance and direction. From there I started selling my personal cars, and then I had commissioned builds. Before I knew it, something that was just happening out of my garage was needing its own facility."

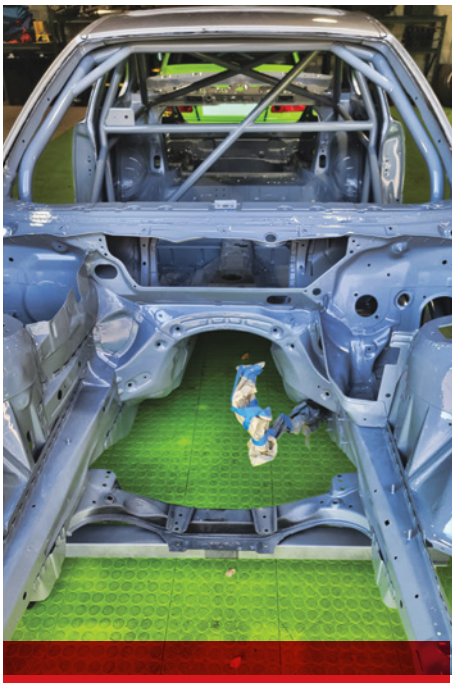
Jones allowed that his "garage" was on 2 1/2 acres, where he parked "15 donor cars, six trailers, several customer cars, and three or four of our own race cars." But as annual production increased from two cars to five, Peter and Lauren shuttered their general contracting business to focus solely on Legacy Motorworks.

"I had to make a decision about how I

"OUR BUILDS ARE NOT NECESSARILY 'NO EXPENSE SPARED,' BUT THEY ARE 'NO STONE UNTURNED.'"

was going to use my time," Jones recalled. "I couldn't do both things." Just last spring Legacy moved into an industrial complex, where it now occupies a 4,500-square-foot warehouse, an additional 1,500 square feet of office space, and 12,000 square feet of open yard.

Even the name of the company has evolved: "Initially we called ourselves Legacy Racing, and that kind of morphed into Legacy Motorworks." But the name has always recognized the influence, assistance, and participation of family—"a family legacy of motorsport."



Legacy Motorworks' strategy in building a Spec E46 race car begins with stripping the car to the bare tub and building it back up "very efficiently, spending money on things that make them faster," Peter Jones said.

THE ENGINE ENTERPRISE

In addition to building new race cars, Legacy repairs wrecks and offers "motor services" for the BMW M54B30 inline-six, including reconditioned heads, rebuilt bottom ends, and re-tapping the aluminum block with steel threads to better secure the head bolts. "We started doing engine work for our personal builds," Jones recalled, "but now we see cars that we've never touched except for the engine. One of the cars that beat us this weekend had one of our engines; we had also built them a backup engine prior to the race."

Jones estimated that "probably 30% of our business is straight engine work," which not only supports Legacy's car builds but also helps keep the shop busy year-round. "The off-season is a time for preparing and having motors built, and then during the season people crash and need cars built. So throughout the year it's a little bit of this and a little bit of that."

Jones found "another way to augment our business" just last year, when "we ventured into the PCA world, where we have friends," and built their first two Spec Boxsters. "It just so happens that they race on different weekends, so the Boxsters also help fill out our year and keep our employees busy."

Legacy employs three people full time, plus "part-time folks for trackside support and weekend work," he said. All are carefully chosen. "My wife and I have been in business for a very long time"—more than 25 years as general contractors—"so we are very particular about who we take on. We get to know an individual before we offer them an opportunity." Most "come from the racing community," and Jones understands that they may not stay. "We've found that there is a pathway in motorsport, where we may not be their final stop. They may find work with a bigger team that offers them more opportunities—and that's just fine with us."

"WE TRY NOT TO SPEND MONEY FRIVOLOUSLY.

THE CHAMPIONS

As we mentioned at the outset, the 2022 NASA NorCal and SoCal Spec E46 class champions are both Legacy customers.

Jones described SoCal champ Lucas Weisenberg of Orange, California, as "an up-and-coming, talented young driver."

"My dad and I have always been into cars," said Weisenberg, who started running time trials in his Porsche Cayman less than three years ago. He earned his NASA license in February 2021 and rented an E46 sedan for an event at Buttonwillow Raceway Park. "It was just an awesome platform," Weisenberg recalled, "so we bought the car. It was a tired-out six-year-old chassis with a junkyard motor, but in our first race at Willow Springs I got the pole." That's also where Weisenberg met Jones, who agreed to garage and transport the car, in addition to providing trackside support.

"We ran half a season with SoCal," Weisenberg continued, "and some NorCal events, too," before deciding that "we needed better equipment. We had seen the work that Peter was doing, so we bought a Legacy car. And we've been winning a lot ever since. The car is really sorted. It's super-stable, with a super-stiff chassis. It has a super-clean interior with a really nice cage. I feel safe in it; I trust it. And it's fast"—on average, about a second quicker around most tracks than the car it replaced.

Weisenberg is equally pleased with Legacy's "great support at the track. Any time that we have questions, whether about mechanics, electronics, or setup, Peter always gives great advice. He always knows exactly what the issue is. He has given us a better understanding of the platform, and that allowed us to do what we did [last] year."

NorCal Champ Casey Mashore of Brentwood, in California's East Bay region, started racing in 2015, "as soon as I got my driver's license." Initially he ran LeMons enduros in an E34 built by his father. "But we wanted something more competitive, more professional." So they moved up to the Lucky Dog Racing League, installed an E36 M3 motor, "and started getting competitive."

At Willow Springs, the Mashores struck up a conversation with a Spec E46 driver and decided that class should be their next step up the ladder. Mashore Senior built a car in 2020, completing it in time for a weekend of NASA sprints at Thunderhill—where by sheer random chance the Mashores parked next to Jones. "We didn't know who he was—or how anything worked. But Pete answered all of my questions. He explained the rules of the series. And he said that if I needed any help, he was right there."

In 2021, Jones invited Mashore to co-drive Legacy's inaugural entry in the 25 Hours of Thunderhill, along with Phil Buffington Jr. and Gary Baker. Mashore was impressed with Jones' and Buffington's mastery of endurance racing strategy. "They are very analytical. They know how long the tires were

Peter Jones reported that nearly a third of Legacy Motorworks' business is "straight engine work." That not only supports Legacy's car builds, it also helps keep the shop busy year-round.

The Legacy Motorworks team finished eighth overall and fourth in class at the 2022 25 Hours of Thunderhill endurance race. "We finished in front of a lot of teams that were more heavily funded, with much faster cars," Peter Jones said, "but the E46 is easier on tires, brakes, and fuel; it's fast enough, without burning up parts."

going to last, and how much fuel they are going to use."

Mashore recalled an earlier incident at Willow Springs, when he had broken four wheel studs, and Jones "was quick to help me drill them out, and torch them and put new studs in. Another time I'd bent a wheel and needed an alignment, and Pete was able to string up the car and square it up right at the track, which was a huge deal.

"He's a great guy who wants to help everybody," Mashore continued. "Countless times he's been under a car, and somebody comes up and asks, 'Can you help me with this?' And soon he's helping seven people at one time."

The way Jones sees it, helping his fellow racers is the best possible promotion. "We have a small social media presence," he noted, and he doesn't see the need for more traditional advertising. "We are trackside. We are visible. We're racing alongside customers and potential customers. We're helping people in the paddock. And we have a very loyal following. The folks who know us see us as leaders in the Spec E46 community. So when they know somebody is looking to get into road racing, they send them our way.

"And whether we end up doing business together or not, we certainly point them in the right direction," Jones concluded. PRI

TITANS OF THE TOP END

Big power and minimal restrictions equate to some seriously fast machines in half-mile and roll racing.

By Bradley Iger

Over the past few years, half-mile and roll racing have carved out their own niches in the world of drag racing. While both have roots in illicit street events, organizers like Shift-S3ctor and TX2K have made significant strides in their quests to legitimize these unique formats while also making them safer and more accessible.

Both half-mile and roll racing tend to attract competitors with production-based, street-driven vehicles. With minimal rules outside of safety equipment, the appeal tends to be less about perfecting technique and more about discovering what man and machine are capable of when unburdened by conventional track lengths and sanctioning body mandates. That means the shops that support half-mile and roll racing are tuning for power, stability, and above all else, outright speed.

GINTANI

Alex Marukian of Gintani in Van Nuys, California, said that late-model sports cars like the Chevrolet Corvette, Porsche 911, Nissan GT-R, Audi R8, and Lamborghini Huracán tend to be common sights at these events. While some competitors show up with cars that are essentially showroom stock, those who are pushing the envelope are typically working with horsepower levels that can push these cars beyond 200 miles per hour before the end of a pass.

"Because of the power we're making, the fastest cars tend to be all-wheel drive," Marukian explained. "And because of the speeds that these cars are hitting at the top end, tire choice is also really important. If you try to use a big drag radial, it can get pretty sketchy at the top end." Instead, Marukian said competitors tend to gravitate toward DOT-legal road course tires like the Toyo Proxes R888 for a better balance of grip and high-speed stability.

He cited the shop's recent Lamborghini Huracán EVO build as an example of how purpose-built half-mile and roll racing cars tend to differ from traditional drag racing builds. Outfitted from the factory with a naturally aspirated 5.2-liter V10 making more than 630 horsepower, a stout dual-clutch gearbox, and an all-wheel-drive system that was developed to tolerate repeated hard launches—along with aerodynamics and suspension systems that were developed specifically for high-speed stability—the platform is ideal for this type of racing. But for shops like Gintani, it's just a good place to start.


2
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Now packing a pair of turbochargers, the V10 is churning out upwards of 1,600 hp while retaining the stock bottom end, a combination that helped catapult the car to a record-setting 220-mph run in the standing half-mile last year. While Gintani offers factory ECU tuning for vehicles like the Huracán and other platforms, Marukian said that bigger builds tend to move over to standalone systems from companies like MoTeC and Syvecs. "That adds features like anti-lag, boost-by-gear, and full traction control adjustability."

He also noted that due to the nature of half-mile racing, which sees these cars operating at wide-open throttle for a significantly longer period of time than in quarter-mile drag racing, the shop tends to focus less on big dyno numbers and more on overall efficiency. "It's fairly easy to strap the car on the dyno and get that 1,600 wheel hp number on a glory pull. Heat soak is the biggest challenge here, so what's important to us is making sure that we're maintaining that 1,600 whp all the way through the half-mile."

To get that consistency, Gintani uses bigger turbos than are required to reach a specific horsepower number, and they are paired with oversized intercoolers to keep temperatures in check throughout the run. "When you go to these events, you'll see people constantly going into the pits and swapping out ice packs," Marukian explained. "We don't use ice tanks. Instead, we run the freon from the air conditioning system through a water tank. When people are sitting there in the staging lanes with their cars shut off so the ice doesn't melt, we're enjoying the AC in our car, and the water going through the system is still freezing cold."

The V10 in Gintani's Lamborghini Huracán EVO produced 630 hp in stock trim. Now twin turbocharged, the engine makes closer to 1,600 hp. It powered the Lamborghini to a blistering, 220-mph run in the standing half-mile last year.

VENGEANCE RACING

"When half-mile first started, it was purely street cars going out on abandoned runways to see how fast they could go, and the speeds were maybe 150–160 mph," said Ron Mowen of Vengeance Racing, Cumming, Georgia. "But as the sport gained popularity, we started seeing people coming out with more purpose-built cars with aero and gearing that had been dialed in for half-mile. Now at pretty much any event you'll see Corvettes, Mustangs, and Vipers with 2,000 or 3,000 hp, and cars

According to Alex Marukian of Gintani, late-model sports cars—Corvettes, Porsches, Audi R8s, and Lamborghini Huracáns—are popular entries at half-mile races. While some of the vehicles are essentially stock, others produce enough horsepower to reach speeds in excess of 200 mph.

Ron Mowen describes the engine in the Vengeance Racing Corvette as "a miniature Pro Stock motor." The 451-cubic-inch LS engine produces about 1,140 hp and has propelled the car to a 199.7-mph top speed—so far.

cracking the 250-mph barrier. We've even seen a Pro Mod out there."

But maximum horsepower and sheer velocity aren't always the name of the game. With builds like Vengeance Racing's own C5 Corvette Z06, the target has been a bit more specific. "We've been campaigning that car since about 2008," Mowen explained. "It started by just putting a big naturally aspirated motor in it. We really didn't know what to do with the car at that point, so we decided to take it out to a half-mile event, and we ended up winning the naturally aspirated class." The build has evolved significantly in the years since, and the team is currently gunning for 200 mph in the half-mile without the aid of any power adders.

To get there, Vengeance Racing equipped the Z06 with a 451-cubic-inch LS engine that Mowen described as a "miniature Pro Stock motor." The combination consists of a filled LSR block with aluminum rods, Mozez canted valve heads, and a valvetrain that was designed to keep the motor happy at 10,000 rpm. The result is an NA motor that dishes out 1,140 hp. With the help of a six-speed sequential gearbox, significant weight reduction, and other strategic upgrades, it has propelled the Z06 to 199.7 mph on three separate occasions.

Despite not quite hitting the goal yet, Mowen said this Z06 is by far the fastest naturally aspirated LS-powered car being used for this type of racing. "Moving to the sequential transmission allowed us to pick

Vengeance Racing has a specific goal for its C5 Corvette Z06: 200 mph in the half-mile without the use of power adders. "We've been campaigning that car since about 2008," said Ron Mowen, and the build has evolved significantly since.

up some pretty substantial mph," he added. "It has a sixth gear 1:1 instead of fourth gear being 1:1, so we're able to keep the engine revs within 500 rpm of peak power at all times."

A single-piece front end makes maintenance easier while also removing some pounds, and a drag wing is installed out back to keep the rear stable at high speeds. "In terms of aero, ideally you want to block off as much of the nose as you can to prevent air from getting into the engine bay without a place to escape, because that will create a lot of drag on the car," he said. "Some folks will also remove their mirrors and tape up hood and fender gaps with racer's tape to make the car as slippery as possible. If you have an intercooler and you have to let some airflow in up front, you want to make sure there's a way for that air to escape from the engine bay in order to minimize that drag."

The C5 is also equipped with a full rollcage, racing seats, harnesses, and a fire suppression system. "Shift S3ctor is one of the more popular half-mile event organizers out there, and it does require safety equipment based on your speeds," Mowen said. "At 150 mph, it's pretty basic stuff—long sleeves, pants, and a Snell-approved helmet that's in accordance with current regulations. When you get up to 180 mph, you're in a fire suit, you must have a rollbar—similar to the things you'd expect to see in a 10-second car at an NHRA event. But, outside of that, we've taken additional steps on our own that go beyond what's required. We were racing at another organizer's event several years ago and a racer was killed, so we

GETTING THE WORD OUT

Even with increasing interest, half-mile and roll racing still reside within a niche of drag racing. To bring greater awareness to this type of motorsports—as well as about the parts and services they offer—Vengeance Racing, Gintani, and English Racing all leverage social media platforms like Facebook and Instagram to give potential customers a closer look at what this scene is all about.

"I really try to emphasize how fun these events are," said Ron Mowen of Vengeance Racing, Cumming, Georgia. "Half-mile is different from traditional drag racing events in some important ways. When you go out to a half-mile event, people's hoods are up, they're talking cars, and they're swapping stories. They're enjoying the camaraderie. At a typical drag racing event, everyone's a little more guarded because that's the nature of that type of competition. But in half-mile you're really competing against yourself, so it's a more relaxed atmosphere."

When it comes to bringing awareness to the products and services that their shops offer, all agree that competing at these events is the most effective way to promote their brands. "Customers want to see your product perform, and they want to see it live," said Alex Marukian of Gintani, Van Nuys, California. "Many of them aren't going to take your word for it just because of a claim on the Internet."

For the team at English Racing in Camas, Washington, the results they achieve at the track have proven to be the most effective way to bring attention to their business. "The racing is the marketing," said Myles Kerr. "When we're at events where big YouTube channels like 1320Video are covering it, people see what we're doing and how our cars perform, and they get ahold of us." *—Bradley Iger*

implemented our own safety standards at that point. Anyone who races under our umbrella with our support is required to have a harness bar with safety harnesses, a full fire suit, a Snell-approved helmet and a HANS device, and fire suppression at a minimum."

ENGLISH RACING

Considering the array of high-buck exotics that normally attend half-mile and roll race events, it can be tough for a team to really stand out in the crowd, but English Racing in Camas, Washington, manages to turn heads wherever it competes.

"When I first started campaigning this car, it was like, 'What's going to happen at 200 mph in an Acura Integra? Probably a lot of things,'" said Myles Kerr with a laugh. "So we started out slow. At the first half-mile event we went to with it, I think I only did 160 mph."

Hitting 160 mph in a standing half-mile in a third-generation Integra is still pretty impressive in its own right, but these days the Acura regularly shames all manner of hardcore sports cars, having gone as fast as 216 mph at an event in 2021. "When we started moving in this direction with the build, it was a 700-hp street car. Sort of a weekend toy—there was no aero on it or anything like that."

These days the Integra is dishing out in excess of 1,400 hp thanks to its four-cylinder, 1.9-liter GSR powerplant, which has been outfitted with Darton sleeves, BME rods and pistons, a ported head, cams and valvetrain

English Racing regularly turns heads at half-mile races with its Acura Integra. Boasting a 1,400-plus-hp turbocharged GSR engine and an AWD conversion, the Acura has been clocked as fast as 216 mph.

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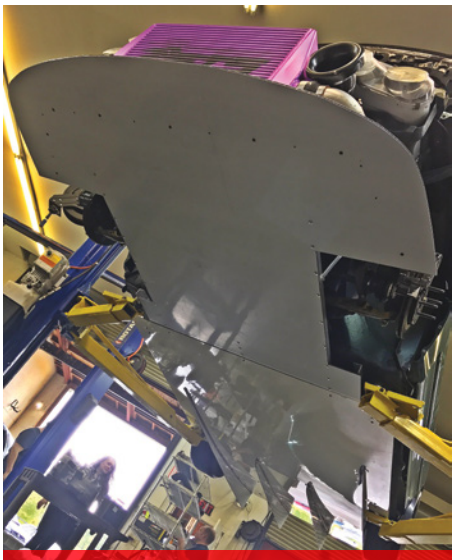

During this Integra's early racing days, Myles Kerr of English Racing noticed a tendency for it to wander from side-to-side at 170 mph. Aerodynamic work, including a front splitter, flat belly pan, rear diffuser, and a rear wing, improved high-speed stability.

upgrades from GSC Power Division, and a Precision Next Gen 7685 turbo that's running roughly 70 pounds of boost.

Although it's a front-wheel-drive platform, the Integra now puts power down to all four corners by way of a five-speed manual transmission out of a Honda CRV that has been upgraded with a billet bellhousing and a billet transfer case (along with other strengthening measures), as well as the rear differential from a 1990s Honda Civic wagon, a model that was available with factory four-wheel drive.

"Previously it would have required fabrication to make this all work," Kerr added. "But a lot of people are starting to race these cars in the drag world, so manufacturers are starting to make parts for this conversion—it's basically a kit now." To hold all the power, the Integra is also outfitted with a two-piece carbon driveshaft from Driveshaft Shop, along with upgraded front and rear axles.

Making the power and putting it to the ground were only part of the equation, though. "Early on with half-mile stuff, I noticed that the car would start to wander from side-to-side across the track at about 170 mph," Kerr said. "It was clear that we needed to do some aero work." The team put together a front splitter and flat-bottomed the car before later adding a rear diffuser and a rear wing with a wicker bill to complete the package, upgrades that immediately improved high-speed stability. But without the benefit of wind tunnel testing, Kerr said that a lot of it came down to trial and error.

"I learned the hard way that I needed a hood vent, too," he added. "When I first built the front splitter I had a big opening in the front bumper from the intercooler. The first pass was over 180 mph and it blew the splitter off. My fix at the time was cutting a hole in the hood to let air out of it. But, when air comes in it must find a way out!"

Carrying speeds far beyond what the factory ever expected for the platform with much more downforce, the suspension needed to be stiffened in order to prevent the car from squatting to the bump stops at speed, too. The car is currently equipped with a set of coilovers with 1,200-pound spring rates up front and 1,000-pound rates in the rear to firm things up at speed. Shock position sensors also allow the team to review data after a run to see how the system is reacting to adjustments.

Kerr noted that English Racing provides full track support for its customers, a service that includes the maintenance and data analysis required to eke every last ounce of performance out of their cars. "If you're doing 210 or 220 mph in the half-mile, stuff is going to need to be looked at between rounds. At a certain point, these cars really need a team behind them rather than just an individual." PRI

SOURCES

English Racing
englishracing.net

Gintani
gintani.com

Vengeance Racing
vengeanceracing.net

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COMPOUNDING INTEREST

Still rebounding from pandemic-related supply chain and labor issues, race tire manufacturers are working to meet current demand while bringing new product to market.

By Drew Hardin

There's a reason the old adage, "where the rubber meets the road," is explicitly about tires. The saying is all about putting someone's efforts to the test, making them real—and that's exactly a race tire's role. All the powertrain engineering, chassis development, and driver skill in the world won't win a race without the right racing rubber joining them with the track's surface.

As we learned from speaking with various tire companies, developing a new race tire is far more complex than just formulating the next sticky tread compound. "Sometimes in order to be first, you don't have to be fastest," said Justin Fantozzi of Goodyear Racing, Akron, Ohio. "Maybe you have to be the most durable, or you have to make sure you have enough speed and then balance that with the way the vehicle feels in order to make very consistent lap times or passes on the drag strip."

Rising horsepower is an ongoing challenge. "Cars are getting faster and faster, and we need to consider their capabilities," said Cameron Parsons of Toyo Tire USA, Costa Mesa, California. "Take a Nissan GT-R for example. If someone decided to track a modified 800-horsepower car at Road America, Road Atlanta, Daytona, or similar, we need to ensure that our tires perform safely and effectively on road courses and 'rovals' where cars reach up to 180 miles per hour. It's a challenge that comes with the modern sports car market, as we work to meet these power and speed requirements while also meeting the rules of the racing sanctioning bodies."

Adding to the design and engineering challenges are nagging problems left over from the pandemic years.

"I hesitate to call it the 'new normal,' but the realities we face as manufacturers is not changing," said Mike Edmiston of Hoosier Racing Tire, Lakeville, Indiana. "The labor market is generationally tight; we're not seeing a whole lot of relief in that area. We still see supply chain and shipping logistics disruptions. Getting certain materials that were never a problem in the past is now more problematic, and trying to coordinate all the production efforts around that can be incredibly difficult." Plus, "no one in our company has seen this level of material pricing volatility in our entire history. That's made it really challenging, and all the more reason to focus where we can when we can to shore up the supply for the customers."

How are tire manufacturers keeping up with rising power levels? "If there's a new application, a new series, or a new car that comes to market, we do extensive speed testing to ensure the integrity of that tire is suitable to the specification of the car," said Hoosier's Mike Edmiston.

Despite these circumstances, demand continues to grow, and race tires need to evolve to keep pace with increasing horsepower, suspension and aerodynamic developments, and newly popular race disciplines. What follows is a look at new race tire products and emerging trends that are influencing how these makers do business.

NATIONAL LATE MODEL TIRE

Hoosier's new National Late Model Tire (NLMT) program is a direct result of the company's circumstances. "In a nutshell, it's a lot of not only what we're doing but what a lot of other manufacturers are doing as well," Edmiston said.

According to Hoosier, the NLMT program "consolidates Hoosier's current selection of dirt super late model tires to just three 90-inch tires and three 92-inch tires." The new program will enable teams to "carry a lower inventory and will decrease their supply of wheels kept on hand. Another key benefit of the NLMT program focuses on the less aggressive compounds utilized, which should allow teams to consume fewer tires."

"Materials prices have gone through the roof, and getting a consistent supply of textiles has been a problem," Edmiston explained. "So a lot of what we and other manufacturers are doing is trying to automate what we can, so we don't have to rely on the labor as much. We're also trying to reduce complexities where we can, so we can offer the capacity and supply to our customers so they can continue their racing series."

The tires in the NLMT program aren't wholly new, Edmiston pointed out. "They're still using the same materials and the same compounds our customers have demanded in the past. There are just not quite as many options to try. We're using serial production materials that we have been using in our race products for years, but we're selecting certain ones for a strategic purpose to get the supply at a level that is going to satisfy the market."

Hoosier has been developing manufacturing equipment "that hasn't existed, that's not used anywhere else, so we can automate a little bit more and have the capability to build tires that don't consume as much material. All those things work hand-in-hand, and the NLMT is an example of that. But we're working behind the scenes to develop even further in that regard to give us the capability to still meet the performance standards that our customers demand but be able to do that in a way where it's more efficient and consumes fewer of the materials that are much harder to get nowadays."

NEW UTV TIRES, DOT DRAG RADIAL

Atturo Tire Corporation in Waukegan, Illinois, recently released a new line of UTV tires. "That's a very fast-growing segment in

In response to more powerful UTVs, Atturo Tire has introduced a new line of UTV tires "made like a modern light truck performance tire," said Michael Mathis. Atturo will market the new tires "through sponsorship and contingency programs for a number of off-road racing series."

off-road racing," observed Michael Mathis, "and a core piece of our marketing of that product will be through sponsorship and contingency programs for a number of off-road racing series."

Mathis noted, "The trend we are seeing with UTVs is that they are getting much higher horsepower. They are all 100-plus horsepower, and Polaris just released a vehicle that makes 200 horsepower. They are coming with active live suspension systems on them like you would find on a Ford Raptor. But they are still running on tires that are built for how they were in the 1990s. We are bringing a product to market made like a modern light truck performance tire, with the same type of build equipment, molds, quality control, uniformity standards, and construction type. It has all steel-belt construction, where other UTV tire brands only use nylon. It's a tire that is able to take full advantage of the power and the suspension these machines have. It's stronger, more uniform, and can maintain its contact patch with the ground. It can translate all that feedback through the suspension and let the suspension do its magic."

The geometry and construction of Goodyear's newest drag slick were specifically designed for Pro Mod racers, though the tire "could also have some legs for alcohol Funny Car," said Justin Fantozzi.

Atturo also recently released a DOT drag radial "targeted at modern muscle cars—Camaro, Challenger, Charger, Mustang type applications," Mathis said. "We think there's continued opportunity in building out product for those types of owners, the ultra-enthusiast who wants to drive one of these vehicles to and from the drag strip and be able to compete on the same tires that got them there."

PRO MOD SLICK

Goodyear has recently released a new Eagle drag slick for Pro Mod racers. "We looked at different points of view for what is available and what isn't and tried to fill the gap," Fantozzi said. When asked what was changed specifically for this class, he

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Goodyear is working with NASCAR and Hendrick Motorsports to develop tires for the Garage 56 Camaro ZL1 that will race at Le Mans this year. The rules of running Le Mans are such that developing an all-new tire "was the best approach" rather than using an existing tire, said Justin Fantozzi. Photo courtesy of NASCAR.

said, "the big change was the geometry—that's mold shape, sidewall length, and how it sits on the wheel. We needed to look at the ratio of moving forward versus what the spring rate was. We looked at how it was drawn up, how the sidewall shape is, and that made a big difference. There are some inner workings that we can't talk about that we also were able to change." Initially the tire will be available in one size—36.0x17.0-16—and one compound, "but if necessary, we'll take these learnings and apply them to different sizes," he said. "We spoke to many racers at the PRI Trade Show, and they were very excited to see the new tire coming out for the Pro Mod guys." The new tire "could also have some legs for alcohol Funny Car."

Goodyear is also working with NASCAR and Hendrick Motorsports to develop tires for the Garage 56 project, a NASCAR Camaro ZL1 that will compete at Le Mans this year. When we spoke with Fantozzi he was at Sebring while the car was undergoing testing. He could not reveal much about the tires, only to say that they were "all new" and not a version of an existing race product. "The rules and regulations are different enough from a technology point of view that new was the best approach."

THE 200-TREADWEAR TREND

Parsons said Toyo was currently in the process of developing "a refreshed line of racing tires, some of which we expect to introduce at the next PRI Show." He had no details to share, but he did say the "number-one question we were asked at the PRI and SEMA shows was about 200-treadwear tire options. We've seen this trend pick up over the years. The 200-treadwear market is expanding so much, some manufacturers are trying to make a do-it-all tire, while others are trying to make specialties for autocross, time attack, or endurance racing." He admitted that "it's difficult to make a product that pleases everybody just because of the UTQG rating. Especially because this whole segment is becoming so popular that now there are specialized subcategories within this segment."

When people think of racing tires, "we tend to think of slick tires, but the tires in the street category are the ones that are picking up the most," Parsons added. "I think it's because people want to race on a budget." As an example, a set of dedicated racing slicks "for a race-only Porsche, BMW, or similar, depending on the tire brand, can cost anywhere from $1,800–$3,000. If you're talking the 200-treadwear market, now your cost might be $800–$1,600, and you'll get a lot more life out of the tires.

"People are really thinking about affordability and sustainability," Parsons said. "Drivers don't want to dump all their money on a $20,000 race weekend once a year, when instead they can get together with friends and split a seat for an endurance ride multiple times throughout the year."

TIRE DURABILITY

When talking about racing tires, "sustainability" has multiple meanings. On one hand, the term refers to tire durability, "and that's our reputation," Parsons said. "Admittedly, when it comes to a slick race tire, a DOT slick, or a 200-treadwear tire, our tires usually are not the fastest out of the gate. But our tires last better than the competition, and on top of that they come out at a better price point." Toyo's Proxes RR tire, he noted, "holds its performance until it's completely done. With some club racing tires and DOT slick tires, you might get a magic lap in the first laps of the heat cycle, then every lap after that is going to be slower. But with most of our products, especially the RR, you run it and get the same result every time until the tire reaches its end of life. You'll see the performance start to degrade way further into its lifespan instead of early on."

"The key to longevity is how to get multiple heat cycles out of a tire so it continues to repeat over time—how many repeat heat cycles can I get that generate grip in the tire," said Scott Junod of American Racer, Indiana, Pennsylvania. Grip, he explained, comes in two forms: physical grip, or "how the rubber conforms to the surface of the track," and chemical grip. "Certain friction levels generate temperatures in the tread of the tire that melt and activate chemicals in the tread. When you hear a racer talk about a tire 'firing,' that's what that is—when the tire gets warm and all of a sudden creates a noticeable increase in grip. There's this happy medium you have to find where you balance wear, physical grip, and chemical grip, and how that translates to the repeatability of the tire. That's the whole science of what we do."

To make a longer-lasting tire "you have to balance the construction of the tire

with the compound in a way that gives them a consistent feel," said Hoosier's Edmiston. "You have to have a more durable compound, but overall the end product still has to be competitive, it has to be confidence inspiring. That is a real challenge from a compounding perspective to give consistent performance within one or two tenths per lap, heat cycle after heat cycle. In the last 10 years or so, we've made more gains and progress in how to achieve those types of properties, but it takes a lot of lab testing, a lot of track testing, and a lot of cooperation with customers and suppliers to make all that happen."

Demands on a tire for off-road racing in the West—as in the Baja 400 seen here—are very different from the short courses in the East, said Toyo Tire's Cameron Parsons. "For the most part, West Coast tracks are in desert climates, so there's more hard-packed dirt. East Coast racing surfaces are a lot softer."

RENEWABLE MATERIALS

Sustainability can also refer to emerging trends in tire materials.

Regarding the materials Goodyear uses, "we look at [sustainability] across all tires," Fantozzi said. "We have a sustainability group, and there's a lot of motion on that."

Goodyear has set a goal to have a tire with 100% sustainable materials by 2030. In January, it unveiled a demonstration tire made up of 90% sustainable materials that passed regulatory testing for road use.

Among the sustainable materials in the demonstration tire were soybean oil, silica from rice husk waste residue, recycled polyester, pine tree resins, steel with high-recycled content, and four different kinds

At American Racer, "we're trying to build a tire that is very good, very responsive, feels good to the driver, is as safe as it could be, and lasts a while, so they're not going broke buying new tires every time they want to go out," said Scott Junod. "That's our DNA."

of carbon black produced from low carbon emissions sources.

"There are sanctioning bodies that are requiring sustainability, but that shouldn't be the reason to do it," Fantozzi continued. "You should be out front looking at it. We want to go fast, and we want to have fun, but we want to make sure that we leave the paddock looking better than when we got there."

The focus on renewable materials and sustainability "is a key driver for Continental AG, which is our parent company," Edmiston said. "We see this as an opportunity to look for ways in which we can utilize renewable materials in our product. We have already performed some trials internally, and there are some materials that are available today in production that we can start using. We want to continue to seek out and evaluate materials incorporating what we can into our products while maintaining and improving the performance of our tires."

Material sustainability can also refer to the ability to procure the materials needed to make a race tire. "There are materials within motorsports that all the manufacturers use in order to get the desired speeds, or get the degradation to hit the right box," Fantozzi said. "If they're single sourced, and that supplier is no longer able to supply for whatever reason, then you need to be out ahead of that, truly recognize that supply can be an issue. If you're single source, then you have to make sure that you de-risk the plan."

"Did we make any substitutions based on raw materials tightness in the market and shortages over the last couple of years? The answer to that is 'no,'" said Junod. "We have not made product substitutions to compensate for not being able to get a raw material. We managed even through the tightness of that, and there were some tough times. Our customers know that, and the industry knows that. We were able to maintain our present specs through that whole process until the raw material supply chain loosened up. We are in a good spot regarding raw materials versus where we were at this time last year."

MORE POWER

When asked how tire makers are responding to increases in power levels and speeds on the track, Edmiston pointed to Hoosier's "extensive history and background of testing. We have test equipment in-house in our lab, so if there's a new application, a new series, or a new car that comes to market, we do extensive speed testing to ensure the integrity of that tire is suitable to the specification of the car. If the materials we have aren't sufficient for that, there are ways we can go to a supplier, work hand-in-hand with them, to develop a material that's stronger."

In Junod's world—"we're in the short-track business," he said of the American Racer brand—"we're not out there trying to build a tire that goes faster. We're trying to build a tire that is very good, very responsive, feels good to the driver, is as safe as it could be, and lasts a while, so they're not going broke buying new tires every time they want to go out. That's our DNA."

In fact, "I don't know that we're seeing higher speeds," he offered. "Promoters aren't necessarily looking for higher speeds. They're looking for a more competitive show. They're in show business." If anything, "we are often the restrictor plate in the chain of speed," he said, laughing. "It costs money to tech cars. It can be very complicated, with sophisticated rules packages about certain high-horsepower motors. So if a track doesn't have the time, money, or expertise to do all that tech work, it's pretty commonplace for them to say, 'Give me a tire that won't go very fast, so you can only deliver so much horsepower to the race track.' That limits the field, and it levels the field.

"When that's the case, you have to make a tire that's very durable from a casing standpoint, because people are going to try to apply a great deal of torque to the tire, to try to get more speed," Junod said. "Yet the grip levels are going to be such that they're not necessarily going to be able to do that, but you still have to engineer the tire to take that kind of pounding." PRI

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SHOCK

HOW TODAY'S SUSPENSION SPECIALISTS HAVE BECOME A CRITICAL CONDUIT BETWEEN MANUFACTURERS' PRODUCT OFFERINGS AND THE EXACTING SETUP REQUIREMENTS OF TOP-PERFORMING RACERS.

By David Bellm

A winning race team is a relentless machine. The ones standing on the podium have looked under every greasy bolt, every battered panel, and every tangled wire for ways to go faster.

You can bet they've put a lot of thought into shock absorbers, or dampers, too. This simple-looking set of tubes can change more aspects of a car than someone might imagine any one component could.

Even so, many racers still don't think much about shocks. They buy a set of dampers, bolt them in, and then basically forget about them. It's an unfortunate oversight; effective shock tuning can vastly improve grip, aero, and the overall feel of a car, all of which can translate into significant gains come race day.

That's why racers of all types increasingly rely on the work of shock specialists to set up shocks and tune them for their exact needs, expectations, and requirements. For many teams, these gurus have become a secret weapon that gives them the edge they need on race day.

THE SHOCK DOCTORS

Shock specialists are experts at interpreting what racers are trying to do with their cars and then translating that information into the shock absorber setup. For the most part, they're in the business of taking off-the-shelf aftermarket components and tailoring them to the exact needs of racers to make them faster.

"Manufacturers do a good job building stuff, but their parameters are really wide, because they're just trying to produce shocks to sell," said Mike Leary of Leary Racing Products & Shock Shop, Denver, Colorado. "We're more specific. We can take all day to build a shock, where obviously a manufacturer couldn't. Our tolerances are really tight. Our stuff is really accurate and repeatable."

This approach of customizing off-the-shelf aftermarket shocks has led most shock specialists to forge close relationships with manufacturers, fostering a give-and-take sharing of information as needed. "I worked at Penske Racing Shocks for 10 years," explained JJ Furillo of Ultimate Performance, Concord, North Carolina. "And then after I left, I helped found JRi Shocks. So when I find things that need to be addressed or I see a direction that we need to go, I share that with them."

"We've been working closely with a lot of companies for a long time," added Angelo Zarra of ANZE Suspension, Jupiter, Florida. "For instance, we were helping Penske in the SCCA ranks in sports car racing. Öhlins came to us and asked if we could help their customers. Then SACHS came to us and asked if we could help their customers, too. So we've been working with all the major brands for a long time."

As far as what kinds of cars shock specialists work on, some are more specialized than others. For instance, Furillo of Ultimate Performance focuses entirely on road racing. "If you're not living a particular world of racing, you can't keep up with it, and it's a longer learning curve to figure out what's needed," he explained. "The world I live in is road racing."


VALUE
SPAN
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"My customers get a lot of information from me, because I've been racing my whole life," said Mike Leary of Leary Racing Products & Shock Shop. "Not only can I help them with shocks, but I can help them with spring and sway bar selections and some suspension settings."

Other shock specialists don't specialize in a particular type of racing, but instead focus on one brand of car, such as TC Kline Racing in Hilliard, Ohio, which is exclusively devoted to BMW cars. This indirectly dictates a relatively narrow range of motorsports for it to work with. "We decided to focus on BMW," said TC Kline, "and I still feel like that was the right decision, even though pretty much all of our competitors do multiple brands. So road racing, driver schools, autocross, and street is our market."

In sharp contrast to the tightly focused niches of Ultimate Performance and TC Kline, most shock specialists are highly general in terms of what types of cars and what motorsports they'll tackle. The prevailing thought among most in the business is that the basic methodology and principles of shock setup are the same no matter what particular surface or type of driving a car is doing. This leads many shock specialists to have a colorful and diverse array of customers at any given time.

"It's all four patches and a steering wheel," said Zarra. "So, in the room right now we have Formula Ford, drag racing, Neon, Porsche Cayman Cup, and Aston Martin GT4. That's where we're at."

"We pretty much cover the gamut," added Leary. "Circle track is my major realm, but we do road racing and a lot of drag racing. And Pikes Peak Hill Climb—we've won it nine or 10 times. We even do ice racing."

For equipment, the shop owners and operators we spoke with primarily rely on Roehrig shock dynos, which can be found doing the bulk of the work at Ultimate Performance, ANZE Suspension, and Leary Racing Products. Since TC Kline Racing uses shock dynos mainly when developing new shock designs, it instead relies on an outside source for its shock dyno work.

GREAT EXPECTATIONS

Effective shock tuning can do a lot for a car, but there are limits. All of the experts we spoke with agree that shock work is the icing on the cake—the final tuning of the suspension. "There's a lot of other suspension tuning that needs to be done before you start changing the shocks," said Leary. "The shocks finish it up."

Even the best shock gurus usually can't make a last-place car into a winner with just shock changes. A lot of it comes down to expectations. "If you're doing pole-winning times, knocking two seconds off a lap isn't going to happen," explained Zarra. "But if you're running 33rd, putting you in the middle of the field is really possible, if the chassis is sorted and we've got good bones to work with."

ANZE Suspension customers represent a diverse array of racing disciplines. "It's all four patches and a steering wheel," said Angelo Zarra. "So, in the room right now we have Formula Ford, drag racing, Neon, Porsche Cayman Cup, and Aston Martin GT4."

That's not to say that good shock tuning can't sometimes have dramatic results. Although shock specialists tend to think of their work as complementing an already effective suspension setup, there are times when nothing more than a shock change has indeed transformed a car and brought radically better results.

"I had a drag racing customer come in, and we improved his 60-foot time by two-tenths—night and day," recounted Leary. "And I have had some road racers bring shocks in, and they pick up a second or two over the whole course."

"During my career in NASCAR, I was approached by a team before a race at Dover," added Furillo. "They considered themselves junk. I built them a set of shocks, and along with a host of other changes, they won the race. That's just one example, but it happens."

As tightly focused of a niche as shock tuning is, the work can sometimes spiral out to incorporate almost all aspects of a car. Shock specialists often make recommendations on practically any part of the suspension. "A good shock specialist understands the entire dynamics of the car," said Furillo. "What the car wants or what the driver is looking for isn't always a shock adjustment. It could be a spring change. Or it could be a sway bar change. Knowing that and moving forward with those changes is what makes a good shock specialist."

"My customers get a lot of information from me, because I've been racing my whole life," added Leary. "Not only can I help them with shocks, but I can help them with spring and sway bar selections and some suspension settings."

This big-picture approach may even include a car's aerodynamics. Although most racers think of shock changes for strictly handling and overall-feel improvements, shocks can also make significant changes in a car's aero. "We can run enough shock that we can hold the attitude of the car where it needs to be," said Furillo. "That can sometimes help to get around certain aero rules."

Even with the many potential advantages to be gained with effective shock tuning, getting those great final results may not be as direct as racers might expect. In some cases, shock experts analyze what a car is doing and recommend addressing other aspects of the car before even attempting to set up the shocks.

TC Kline Racing "always includes a setup sheet with our shocks," said TC Kline. Racers who follow those guidelines will be "within 2% of optimal all the time," so they can "fine-tune once they get used to driving the car with our setup."

"It's not always just the shocks," noted Zarra. "For example, we just won the Pan American Nationals in drag racing. That process started years and years ago. We built a set of shocks for the guy, and he sent me a video. I said, 'Look at how the rear wheel ratchets—it winds and unwinds. That's not shocks. You've got a driveline issue.' So he fixed that and some other things, and then 'boom'—championship."

No matter what underlying issues shock specialists have to deal with to get a particular car where it needs to be, the primary measuring stick for success is how the car feels for the driver. This is both the starting point and the end goal for shock specialists.

"For most really good drivers, feel correlates to speed," said Zarra. "If the driver is comfortable, he's going to be fast. We call that confidence-inspired grip. At a subconscious level, the driver says, 'I keep asking for more, and it just keeps giving it to me.'"

That said, there are times when the best-feeling setup for a car isn't the fastest around the track. This is relatively rare, according to our experts, but it does happen. Many times, such mismatches are rooted in the experience and skill of the racer.

"Racers form habits, and they know what they like," explained Leary. "But that may not always be the fastest way. Actually, young drivers are usually easier for us to work with—they don't know what the car should feel like. They get in the car and think, 'Okay, this is what it's supposed to be like,' and they drive it."

A lot of it comes down to learning each driver's preferences over time and knowing how to serve those needs best. "It's easier if you've worked with a driver for a period of time to really zero in on what they need," noted Furillo. "Because you have a relationship with them, you know what they're looking for, and the communication is good. When it's somebody new, you have to say, 'Here's a good starting point, then we can progress from there on how to fine-tune that to your needs.'"

GETTING TO KNOW YOU

When starting that relationship, first, lay some groundwork. Racers need to begin by looking at their cars closely and making sure everything is correct to begin with. If there are misaligned pieces, worn components, or damaged structure, the work of a shock specialist will, at best, be a bandage on those problems.

Chances are, the shock specialist won't even want to begin the process until these other issues are addressed. "I want to know about the chassis setup," said Zarra. "Is it pitched? Is it tilted? Is it bent? Is it welded crooked? Is it cracked in half? Has it been rolled over 17 times?"

After carefully inspecting the car, then it's time to gather plenty of information about the current setup. Generally, the more detail a racer can provide, the better. Along with that, videos can offer valuable insight as well.

Ultimate Performance focuses its expertise purely on road racing, said JJ Furillo. "If you're not living a particular world of racing, you can't keep up with it, and it's a longer learning curve to figure out what's needed," he said.

"The more feedback we get, the more areas we can dive into," explained Zarra. "It starts with the basics. What's your ride height? What's your corner weights? If you can go deeper, what's your motion ratio, and wheel rate?

"And videos, too," continued Zarra. "Inside videos are good—we get to see the steering wheel and the driver. But boy, sometimes outside video is amazing. I just got three videos yesterday of a front-drive drag car. So I can watch it in slow motion and see how the car squats, rotates, and what it does. So just through simple video analysis and driver feedback, we can get a pretty decent idea of what's happening."

Next, customers need to think about what they're feeling when they drive their cars, and what they're dissatisfied with. This is obviously subjective. They need to discuss their preferences with the shock specialist, who can properly customize to their requests. This often requires a nuanced conversation between the driver and the shock specialist. Good shock specialists are experts at getting to the heart of what drivers are really feeling.

"A lot of times I'll ask the same question to the driver three different ways to make sure that's exactly what he's feeling," said Furillo. "Because sometimes, what they're describing as the problem is just the end result—the actual problem is somewhere else. For example, the big thing we hear is the driver saying, 'I'm loose off.' Okay, well, we can try to fix that. But more than likely, the problem is happening at the corner entry to the middle of the corner."

In these conversations, racers need to be completely open and honest about what they're actually trying to do—how often they plan to race, what resources they have from week to week, and what level of success they're aiming for. "Every driver, every race mechanic, every team needs to admit what they're really after," said Zarra. "Maybe that's, 'Hey, we're going to run four races a year, and we're going to try to zing it up front and beat the factory teams.' And then I can say, 'In only four races? All right. It's going to be tough, but we'll try to get you there."

Armed with information like this, shock specialists will work to provide the optimum initial setup for a car, with an eye toward the team's long-term goals and the available resources. Along with that initial setup, shock specialists typically provide guidelines for ongoing changes.

"We always include a setup sheet with our shocks," noted Kline. "If you follow our guidelines, you're going to be within 2% of optimal all the time. So you can fine-tune once you get used to driving the car with our setup, and you're very familiar and comfortable with it."

No matter how well a shock specialist sets up the shocks, remember, nothing stays the same forever. Rules, technology, and tracks can vary wildly over time. The initial work with a shock specialist will likely be the first contact in an ongoing relationship.

"This isn't set-it-and-forget-it type stuff," said Furillo. "Setups change, aerodynamic packages change, tires change, brake packages change. As one thing changes, it's very much a chain event. It impacts other parts of the car. So we need to keep up with that. We continue to evolve to try to make things better."

Even if rules and setups are relatively stable for a particular type of racing, shocks still need ongoing maintenance. Many racers bolt in new shocks and forget about them, but like anything else on a car, the performance of shocks degrades.

Most shock specialists develop close working relationships with shock manufacturers so they can share information as needed. Angelo Zarra said ANZE Suspension has collaborated with Penske, Öhlins, and SACHS, among others. "We've been working with all the major brands for a long time."

Sometimes the change is so gradual racers don't notice.

"Think about if every time you take the car out, it's 1% less crisp," said Zarra. "If you do 21 track days, imagine being 21% worse on horsepower. Now, with shocks, it's not necessarily that number, but you get the idea. It creeps up on you."

What's more, like other parts of a car, neglecting shocks can make them harder to save when the customer finally brings them in for work. It's likely to be far more cost-effective in the long run to take care of the shocks during the season rather than neglecting them until they're unsalvageable.

"If you think about it, when do you change the oil in your engine?" asked Zarra. "When you shove a rod through the block? When the pistons are scored? It's your choice. We're budget-minded, but when you send in dampers that haven't been serviced in 15 years, there's only so much we can do. Stuff we serviced just last year is fairly crisp, everything's good, the service goes easier, and the parts bill is less."

How often should racers have their shocks serviced? The experts we talked to said shocks should come in for service at least once a season. But they quickly pointed out that this is a very general minimum. The ideal interval for servicing shocks can vary greatly.

"Shocks need to be serviced at least every year," explained Zarra. "How do you know if the sealed black tube on the corner works or not? You send it across the dyno. Every championship we've ever won, the shocks came back here for revalving and tuning two or three times within the year."

"It depends on what's actually going on," added Furillo. "In some series, shocks may run 10 or 12 races, so you can get away with doing it once a year. But even that depends. If you're a Saturday-night racer and you race 25-lap main events, your rebuild isn't the same as the guy running 100-lap main events."

With the help of shock specialists, racers can see big gains in all aspects of a car. No, these experts generally can't transform a struggling back marker into a podium star. But they could very well be the elixir that elevates a race car that little bit extra from good to great.

In the process, customers almost certainly end up with cars they enjoy driving more. That is, after all, one of the key aims of shock tuning—to make the driver feel good behind the wheel. Doing so almost always translates to better on-track performance.

"When the car handles really well, you're buried in the throttle all the time," said Kline. "And that's the essence of our focus—your ability to use power with total confidence." PRI

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SKILLED WORKFORCE

The speed and precision that CNC machines offer are not lost on the speed community. An early pioneer was Robert Yates, who installed a CNC machine in a secret Virginia location in the early 1990s to develop the famed C3 head for Ford's NASCAR teams. CNC machines quickly became the winning advantage for teams and parts manufacturers who needed consistency and flexibility in their operations.

The holdouts have always had their reasons. Cost, of course, is a valid point, but crunching the numbers today is becoming more favorable due to labor issues. Another well-sounded excuse is fear of computer programing. Yet, that is another myth quickly fading.

Consider the call that Anthony Usher of MEC CNC in San Clemente, California, received from a Pennsylvania automotive machine shop with strong ties to a strict religious order. The employees had no cell phones or computer experience and specifically requested a manual machine.

"We delivered a CNC machine but didn't tell them it was CNC," recalled Usher. "Once I had it on the floor and a chance to show them, they loved it. It's a proper CNC machine, but they didn't realize it because it has such a simple interface."

To be sure, there are still iron-willed disciples of the Industrial Age in automotive circles who simply prefer the meticulous art of manual machines. Give a master machinist a WWII lathe and Bridgeport and plenty of time, and they can still turn out many of the components needed in a winning race car.

However, the number of skilled machinists and those aspiring to the trade are dwindling fast in the racing market—mostly through retirement but also due to lack of interest in younger generations to take the places of experienced workers. Helping to fill that void has been CNC machines.

"We're making these machines today very easy to learn so that anyone can operate them with minimal training," said Usher. "Customers need CNC machines, but they want them with only two or three buttons—and so we're developing them."

PRI sampled seven shops that recently purchased a CNC machine. All are associated with engine building or manufacturing of performance parts. For some it was the shop's first CNC purchase, and for others the acquisition was added to expand product offerings or increase current production.

These case-study capsules revealed real-world topics of labor, training, logistics, business-plan direction, and other industry dynamics. Looking ahead, CNC machine manufacturers are designing next-generation features to address future needs of the customer. A key factor will be integrating advanced AI or artificial intelligence.

"Researching the use of AI in optimization is already in full swing," said John Cowher of Centroid, Howard, Pennsylvania. "The biggest benefit will be in optimizing strategies for a number of different applications. For CNC machine tools, generating better and more efficient tool-path strategies is always on the minds of the software developers producing the CAM software that is required for today's high-speed machining.

MORE ENGINE SHOPS AND AFTERMARKET MANUFACTURERS ARE EMBRACING NEW CNC MACHINES AND THEIR COST-SAVING, PRODUCTION-BOOSTING FEATURES.

By Mike Magda

"CNC machine tools themselves may be able to benefit from on-the-fly smoothing applications that might be able to take advantage of AI helping to improve surface finish and improving accuracy of the final part through improved motion control," added Cowher.

Also, the future may see CNC machines incorporate additive manufacturing. "An example of an application might be to 3D print a prototype part on the CNC and machine it to the proper tolerance prior to going to production casting," said Cowher.

SHOP: Advanced Product Design

MACHINERY: Haas UMC-750

Although the company has earned much of its reputation for manufacturing drag racing carburetors, Advanced Product Design (APD) in Genoa, Ohio, also offers belt-driven fuel systems, cylinder heads, and other private-label products. In early 2022, APD purchased a Haas UMC-750 five-axis CNC machine from Haas Automation in Elk Grove Village, Illinois, to help expand the production of rocker arms.

"I would have to say it's the most turnkey machine I've ever seen. We were making parts on day one," said John Kyle. "The main parts and components we have run on the Haas at this point are pretty diverse. We've run anything from 4340 steel, cold-roll steel, 6061, and 7075 aluminum. The steel was a concern with a five-axis trunnion table, but we've had zero rigidity issues. We make parts in incredible time."

John Kyle, owner of Advanced Product Design, operates the company's Haas UMC-750 five-axis machining center. He has found the five-axis configuration speeds up overall production time, such as these rocker arms being machined inside the Haas UMC-750, which take less than 10 minutes, compared to an older machining center that produced a rocker arm every 18 minutes.

An older machining center produced a rocker arm every 18 minutes. With the Haas, that production time is now less than 10 minutes. Production times of other parts are also down, as is the transition time between jobs.

"This machine has made short runs much easier because of its ability to set up a job quickly without having to indicate a part, having the probing system and the dynamic work offset, you're only losing at most an hour from job to job versus typically sometimes as much as six hours," explained Kyle, noting that the five-axis configuration also speeds up overall production time. "Once again, in the five-axis machining world, that part can be produced with one hit of the cycle start button. That part I would say in a three-axis milling application would be well over a five-hour part. In a five-axis application on this style Haas UMC, you're looking at a 45-minute cycle time."

For complex jobs, the Haas has features to streamline fixturing and produce completed parts much quicker. An order may call for 1,000 parts, but there are three or more different setups, then a finished part isn't available until the last setup.

"In our business that's a problem because that can delay weeks before a customer sees a part," added Kyle. "We've really tried with five-axis machining to go every time you hit the cycle start button, you have a finished part or multiple finished parts coming off complete."

SHOP: Baldwin Racing Engines

MACHINERY: Rottler F69A

Jeff Baldwin already had a Rottler F65M manual block-machining center at Baldwin Racing Engines in Friedheim, Missouri, but the loss of an employee prompted the step up to the automated F69A.

"As bad as it sounds, we let a guy go for quality reasons, and it's hard to find people right now," explained Baldwin. "The reality of it is, this CNC machine doesn't call in sick, doesn't have girlfriend problems. It just shows up to work on time every day. That's how we've approached it."

Some accommodations were necessary to fit the machine in the shop to utilize the existing crane system. Marty Merz from Rottler in Kent, Washington, helped with the installation and training.

"It helped that I already had the Rottler H85AX honing machine, so I was familiar with how they approached machining," said Baldwin. "But they've got it very user friendly."

Baldwin uses the F69A for line honing, cylinder boring, surfacing the decks, and lifter bores. He can also lighten the blocks and add logos.

"We've got a Renishaw probe. That speeds up the process so much—just being able to measure and locate everything. Also, Rottler's strong point is the fixturing. They either have a fixture for the job, or it's easy to come with something that will work," said Baldwin.

The F69A allows Baldwin to maintain the previous production level with one fewer person on staff in addition to increasing the types of machining operations not available on the previous manual machine.

"I've got it positioned next to my hone. I can bounce back and forth between the two machines. Today in the '69 I'm boring the cam tunnel out for a 50-mm cam, and I've already done two or three blocks in the hone. Doubling up on time is where this really shines," said Baldwin, noting that installing lifter bushings is extremely easy with the F69A. "I just hit the go button, and it'll do all 16 bushings in one run. Before, I had to move it manually from bore to bore. What used to take five hours now takes 45 minutes on the new machine."

Pictured is an engine block set up on the Rottler F69A automatic machining center at Baldwin Racing Engines. Baldwin uses the F69A for line honing, cylinder boring, surfacing the decks, and lifter bores.

SHOP: Chaos Fabrication

MACHINERY: Centroid A560 XL

Developing its own cylinder head for diesel inline-six applications prompted Chaos Fabrication in Washington, Pennsylvania, to purchase the Centroid A560 XL CNC machine last November in order to expand the shop's operation.

"It wasn't efficient to try and do on our other machines," reported Kevin Campbell, adding that the shop also developed its own billet cylinder blocks. "There really wasn't much of a challenge in setting it up. We told Centroid what we were doing with it, and they provided all the fixtures for those applications."

Since Campbell's techs had previous experience with CNC machines, the training sessions went quickly, and the team was up to speed in short order. The main

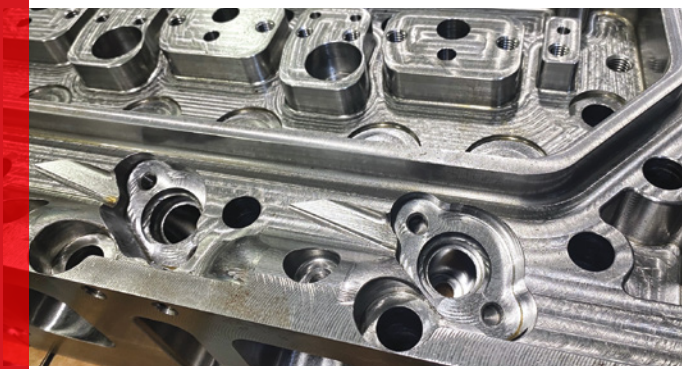
advantage of the A560 XL for Chaos is its size, which can accommodate Cummins and International applications.

"For six-cylinder heads and blocks, they're just so big and long. You've got to have a large machine to be able to work on them. It's not like a V8 head," said Campbell, noting that machining a head from billet steel takes up to 80 hours. "But the reason the heads take so long is because of their physical size. They're probably the size of a couple Chevy heads end to end. We also take a lot of material out of the head to get it lighter."

Each cylinder head starts out as a 600-pound chunk of 1018 or A36 metal, and the finished product weighs around 275–300 pounds. It is heat-treated after machining.

"The way it's able to lay out port designs made it a better fit for what we're doing than our other CNC machines," added Campbell, noting that currently all the heads are machined for dry applications such as drag racing or tractor pulling.

For Chaos Fabrication, the main advantage of the Centroid A560 XL machining center is its size, which can accommodate the large blocks and heads used in Cummins and International applications. "We take a lot of material out of the head to get it lighter," said Kevin Campbell. Each head starts as a 600-pound piece of metal, and the finished product weighs 275–300 pounds.



SHOP: ProTorque

MACHINERY: Mazak HC-5000 & Mazak QTU-350MSY

Nitro dragsters and Funny Cars go through clutch floater plates about as fast as ProTorque in Yeadon, Pennsylvania, a division of Boninfante Friction, can make them on its new Mazak HC-5000 horizontal machining center from Mazak in Florence, Kentucky.

"We make roughly 20,000 parts a year to fill the demand," said Elliott Pickett, noting that the HC-5000 is needed for precision and consistency. "There's a lot that we have to do as far as concentricity. The groove count and the groove quality are something that we work on very hard. For the most part, all the teams run the same style clutch, but everyone runs a different groove package, anywhere from one to eight grooves and at varying widths."

ProTorque machinists have developed numerous macro programs based off customer needs, and the HC-5000 is a steady production machine that can turn out thousands of parts with the only variable being the grooves. A typical nitro clutch uses five floater plates and six friction discs. All five floaters are discarded after each run, while the friction discs can survive two runs. The groove package may change during a season, so the machine orders have to be flexible and react as needed.

"If a disc is not wearing as much, they might put a couple extra grooves in. If it's wearing too much, they might take a couple grooves out. A lot depends on the season and how they're prepping the track," said Pickett.

Other Mazaks on the floor are the QTU-350 and QTU-350MSY. The former is for machining nitro input shafts out of a proprietary steel that can handle the 12,000 lbs.-ft. of torque fuel engines are estimated to produce. The other QTU machine can be set up for torque converter stators and other parts.

"Our main guy on the floor had no programming experience, and he was able to go through the training when we first introduced the QTU," said Pickett. "Within a couple of days he had parts coming off. That's a testament to the people that Mazak has in training."

VALUE OF AFTER-SALES SERVICE

Convincing a race shop, engine builder, or manufacturer to purchase a CNC machine may be the easy part. Keeping that operation as a customer requires a commitment to service all the parts and repair needs. Following are thoughts on this topic from a few of this story's sources:

"It's not just the machine with Haas. It's everything from the financing. Financing was way easier than I ever did with a bank. We've only had one problem with the machine. There was a filter that was causing a pump to cavitate a little bit. Another amazing thing about Haas is its huge online portal where you can see other people's problems. Within minutes we figured out that stone filter has the ability to clog up. We just removed that filter and fixed the problem. One phone call. The ability to get parts is a huge, huge plus on the machine. *—John Kyle, Advanced Product Design*

"We've been in contact with Anthony [MEC sales rep Anthony Usher], and he's always been responsive. He's sent us care packages with parts that came out after the sale. We had a couple of issues, and he's come up with new fixtures to solve those problems. Now we can cover a wider range of cylinder heads, and we can run two big block Chevy heads at the same time. *—Brendan McInerney, Ross Automotive Machine*

"The Rottler F69A uses the main journals and the cam tunnel for location, and we had ordered the basic pucks to locate everything. After I got the machine and started going through it, I found things I needed or extras I wanted. You call them and they're very good about getting the parts out right away. I also purchased their R-Cam software that can be used to machine logos. Ryan Thompson (of Rottler) came down and trained with me, but it's something I don't use every day. Literally almost a year went by before I wanted to put logos on valve covers again, so I was at a loss. I called Ryan, and he logged in with his computer on the machine and he was able to walk me back through. I was putting logos on within an hour. It's amazing to work over the Internet. They can literally run my machine from Washington. If that would have been just a conversation over the phone, that would have been very hard to navigate." *—Jeff Baldwin, Baldwin Racing Engines*

Jeff Baldwin worked with Rottler on the phone and over the Internet to retrain using the F69A to engrave his logo on valve covers and intake manifolds.

When ProTorque's Mazak QTU-350MSY small-footprint CNC turning center was installed, "our main guy on the floor had no programming experience," said Elliott Pickett. "Within a couple of days, he had parts coming off. That's a testament to the people that Mazak has in training."

SHOP: Ross Automotive Machine

MACHINERY: MEC Robins SG8-XL & MEC Robins RubiSurf 1.9

A full-service engine machine shop that includes dyno services, Ross Automotive in Lapeer, Michigan, stepped up to CNC machines as business was outpacing the aging manual machines in use. One of the upgrades was a MEC RubiSurf CNC surfacing center used for cylinder heads.

"We went from 45 minutes on and off with the head to about 10 minutes with the RubiSurf," said Brendan McInerney, noting that the RubiSurf can also be used for exhaust and intake manifolds. "It's a huge time saver for us. When you click start, we let it run, and walk away until you come back to put on the next head."

McInerney admitted that there was apprehension among the employees with the arrival of two CNC machines. But he had previous CNC training on a Haas that is used to make custom parts like pulleys.

KINSLER
We did the Lucas metering for the Can-Am: 60's thru 70's; still do. Any injection: Road race, Sprint cars, Boats, Indy 500, NASCAR Cup, Drags, Motorcycles, Bonneville, Pullers, Street, etc. EFI, Constant Flow, Lucas Mechanical
Action Express Cadillac, '14, '15, '16, '17, IMSA Champs. '18, '21 Won driver & Mfr. Champs, overall '20 Daytona 24 Hrs.
K-140 Pressure Relief Valve
All the components, are carefully measured for each valve build, and recorded. This valve has the tightest loop of any valve we have tested:
Hard coated billet housing has four grooves above and below two diaphragms to lock them in place.
Smallest and Lightest But Highest Flow
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On 95% of NASCAR Cup and INDY 500 cars
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WE NORMALLY ADJUST PR VALVES TO FLOW 100 LB/HR AT THE DESIRED PRESSURE; 50 LB/HR AT 75 PSI FOR NASCAR Cup
Poor Valve
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CLOSING (Our K-140)
CLOSING PRESSURES
K-140 HYSTERESIS LOOP IS JUST .2 (2/10) PSI BELOW OPENING PRESSURES
90
85
80
75
100
500
1000
BYPASS FLOW IN LBS/HR
Monster Mesh™ Filter
10/3 Element
EFI Injectors, all makes of Pressure Relief Valves and Lucas Mechanical Metering Units, need 3 micron protection, but 3 micron filters plug up too quickly, so most racers use10 micron, which is too coarse. We made this new element for NASCAR Cup cars: 10 micron premium paper top layer to take out 95% of the dirt, with a 3 micron precision Fiberglass lower layer.
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An operator at Ross Automotive Machine runs the MEC SG8-XL seat-and-guide machine. This and another MEC CNC machine have "saved time and money for us," said Brendan McInerney. "I'd say we're 60% faster than before."

McInerney also handles the design work using Fusion 360 software.

"Some of the older guys were a little uneasy, but they actually like it now," said McInerney.

The SG8-XL handles valve guides, seats, rocker studs, and other head-related chores. It will perform valve jobs, from one- to three-to five-angle options.

"We just got this machine, so we're designing some of our own cutters for custom port jobs," said McInerney. "For the moment, however, we're using the supplied cutters."

The shop previously had the equipment to surface heads and offer valve jobs, but the new machines have improved efficiency.

"It's pretty much to save time and money for us. I'd say we're 60% faster than we were before," said McInerney. "Maintenance is super easy."

Workflow focuses on all employees trained to run all the machines. "Everything here is custom. When we do a set of heads, we like to keep one guy doing that set of heads. Then there are three or four other guys behind him. Everybody can use the machine, so its fluid, not just one guy trying to keep up with everyone else's workload," explained McInerney.

SHOP: Scorpion Racing Products

MACHINERY: Star SR-32

The manufacturing center for Scorpion Racing Products in Ocala, Florida, could be a showroom for Star CNC Machine Tool in North Olmsted, Ohio.

"We have two SB-16s, three SR-20s, and one SR-32," said Zac Collins, noting that the oldest is a 2005 model and the newest arrived in 2022. "In our line of work—rocker arm and valvetrain manufacturing—we use the Stars for all of the steel sub-assembly components. They make everything from our Polylocks and lock nuts to our pedestals for the Ford and LS rockers. Also pushrods, seat inserts, pins, rollers, fulcrums or trunnions for the rocker assemblies. Basically, anything steel goes through those machines to supply all of the steel components for our rocker assemblies."

Pictured is the Star SR-32 CNC sliding-head lathe with the automatic bar feeder at Scorpion Racing Products. "The Stars are so consistent, they hold tolerance very well, even when we cut several different materials on them," said Zac Collins. "They're holding plus or minus half a thousandth of an inch."

Scorpion was running three shifts, six days a week, and still found the need for additional machinery due to increasing private-label orders.

"Basically, we looked at the numbers and said there just weren't enough hours in the day, even at three shifts," recalled Collins. "That's when we justified purchasing another machine. The Stars are so consistent, they hold tolerance very well, even when we cut several different materials on them. They're holding plus or minus half a thousandth of an inch."

Scorpion has one operator to run all six of the Star machines in addition to a pair of twin-turret lathes.

"Once you get them running, you don't have any issues with feeds, or speeds, or any of the programming," added Collins. "They run as long as you feed them with material."

Collins said transitioning to the newer machines was easy, as many of the fixtures and programming carried over. In-process inspections are routinely held to check critical measurements, but otherwise the machines run without operators.

"The main benefit is not to rely on an operator," continued Collins. "You put a 12-foot bar on it and walk away. And you can get a bar feeder that will hold eight or 10 bars and you're loaded up for hours."

One feature Collins would like to see in the future is offsite communication where if a machine goes out of tolerance or there's an alarm on the machine, company officials are immediately notified and can return to the shop to address the problem.

"It would be great to go fully lights out and still have visibility on the machine," he said.

SHOP: Unlimited Diesel Performance

MACHINERY: RMC V50

Nate Bailor was rather new to CNC machines when he started training his staff at Unlimited Diesel Performance in Bremen, Ohio, on a V50 block machining center he purchased in March 2021 from RMC Engine Rebuilding Equipment in Saginaw, Michigan.

"We were doing block work with older equipment," explained Bailor. "It would take us an entire day to bore and resurface a block. When we bought the V50, I can bore eight cylinders in about eight minutes. The longest part of the job is the setup. The entire job is done in two hours. It definitely has increased our productivity."

Bailor has yet to run the V50 himself but has one machinist fully trained. "I can tell you, the guys from RMC have a great software package," he said. "When we trained with them, it was very easy to learn. They do it in such a way that they can take someone who has never run a CNC machine, and by the time you leave their facility, you're really confident in what you're doing with it."

Bailor said the operating system has plenty of safeguards built in to avoid costly mistakes, and the customer service is always helpful when there is a new application or a new procedure they want to try.

"As for the setup, it does take a large footprint for sure," said Bailor. "But with all the extra work we've taken on, it feels like it's taking up even more room. Actually, we had to take one of the lifts out of the shop to locate this machine. We went from a three-bay shop to a two-bay, but it was definitely worth it in the long run." PRI

BJ Collins at Unlimited Diesel Performance watches the probe measuring the deck height on the RMC V50 machine center. Using its older equipment, "it would take us an entire day to bore and resurface a block," said Nate Bailor. "When we bought the V50, I can bore eight cylinders in about eight minutes."

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MEMBER CHECK-IN

PERFORMANCE WHOLESALE AUSTRALIA

The call for "a strong, united voice in the future of motorsports" comes from Australia's largest provider of custom and off-the-shelf engine parts.

By Jim Donnelly

Queensland Speedway Spares is a subsidiary of Bill Mann's Performance Wholesale Australia, marketing pure race components to Australia's enthusiastic motorsports community.

What does the lonely work at cattle and sheep stations in the outback of Australia have to do with the world of automotive high performance? Plenty, because that's where founder Bill Mann cut his teeth. He worked in rural farming before starting out in a series of speed-related enterprises that culminated in 1986, when Mann established Performance Wholesale Australia Pty Ltd. Today it's the Southern Cross' largest provider of custom and off-the-shelf engine parts from a galaxy of manufacturers, including many based in North America.

American-style high performance and motorsports are extremely popular Down Under, with enthusiasts in Australia amped on everything from muscle cars for the street to drag racing, sprint cars, and midgets (or as they're known in Australia, "speedcars"). It's a rich environment that saw Mann spin his first wrenches at age 14 at a local repair shop that dismantled and fixed junk vehicles, among other things. While working full time, Mann successfully completed correspondence courses in mechanical engineering, driving combines to pick up extra cash. His career as an independent business owner dates to 1976, when Mann opened Bill Mann Performance as a machine shop building racing engines, primarily for the dirt track scene in Australia, plus dragsters and performance boats.

That was when Mann first started importing engine parts from the United States to evaluate and sell. The parts-importing end of his business grew exponentially, leading him to open Performance Wholesale Australia in Brisbane, Queensland, Australia, as a means to supply the best engine parts available from anywhere for sale in Australia, for every motorsports or enthusiast application. The firm employs a full force of sales and technical specialists, much like a US-based performance retailer would. Some have been with the company for 25 years or more. The listing of product categories and suppliers that sell through Performance Wholesale Australia easily reaches into the dozens.

The firm continues to test and evaluate components. For specialized fabrication of parts, it operates multiple five-axis CNC machines, two Newen Contour computerized cutting machines, an engine dyno, and flow benches. The firm also operates Queensland Speedway Spares as a subsidiary, marketing pure race components. As Mann puts it today, "The company is driven and fueled on basically one word, that being 'passion.'" Maintaining employee enthusiasm in the face of global challenges is a never-ending priority, he said.

"With the purchases of household name brands in the performance industry by venture capital companies, it is all about bean counters and profit," he said. "Companies have lost their passion as the originators sell out, retire, or pass away. It is a very sad situation, and most of these so-called new companies carry very little stock and have very few people that have any knowledge or

Performance Wholesale Australia has had to drastically increase its stock to survive, Bill Mann said. "It is not uncommon to have product on order for up to two years, and the average supply lead time is 52 weeks," he said.

passion except for staff who want to have a business card with some important words on it. I plead with the investment groups to keep good staff, with knowledge and passion to take their companies forward. Our industry is founded on passion, not spreadsheets.

"Companies like ours have had to increase their stock by 100% to survive, and to make up for the inadequate ability of these companies to carry stock," he continued. "It is not uncommon to have product on order for up to two years, and the average supply lead time is 52 weeks. Most small-owner personal companies all have good supply."

A consistent, experienced staff has enabled Performance Wholesale Australia to better navigate the buffeting caused by global supply challenges, Mann said. "We've been able to survive in an extremely difficult time by putting our entire livelihood into our company. The dedication of key staff to go way beyond their call of duty to make it happen, and to achieve incredible sales growth, has been key to us. It is all about people."

Finding the right people to staff the operation is a daily part of running the business, Mann explained, noting that "the biggest single challenge of businesses all over the world is the ability to hire staff that are old school, extremely passionate, and are prepared to give an honest day's work for an honest day's pay. Modern-day phones and social media, in all their might, have destroyed the ability for most workers and families to think and communicate verbally for themselves. They are led along like sheep and are joined at the hands with that screen that they call life."

Performance Wholesale Australia is relatively new to PRI as a Founding Member, but Mann said the experience and the benefits have consistently been invaluable to the company. "The PRI Membership is new, but I have attended every PRI Show since its beginning," he said. "I have joined as a Founding Member as I feel there needs to be a strong, united voice in the future of motorsports [on] the reduction of emissions and the development of electric cars. I believe SEMA and PRI will be creative in their benefits to Members in the future. It's been a good decision by SEMA and PRI to head this way. We owe a lot to Steve Lewis and his original crew who had the vision for PRI." PRI

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PRI TECH

STEPPED PIPES VS. STRAIGHT PIPES

While stepped headers may offer improved power and power band, some applications are nonetheless better suited to a straight design.

By Vince Roman

How do you get maximum performance out of your exhaust header?

For starters, an effective exhaust system optimizes the movement of the pressure waves occurring within it. Pressure wave management helps maximize "mass-flow." Mass-flow is the process of moving the largest amount of exhaust gas out of the header as efficiently as possible. Performance header design focuses on optimizing mass-flow.

During camshaft overlap in the cylinder head, vacuum waves resulting from pressure wave reflections in the engine's exhaust ports function to extract exhaust gas out of the cylinder. To maximize mass-flow, there are key aspects of header design that affect both the timing and strength of these pressure waves. They include:

- primary length
- primary diameter
- collector size
- tail pipe size

These components are 95% of the qualitative game.

The question now becomes, "What exhaust header design offers the best performance—stepped or straight?" Let's first break down their differences.

Straight-tube headers have constant diameter tubes that flow exhaust from the engine to the atmosphere. By contrast, a stepped header has exhaust tubes that increase in size as they get farther from the exhaust ports. These "steps" are typically spaced in 1/8-inch increments.

Stepped headers may provide another 5% of improved power and power band by further managing the flow and wave dynamics. That's not to say you will see a 5% increase in max power output, but rather an increase of 5% in the total of any performance gained from the entire exhaust system.

Most stepped headers feature sharp steps. This Bonneville big block header uses smooth transitions that are required for thin wall exhausts (0.035-inch wall or less).

PRESSURES AND WAVELENGTHS

To explain how stepped design improves flow and power range, let's review what happens in the header. As the exhaust valve opens following the power stroke, a pressure wave and a mass of exhaust gas flows from the cylinder into the header primary. The graphs on page 97 help to illustrate this process.

The pressure wave generated travels at near the speed of sound. In the case of a constant diameter tube without a collector, the wave hits the end of the tube, and a negative pressure (i.e. vacuum) wave reflects up the tube. The reflected negative wave is the result of the "boundary condition." This is the constraint point at the physical end of the system. In this case, it is the exhaust tip(s) or exit point of the tube. At this boundary, the pressure must equal atmospheric pressure, giving rise to a balancing negative pressure wave.

Using the speed of sound value calculated by the temperature and composition values of the exhaust gas flow, we can understand the time required for a pressure wave to travel the total length of the tube.

The goal is to time the exact speed the pressure waves will travel from the exhaust valve to the end of the pipe. That value is then combined with the value of the resulting vacuum wave traveling back to the exhaust port. When these two combined values are equal to the time of one crankshaft revolution for a set engine speed, it is known as the "tuned rpm."

TUNED RPM AND EXHAUST SCAVENGING

At the tuned rpm, this wave will enter the cylinder during the cam overlap period. This will "suck," or scavenge, residual exhaust out of the cylinder, helping the intake charge to fill the cylinder. A straight open-ended tube for each cylinder will create the strongest possible wave reflection from the end of the tube.

While stepped-header tubes are often the best solution for specific race engines, they are also more difficult and more expensive to fabricate than straight-tube headers. This set of straight headers from a 1968 Gurney Weslake Indy car were likely sand-bent exhaust headers, according to Vince Roman of Burns Stainless.

However, a problem arises when the engine rpm is "off" the tuned rpm of the pipe. The wave reflections can disrupt the cylinder from scavenging and filling. Consider: At an off-tuned rpm, vacuum waves may reach the exhaust port when the valve is closed. This results in a positive wave reflecting from the end of the tube. If this wave arrives at the valve during cam overlap, the exhaust gas flow becomes restricted. The result is a narrow tuning range resulting in a "peaky" power band.

With a stepped header, the smaller tube size near the port provides a higher gas velocity. This allows the exhaust to evacuate further while the exhaust valve is open. The larger tube size downstream reduces the pressure drop through the header, thereby improving mass-flow through the tube.

CREATING BROADER POWER BANDS

In addition to the above, the stepped design also creates multiple wave reflection points. These smaller vacuum waves help evacuate exhaust from the cylinder at different engine speeds. This results in improved torque across the power band.

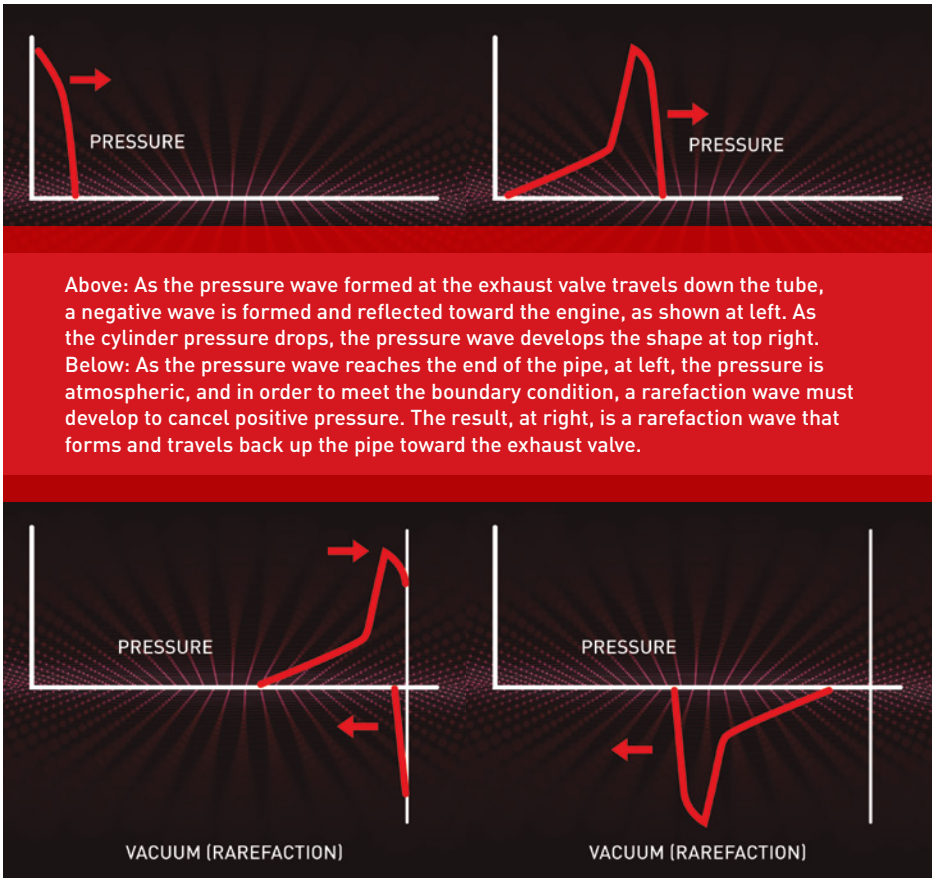
These multiple reflections also reduce the strength of the positive wave traveling to the end of the tube. This results in a smaller-sized primary scavenge wave.

Due to the amplifying effect of frequency resonance, these waves will still have enough scavenging strength at the tuned engine speed. Yet, the reduced strength of the waves will cause less havoc at other engine speeds. This again results in an increased range of the power band. In a perfect world, a constantly tapered exhaust primary tube would be ideal. This would distribute the reflected waves infinitely over the length of the primary tube.

BIGGER ISN'T ALWAYS BETTER

There are many benefits to a stepped exhaust header. One practical benefit is that the exhaust tube is smaller at the cylinder head. This is often easier to package in a full chassis car. It's the reason racers likely developed this design in the first place. Yet, the most important benefit is its performance improvement over straight-tube designs.

So, when money is no object, then a stepped pipe is better, right? Well, no, not always.



Above: As the pressure wave formed at the exhaust valve travels down the tube, a negative wave is formed and reflected toward the engine, as shown at left. As the cylinder pressure drops, the pressure wave develops the shape at top right. Below: As the pressure wave reaches the end of the pipe, at left, the pressure is atmospheric, and in order to meet the boundary condition, a rarefaction wave must develop to cancel positive pressure. The result, at right, is a rarefaction wave that forms and travels back up the pipe toward the exhaust valve.

Remember what we said earlier: Two of the most important aspects are the primary and collector diameters. Oftentimes, engines have exhaust ports that are too large. This is especially true in vintage engines and lower-performance modern engines.

In general, engines dislike tubes that are reduced in diameter. If the exhaust port is larger than the ideal primary size, building a stepped pipe will result in the primary and collector being too large. This results in inferior performance.

COST AND APPLICATION CONSIDERATIONS

Stepped-header tubes are also more difficult and more expensive to fabricate than straight-tubed headers. So, if you do not need to extract all the power available, then a straight-tube header is going to get the job done.

Which is to say that stepped headers are often—but not always—the best solution.

We do find that for well-developed modern race engines with properly sized exhaust ports, a three-stepped exhaust primary is best. For example, the ideal header size for an LS7 crate motor would be a 1 3/4-inch + 1 7/8-inch + 2-inch OD stepped primary. In comparison, a lower-performance LS3 crate engine with similar-sized ports is 1 3/4-inch OD.

The fluid dynamics and thermodynamics occurring in the exhaust of an internal combustion engine are extremely complex. Explaining them fully in this space is simply not possible. Instead, the goal here is to help you develop a visual understanding of what is occurring in the exhaust system and assist in guiding you to the best solution for your performance build. PRI

As the owner of Burns Stainless, a manufacturer of racing exhaust components, Vince Roman has designed exhaust systems for more than 20 years. Prior to working at Burns Stainless, he was a research engineer working in combustion phenomenon and air pollution control. Roman has a BS and MS in Mechanical Engineering from the University of California Irvine.

ADVOCACY CORNER

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

Edited by Laura Pitts

PRI's Washington, DC-based legal and advocacy teams work continuously to protect and support motorsports venues, sanctioning bodies, and businesses around the nation. We are tracking several initiatives this month, including new regulations for R&D investments, new legislation designed to better race track operations in West Virginia, and a "win" for internal combustion engines in Virginia.

R&D TAX CREDIT AND BONUS DEPRECIATION FOR BUSINESSES

When the 2017 tax law was enacted, it allowed companies to amortize certain tax deductions over one year, but the benefit was only temporary. The business community urged Congress to extend the provisions in 2022, but this did not occur despite widespread support in Congress. PRI's DC-based advocacy team will be making a push in 2023 to get Congress to reinstate the 2017 provisions for R&D expenditures and the bonus depreciation.

Of particular interest:

- From 2017 through 2021, companies could take a 100% tax deduction for R&D spending in the year it occurred. Starting with the 2022 tax returns, companies have to deduct their R&D expenses over a five-year period.
- Under the 2017 law, a company could expense 100% of the cost of any Section 179 property—such as equipment, vehicles, and software—and deduct it in the year the property was placed in service (applicable between September 28, 2017, and December 31, 2022). The law increased both the maximum deduction to $1 million and the phase-out threshold to $2.5 million, adjusted for inflation. The Section 179 deduction now phases out over the next four years: 80% in 2023, 60% in 2024, 40% in 2025, and 20% in 2026.
- Unless the law is changed by 2027, the bonus deduction will disappear, and companies will have to return to spreading out the depreciation over many years.

"Motorsports businesses make significant investments in equipment along with R&D, which are necessary to provide racers with technology that allows them to win. It's important that Congress provides small businesses with a predictable, forward-looking tax structure that rewards companies that make long-term investments and plan for the future," said Eric Snyder, Senior Director, Federal Government Affairs.

For more information, contact Snyder at erics@sema.org.

WEST VIRGINIA INTRODUCES MOTORSPORT RESPONSIBILITY ACT

West Virginia lawmakers have introduced the PRI-supported Motorsport Responsibility Act (H.B. 2569/S.B. 236), which is designed to help motorsports facility operators and owners by defining areas of responsibility and assumed risks by participants.

"Motorsports venues and recreational areas are major contributors to the West Virginia economy. Clearly defining the obligations and responsibilities—for both participants and race tracks—will make the state more enticing for racers, promoters, and future facilities," said Christian Robinson, Senior Director, State Government Affairs & Grassroots.

H.B. 2569 has passed the House of Delegates while S.B. 236 is currently pending in the Senate Judiciary Committee. To contact lawmakers in support of the Motorsport Responsibility Act, visit https://p2a.co/S9lLlWt.

For more information, contact Christian Robinson at christianr@sema.org.

West Virginia Motorsports Day / Courtesy of WV Legislative Photography, photo by Will Price

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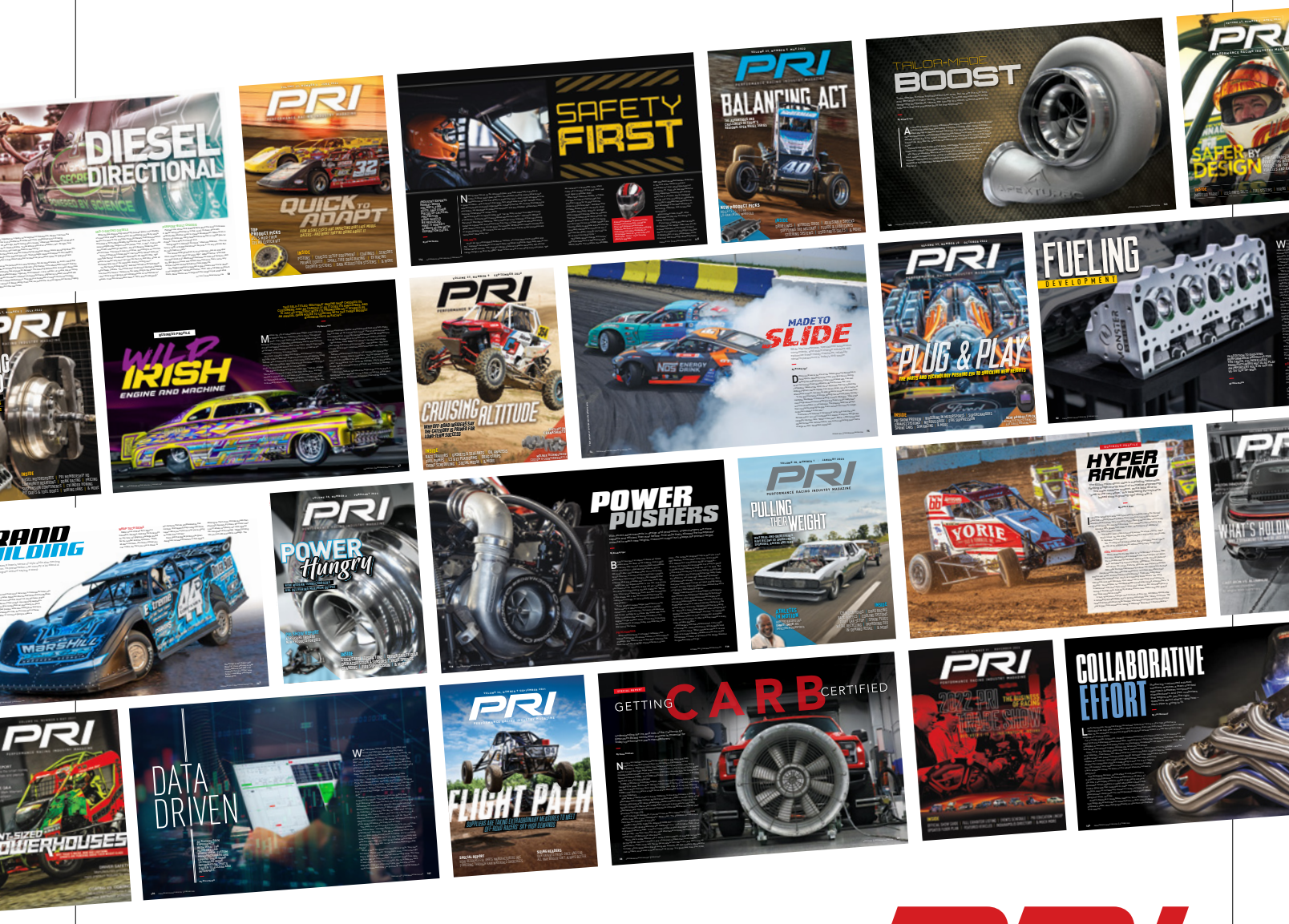

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VOICE YOUR SUPPORT: VIRGINIA GOVERNOR PLEDGES TO REPEAL ICE BAN

Virginia lawmakers have introduced PRI- and SEMA-supported legislation (H.B.1378) to repeal the law tying the state to California's motor vehicle emission standards. Under current law, sales of new gas- and diesel-powered vehicles will be banned starting in 2035.

"It defies common sense that in 2021, lawmakers decided that instead of writing our own electric vehicle laws, Virginia would simply do whatever California decided to do," said Virginia Governor Glenn Youngkin. "Because lawmakers outsourced their responsibilities and surrendered our values to California, Virginians face a mandate starting in 2024 that limits and eventually bans the buying of gas-powered cars or trucks. Unless we act, Virginia is hostage to the extreme policies of California. Common sense says that the law of Virginia should be written by elected leaders here, not outsourced to radical bureaucrats in California."

Virginia Governor Glenn Youngkin

"PRI and SEMA support legislation in Virginia to repeal the law tying the state to California's motor vehicle emission standards," said Robinson. "PRI and SEMA also do not believe that the government—Virginia's or California's—should be choosing winners and losers in the automotive market. Virginians should decide what vehicles are best for them and their families."

To voice your support and contact Virginia lawmakers in support of the bill, visit https://p2a.co/milPoek. PRI

PRI Membership represents a powerful, unified community of racers, enthusiasts, businesses and others dedicated to building, promoting and protecting the motorsports industry and its interests. It helps support advocacy on the grassroots, state and federal levels, including assistance to race tracks and active participation in legislative/regulatory processes. Membership also comes with a full suite of exclusive benefits and services. Join the first-ever membership of its kind—PRI!

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INDUSTRY NEWS

JESEL VALVETRAIN FOUNDER DAN JESEL, 81

Dan Jesel

Jesel—the valvetrain parts manufacturer based in Lakewood, New Jersey—has announced the passing of company founder Dan Jesel. He was 81.

"Per Dan's wishes, Jesel Valvetrain Innovation will continue to operate as a privately held company run to the highest of standards. Through Dan's wisdom and knowledge and with the dedication of his employees, Jesel Valvetrain will continue to supply the industry with components worthy of his name," a company representative stated.

It was previously announced that Jesel had transitioned from president and CEO to executive chairman in December. Rich Runne, a 31-year company veteran, assumed controlling interest and the CEO position in partnership with Dan's brother, Wayne Jesel.

LONGTIME EDELBROCK ADVISOR SMITTY SMITH, 70


Smitty Smith

Longtime Edelbrock Senior Technical Sales Advisor Smitty Smith has passed away. He was 70.

Smith worked for the Olive Branch, Mississippi-based company for 30 years and had been using its products for 50. His primary duty was to help consumers by responding to their inquiries from Edelbrock's website and through social media.

"Smitty's official title was senior technical sales advisor, but his fingerprints are all over everything Edelbrock. If you ever visited the Edelbrock trailer, chances are you met him. He was a staple at almost every race, show, or event where the trailer went," a company rep said.

MIDWEST PRO STOCK ASSOCIATION SET FOR REBIRTH WITH 8 RACES IN 2023

Motorsports pros Rick Jones, Kevin Lawrence, Dave River, and Jeff Wick have announced the rebirth of the Midwest Pro Stock Association (MPSA), a drag racing series formed by Jim Wick in the late 1980s. The series folded following the passing of Wick in 2002.

"A group of us were together at the World Series of Drag Racing at Cordova—which itself is an end-of-the-season match race—and we thought it would be a good deal to bring back match racing year-round like they used to. So I called [Jim's son] Jeff Wick to see if we could use the MPSA name. He was on board and even wanted to help and compete, too," Lawrence said to PRI. "Jeff will compete in the Matchmaker car they haven't run since Jim's passing."

"Our main goal is to put on a good show for the fans and let people relive match racing as it used to be," Lawrence continued. "Match racing is not as, let's say, politically correct or sterile as other racing. It's all about 'let's settle it on the track; the first guy to the finish line wins.'"

At press time, the series had confirmed visits to five cities across eight race dates beginning with the Spring Nostalgia Drags event at Central Illinois Dragway in Havana, Illinois, on June 10.

TAGLICH PRIVATE EQUITY ACQUIRES VORTECH SUPERCHARGERS, PAXTON AUTOMOTIVE

Taglich Private Equity has acquired Oxnard, California-based Vortech Superchargers and Paxton Automotive. They join the Air Flow Research (AFR), Scat Crankshafts, RaceTec Pistons, and Procar Custom Seating Systems family of companies.

"Vortech Superchargers is a perfect match with this organization; all brands complement one another. For the first time in the performance aftermarket, a customer can purchase a reliable, high-horsepower, proven combination directly from the companies manufacturing the core components," said Jim Middlebrook, the founder of Vortech Superchargers.

SUNNEN ACQUIRES GERMAN DEALER HOMMEL PRÄZISION

Sunnen Products Company—the St. Louis, Missouri-based manufacturer of innovative honing solutions—has acquired distribution partner Hommel Präzision based in Aldingen, Germany.

The entire Hommel sales and technical team is now part of Sunnen and will continue to support its German customers, with the current communication channels, including contact persons, remaining the same.

NEW OWNER FOR OHIO VALLEY SPEEDWAY (WV)

Rich Michael Jr. has purchased Ohio Valley Speedway, the 3/8-mile dirt track located south of Lubeck, West Virginia.

Plans include a new fence on the backstretch, updated guide rails, a new PA system, and a more family-friendly concession stand menu, officials said.

SWAINSBORO RACEWAY (GA) REOPENS WITH NEW OWNER

Swainsboro Raceway—the 3/10-mile dirt oval in Emanuel County, Georgia—has been purchased by JJ Williams and his wife, Dana. They take over operations from Paul Purvis, who has owned the track with his wife, Debra, for 22 years.

Purvis plans to remain involved with the track, which has been intermittently closed since 2019 but still hosting special events.

MEYER DISTRIBUTING ANNOUNCES HURRICANE, UT LOCATION

Jasper, Indiana-based Meyer Distributing has announced the addition of its Hurricane, Utah cross-dock. The facility will have a direct feed from Meyer's Kingman, Arizona, hub.

"The Hurricane dock will allow us to deliver daily to the fast-growing region of St. George as well as capture some additional rural markets in Utah," said Alex Blackgrove, Meyer Distributing director of Crossdock Operations.

HENNESSEY PERFORMANCE UNVEILS VENOM F5 'REVOLUTION' HYPERCAR

Hennessey Performance—the Sealy, Texas-based hypercar manufacturer and high-performance vehicle creator—has unveiled a new, lighter-weight, track-focused version of the Hennessey Venom F5. The new Venom F5 Revolution Coupe is designed to be one of the most powerful and "visceral" pure combustion hypercars in the world.

Venom F5 'Revolution' Hypercar

The Revolution Coupe features reworked aerodynamics, suspension, engine cooling, digital telemetry, and reduced mass from the Venom F5. Mid-mounted in the carbon-fiber monocoque chassis is Hennessey's twin-turbocharged, 6.6-liter, 'Fury' V8 engine rated at 1,817 bhp.

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CHEVROLET REVEALS CORVETTE Z06 GT3.R FOR 2024 COMPETITION

Chevrolet has debuted the new Corvette Z06 GT3.R race car—designed and developed in collaboration by GM's Competition Motorsports Engineering division and Pratt Miller Engineering. The Corvette Z06 GT3.R is Chevrolet's first race car that fully meets FIA technical regulations for GT3 cars.

The Z06 GT3.R—which will be eligible for multiple championships in North America and around the world—will race for the first time as part of the GT Daytona (GTD) PRO category at the 2024 Rolex 24 At Daytona to open next year's IMSA WeatherTech SportsCar Championship.

Corvette Z06 GT3.R race car

CHAMPION BRANDS PARENT COMPANY NAMES NEW CEO

PLZ Corp—the North American-based specialty aerosol and liquid product manufacturer and parent company of specialty lubricants manufacturer Champion Brands—has announced the appointment of Brett Finley as chief executive officer (CEO).

Finley, who comes from Fortune Brands, will focus on leveraging R&D resources and product breadth, a company rep stated.

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DAYCO ANNOUNCES NEW AFTERMARKET/BELT CEO

Roseville, Michigan-based Dayco has announced Craig Frohock as the new CEO of Dayco Aftermarket and Belts. Reporting directly to the board of Dayco, Frohock is responsible for the business unit's global operational performance and strategic direction.

Frohock has held senior leadership roles with Tenneco for the past six years, most recently as group vice president and general manager of the company's OE Ride Control business.

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NASCAR NAMES NEW SR. VICE PRESIDENT OF COMPETITION, PROMOTIONS

Daytona Beach, Florida-based NASCAR has announced Elton Sawyer as its senior vice president of Competition. Following a driving career, Sawyer held leadership positions for several race teams and at NASCAR.

He replaces Scott Miller, who will assume the newly formed role of competition strategist within the NASCAR Competition team following a 40-plus year career in motorsports.

In related news, NASCAR has also announced the promotions of several individuals to key positions within its Competition leadership team.

John Probst has been promoted to NASCAR chief racing development officer. Dr. Eric Jacuzzi has been promoted to NASCAR vice president, Vehicle Performance. Dr. John Patalak has been promoted to NASCAR vice president, Safety Engineering. And, Brandon Thomas has been promoted to NASCAR vice president, Vehicle Design.

SPEEDWAY MOTORSPORTS PROMOTES LEADERSHIP AT DOVER, TEXAS

Concord, North Carolina-based Speedway Motorsports has announced Jim Hosfelt was named vice president of Safety and Security at Dover Motor Speedway (Dover, Delaware) and director of Safety and Security for Speedway Motorsports.

Kenton Nelson, meanwhile, maintains his position as vice president of Events at Texas Motor Speedway (Fort Worth, Texas) and adds director of Events for Speedway Motorsports to his role.

Finally, Kyle Nelson was named vice president of Operations at Texas Motor Speedway.

LUCAS OIL PRODUCTS ANNOUNCES ADDITIONS TO LEADERSHIP TEAM

Lucas Oil Products—the Corona, California-based manufacturer of automotive aftermarket lubrication product lines—has announced three additions to its leadership team: the hiring of Jason Bonikowske as general counsel, and the promotions of Nicole York to vice president of Finance and Megan Burakiewicz to vice president of Human Resources.

PERTRONIX PERFORMANCE BRANDS PROMOTES STACY TO VP OF SALES

San Dimas, California-based PerTronix Performance Brands has promoted Jeff Stacy to vice president of sales, where he will oversee sales for all brands within the group, including PerTronix Ignition, JBA Performance Exhaust, Doug's Original Headers, Patriot Exhaust, Compu-Fire, Spyke, Aeromotive Inc., Waterman Racing Components, and Taylor Cable Products.

Stacy brings nearly 40 years of automotive industry experience to the position, including time as the executive vice president of Aeromotive and Waterman Racing Components.

NORTHERN RADIATOR ADDS NEW SALES MANAGER

Dave Amato

Northern Radiator—the Willmar, Minnesota distribution-based supplier of cooling system components for high-performance, automotive, and other markets—has announced Dave Amato as its new sales manager.

Amato's previous experience includes more than 25 years at Baldwin Filters in Kearney, Nebraska, in various sales and marketing leadership positions, including vice president of Sales for the US and Canada. He also served as vice president of Sales and Marketing for Bulldog HD/DMA Sales.

INDYCAR TO FEATURE NEW MEDICAL UNIT IN 2023

IndyCar and its longtime partner Indiana University (IU) Health have debuted its new mobile medical facility for the 2023 season. The new transporter features double slide-outs designed to provide an environment for consistent and accessible care during each NTT IndyCar Series and INDY NXT by Firestone event.

Previously, IndyCar's medical team utilized a combination of a mobile trailer and the facilities available at the venues that host events.

"IndyCar medical has always been the industry standard of care and service in motorsports," IndyCar President Jay Frye said. "The investment into the IndyCar Medical Unit is an important step in continuing that expectation and assuring that all personnel will receive excellent care."

2023 DRIVE FOR DIVERSITY DRIVER DEVELOPMENT CLASS ANNOUNCED

NASCAR and Rev Racing have announced the eight drivers who have been selected for the NASCAR Drive for Diversity Driver Development Program.

Lavar Scott, Andrés Pérez de Lara, Jaiden Reyna, and Justin Campbell are returning to Rev Racing for the 2023 season. Paige Rogers, Eloy Sebastián López Falcón, Caleb Johnson, and Nathan Lyons will make their debut in 2023.

HOLLEY ANNOUNCES 2023 EVENT DATES

Bowling Green, Kentucky-based Holley Performance Products has revealed the dates for its popular high-performance race events.

Holley LS Fest West; April 28–30; Las Vegas Motor Speedway in Las Vegas, Nevada.

Holley LS Fest Texas; May 19–20; Texas Motor Speedway, Fort Worth, Texas.

Holley LS Fest East; September 8–10; Beech Bend Raceway Park, Bowling Green, Kentucky.

Holley MoParty; September 15–17; Beech Bend Raceway Park.

Holley Intergalactic Ford Festival; September 28–October 1; Beech Bend Raceway Park.

Holley High Voltage Experience; dates and location set to be revealed later.

NASCAR INDUCTS HALL OF FAME CLASS OF 2023

The NASCAR Hall of Fame—based in Charlotte, North Carolina—has welcomed its class of 2023 with an induction ceremony at the Charlotte Convention Center.

Inductees included 2003 NASCAR Cup Series champion Matt Kenseth; Kirk Shelmerdine, who helped guide Dale Earnhardt Sr. to four Cup titles; and Hershel McGriff, who secured four Cup races in 1954 and returned to NASCAR racing in 2018 at the age of 90.

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

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RUBI SURF

RUBi SURF

Heavy Duty Cylinder Head Surfacing Machines

RUBI SURF 1.7 SPECIFICATIONS

X-axis workhead travel: 42 inches (1065 mm)
Cylinder head length: 34 inches (865 mm)
Cutter head diameter: 14.0 inches (356 mm)

RUBI SURF 1.9 SPECIFICATIONS

X-axis workhead travel: 56 inches (1400 mm)
Cylinder head length: 47 inches (1200 mm)
Cutter head diameter: 16.5 inches (420 mm)

COMMON SPECIFICATIONS

Spindle speed:	200-1200 RPM variable (CNC AC SERVO)
Surface finish:	As low as 0.2 Raμmm
X-axis slideways:	Low friction turcite slideways
Operator panel:	Rubisurf Smart Series
Waviness:	Below 70 Wt

Unique revolutionary concept for V6 and V8 cylinder blocks machining

****No Precision Locators Needed****

Reference from either main bearing bores/cam shaft bores or pan rail surfaces!

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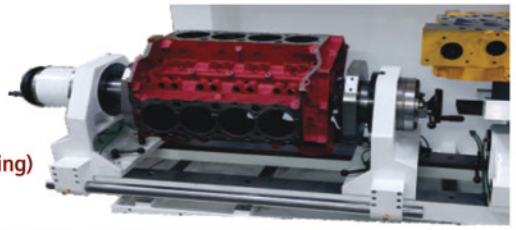

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SG12 HD SMART HEAVY DUTY

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Rotate the largest 24 valve diesel cylinder heads 360° effortlessly!

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SG12 HD SMART HEAVY DUTY Specification

Max cylinder head size	47"L x 15"W x 10"H (1200mm x 380mm x 254mm)
Spindle Stroke	8.500" (216mm)
Spindle Speed	35 - 500 rpm
Spindle tilt	± 15 Degrees
Roundness	<0.0002" (5 microns)
Concentricity	0.0002" (5 microns) with Honed Guides
Surface finish	<0.6 Raμmm

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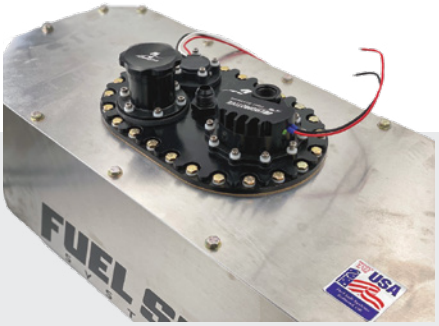

AEROMOTIVE

aeromotiveinc.com

This fuel cell plate features a bolt pattern that will fit most fuel cells with a 6- by 10-inch outlet plate, and the unique design allows for local or remote filling without purchasing an additional full neck. Two different plate configurations allow for pump options to suit most fuel flow requirements. Return line port fittings and nut ring and gasket are included.

Contact: 913-647-7300

ARP

arp-bolts.com

ARP has expanded its line of wheel studs with a 1/2–20 thread and an underhead length of 1.950 inches. They are manufactured from 8740 chromoly steel and heat-treated to a tensile strength of 190,000 psi, and cadmium plated for extra durability. Threads are rolled to provide up to 10 times better fatigue life.

Contact: 805-339-2200

COMP CAMS

compcams.com

COMP Cams offers three new camshafts for Ford's 7.3-liter Godzilla V8. Each cam features different characteristics to maximize performance. Two of the cams are "no springs required" (NSR), meaning they will work with the stock valve springs.

Contact: 800-999-0853

DEATSCHWERKS

deatschwerks.com

The VB40aX1 and VB40aX2, Single and Dual Pump Voltage Boosters are compatible with in-tank, in-line, brushed, and brushless fuel pumps. They feature an adjustable ramp rate to avoid fuel pressure spike, are endurance tested to 40 amps RMS, are compatible with DW brushless controllers, and have a 6160 T6 aluminum case with integrated finned heat sinks.

Contact: 405-217-0701

DESIGN ENGINEERING, INC.

designengineering.com

DEI's line of exhaust and pipe wraps are designed to contain heat inside of the headers to assist with increasing exhaust velocity. Wrapping headers helps reduce underhood temperatures, protecting components while increasing performance. The wraps are offered in three categories: glass fiber exhaust wraps, titanium exhaust wraps, and EXO Series exhaust and pipe wraps.

Contact: 800-264-9472

HOSTILE INDUSTRIES

steeringbuddy.com

Owning a Steering Buddy is like having an extra crew member. It allows racers to effortlessly steer their cars around the pits, in and out of the trailer, and around the shop. It bolts on to where the steering wheel attaches and is operated via a handheld controller or an Apple/Android-based app. Two versions are offered—one for dirt and one for pavement.

Contact: 256-624-0645


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HOOSIER RACING TIRE

hoosiertire.com

Hoosier offers new rear drive tires for sprint car dirt racing. They feature an updated symmetrical tread pattern design and profile, allowing competitors to rotate tires to extend use and longevity. Along with the new designs, further consolidation of offerings will be implemented across various platforms of winged and non-winged sprint car racing.

Contact: 574-784-3152

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MAHLE MOTORSPORT

mahlemotorsports.com

MAHLE Motorsport offers a Ford 5.0L Modular Coyote PowerPak piston set for 2018+ engines. This set is designed to lower the compression ratio to 10.4 to 1 to allow for power adders for those who want to build a high-horsepower Coyote. Pistons are dual coated with phosphate and GRAFAL coating for reduced drag and wear.

Contact: 888-255-1942

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JERRY BICKEL RACE CARS

jerrybickel.com

Universal race car push bar kits make pushing a vehicle around the pits easy. It comes with all of the necessary hardware and includes telescopic push bar for easy storage. It bolts on, so no welding is required.

Contact: 636-356-4727

LINCOLN ELECTRIC

lincolnelectric.com

The POWER MIG 211i welder is a 200-amp machine for MIG, flux-cored, and spool gun welding. The seven-segment display and basic knob controls enable the user to start welding quickly in a three-step process. The machine automatically provides the optimal voltage and wire feed speed settings.

Contact: 888-935-3877

PROFORM PARTS

proformparts.com

MOPAR emblem rocker arm offerings from PROFORM Parts are expanding to include both 1.6 ratio (LA & B/RB engine families), and 1.7 ratio (B/RB engines). Features include precision-machined rocker arms for consistency and ratio accuracy, black anodized finish, bronze bushings inside each rocker for low friction pivot point, internal oiling system, and more.

Contact: 586-774-2500

WILWOOD

wilwood.com

The Mopar four-bolt tandem master cylinder with a flange matches the B-body, the A-body, and the E-body. These Mopar-specific master cylinders are offered in 15/16-inch, 1 inch, or 1 1/8-inch bore sizes compatible with manual and power, drum or disc brakes. They are available with either a chrome powder coat or black E-coat finish.

Contact: 805-388-1188

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AD INDEX

SOCIAL STATUS

A closer look at how racing and performance industry members can increase engagement on Instagram, Facebook, TikTok, and more.

It's commonly acknowledged that social media provides myriad benefits in marketing one's business. It's a way to build brand awareness, promote products and services, increase customer engagement, reach a larger audience, and more, all at little to no cost.

Because of its growing influence on today's professional environment, it's worthwhile to examine some of the major social media platforms and why businesses should consider creating accounts (if they haven't already) or looking deeper into the various possibilities each one offers. The options just continue to expand.

Facebook: As one of the original social media platforms, Facebook has the largest number of active users (about 2.9 billion), making it essential for businesses to have a presence and utilize it as a marketing tool.

With a mild marketing budget, users can boost posts or create paid campaigns to target audiences and reach even more people. Facebook gives companies the potential to reach millions of people at a minimal or no cost.

YouTube: Did you know that YouTube is the second largest search engine after Google? Additionally, YouTube also has more than 2 billion active users, and it can be used to showcase products, provide tech tips, highlight an area of expertise, and more. YouTube can be used similarly to Google in regard to search engine optimization (SEO), and once a channel grows, monetization is possible through various avenues.

YouTube used to be primarily for longer form videos, but with the popularity of TikTok, Instagram, and Facebook Reels, YouTube has since hopped on board to compete with them, creating Shorts geared toward short-form video.

LinkedIn: This platform is typically a place where companies can get down to business by posting job openings, relevant updates about the industry, educational data, and technical product information, along with entertaining content.

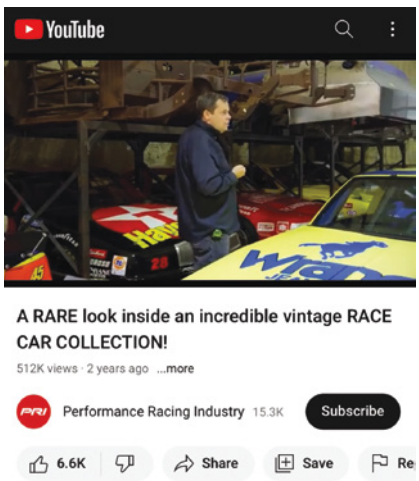
LinkedIn is one of the go-to platforms for job searches, so having a presence there can bring in qualified and genuine applicants and improve company credibility in the workforce. Additionally, businesses can seek out potential candidates and engage with top talent in their industry. This network is full of business-minded people looking to connect with other forward-thinking professionals.

TikTok: This short-form video platform may not seem like a powerful marketing tool. However, TikTok has grown exponentially in the past few years and is a great way to connect with a younger demographic. Plus, TikTok has one of the highest engagement rates, which means users are very active on this platform.

Although TikTok has expanded its offerings to allow longer videos, short, eye-grabbing videos are ideal, as its younger viewers tend to have shorter attention spans.

Instagram: What started as a photo sharing app has emerged to favor short-form videos, similar to TikTok, with its Reels function. Instagram is a favorite among social media users because of its simple nature; and these days, it's almost expected for businesses to be on Instagram. One of the first places people go when looking for more information on a company is Instagram. Like Facebook, there are many ways to put content on Instagram, including the main feed, Reels, and Stories.

Plus, Instagram offers its Shop feature, where users can buy directly through the platform by clicking on the product in the posted image, which brings the customer to that exact product on a company's website. This makes shopping easy, and can lead to increased sales and more website traffic, among other benefits. PRI



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