VOLUME 37, NUMBER 1 JANUARY 2022

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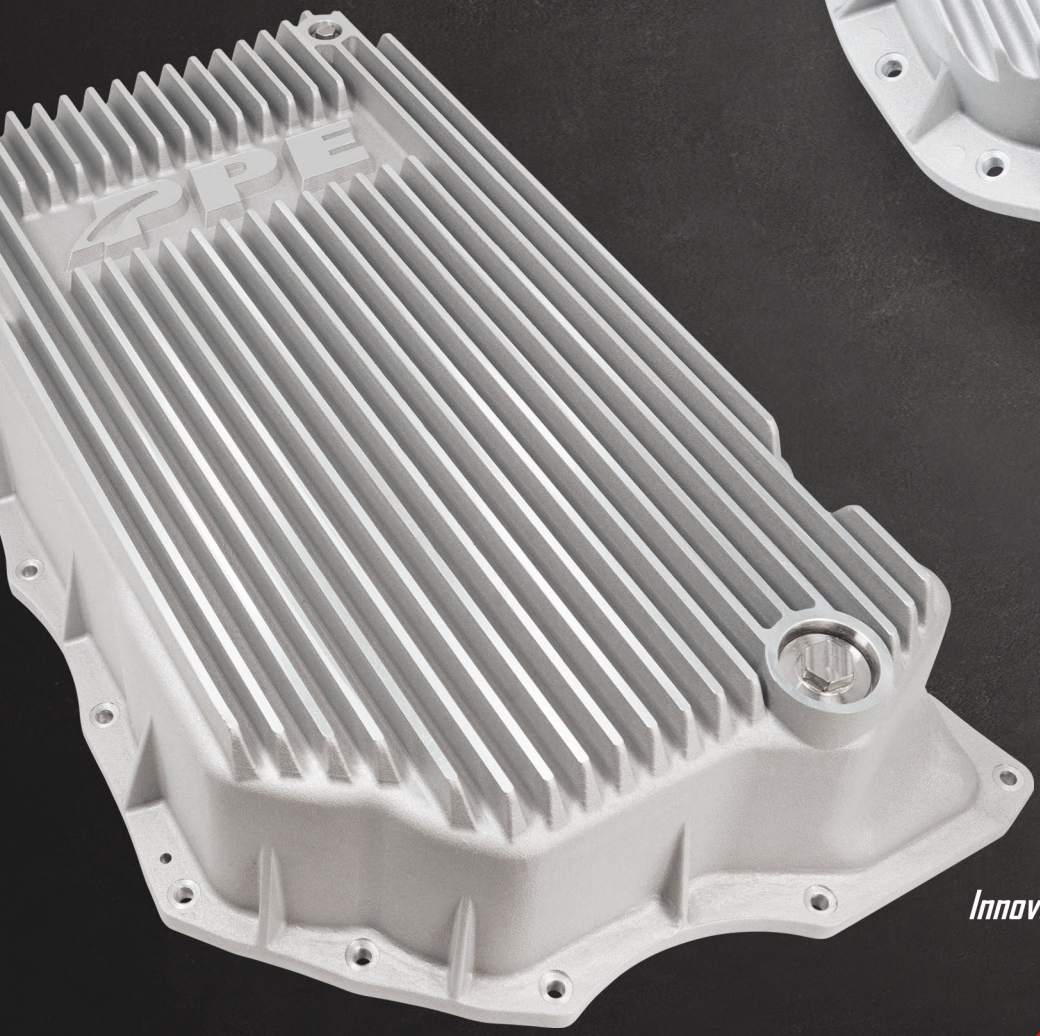

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CONTENTS

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CONTENTS

JANUARY 2022 | VOLUME 37, NUMBER 1

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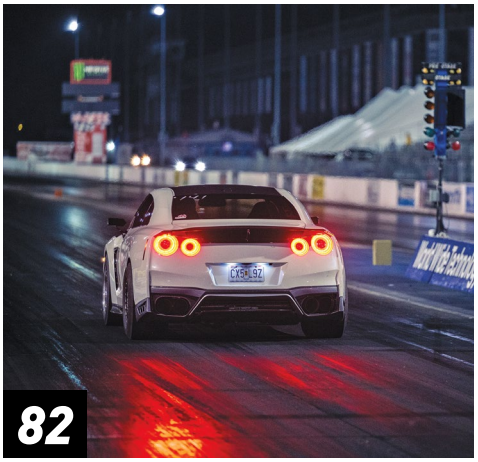
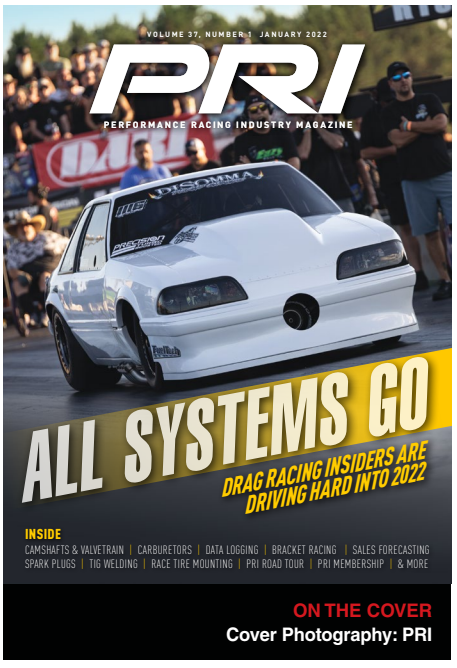


FEATURES

DRAG RACING COVERAGE

PRI MEMBERSHIP

DEPARTMENTS



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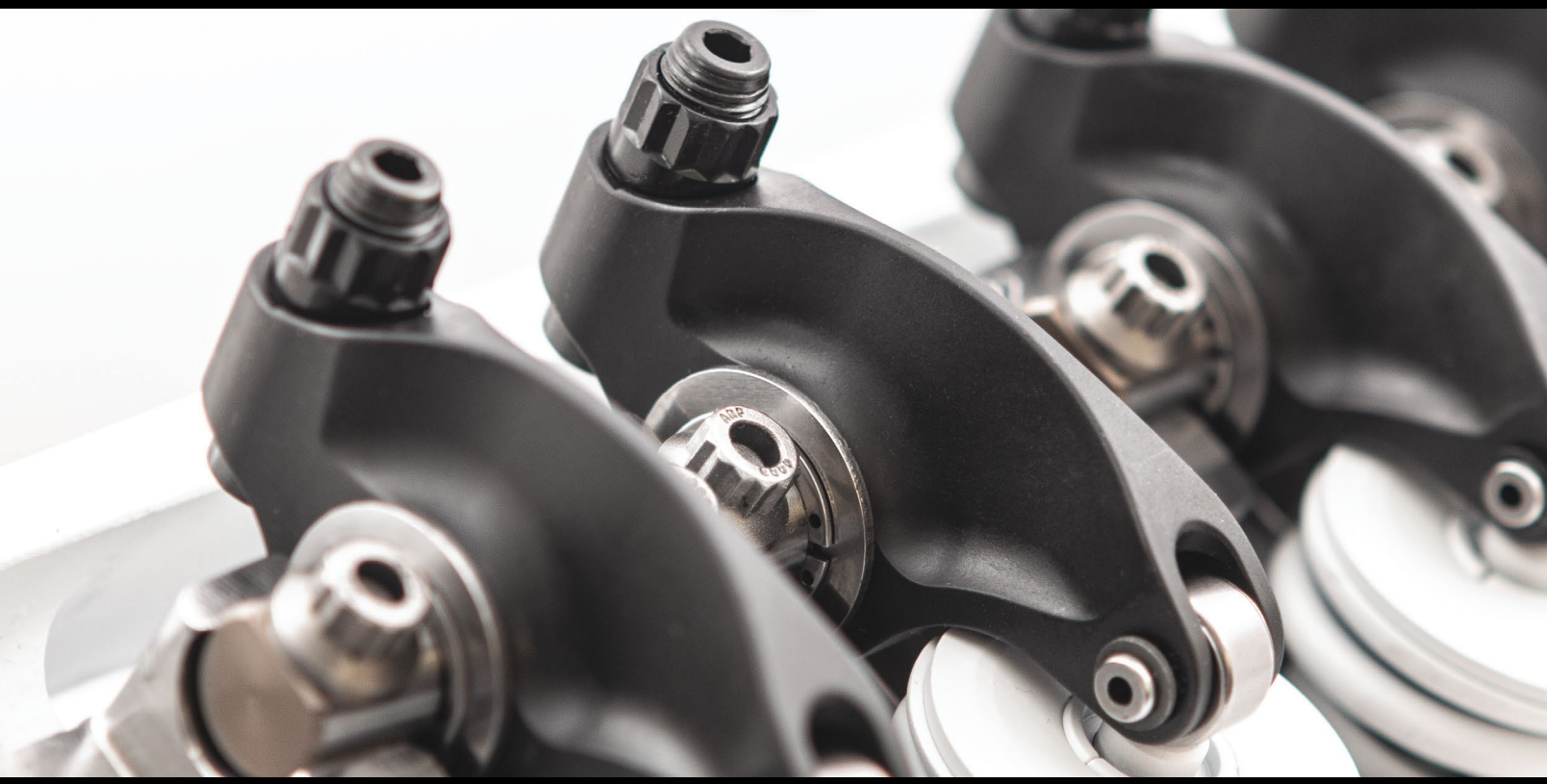

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FROM THE PRESIDENT

DR. JAMIE MEYER
jamiem@performanceracing.com

WHAT A SHOW!

Thank you. Thank you for making the 2021 PRI Trade Show the most memorable of our 33-year run. We are still adding up the numbers, but by all measures this year's PRI Show will go down as a smashing success. Racing experts from around the world converged on Indianapolis this past December to do what we have been doing for four decades. We are the business of racing!

Thanks to a resilient PRI Show team and the pure momentum of the racing industry, the 2021 PRI Show wasn't only a success… it was the largest in-person racing trade show in the past two years. That sounds obvious, but nothing can be taken for granted in the age of COVID. Pandemics be damned, as the racing community doesn't have time for it. We've got cars to build and races to win!

As you can imagine, my schedule was packed for the Show this year, but I tried to sample some of everything at PRI. Congratulations to our exhibitors. The Show was packed with innovation as usual, but this year seemed special. Being able to look at parts in person and ask a human being detailed questions about a part was so refreshing. Our TOPS lounge (a gathering place for track owners and operators, as well as sanctioning bodies) was a huge success. Throughout the pandemic, PRI Ambassadors built 20 state coalitions to help get racing facilities back up and operational. For many of these folks, this PRI Show offered them the first chance to meet in person and plan future endeavors. How exciting! The PRI Educational series was, again, bigger than ever. And PRI Editor Dan Schechner brought the industry's brightest minds to stages all around the Indiana Convention Center to share their knowledge.

Perhaps the most daring element of the 2021 PRI Show was our EV Racing area, which was combined with a Content Creator area. The PRI team evolved the media opportunities at the Show this year and merged this effort with the most compelling innovations in racing—alternative powertrains. Without question, EV racing is here, and we wanted our attendees to have exposure to the biggest/boldest/brightest teams out there. As you know, technological innovations in racing so often make their way into production vehicles and other industries. With PRI on the forefront of sharing this technology, I hope you took advantage of the opportunity to learn from your peers who are doing some amazing things with EV. As for our media guests, they included some of the most diverse news channels we have ever seen. Several independent outlets are able to reach millions of race fanatics with a single post on any given social platform. And I must give credit to our PRI Road Tour team, who wrapped up their second year on the road visiting you and your customers. With thousands of miles traveled and hundreds of stops, the Road Tour team racked up over 100 MILLION impressions in 2021—more than two Super Bowls commercials!

Our connection with the city of Indianapolis was on full display this year. Thank you to Roger Penske, Doug Boles, Helio Castroneves, the Indianapolis Motor Speedway (IMS) team, the entire Visit Indy team, Mayor Joe Hogsett, Governor Eric Holcomb, and all the residents who opened their doors (most notably hotels and restaurants) to our community. In case you missed it, at the PRI Show we announced a new Indianapolis headquarters for the PRI organization. This location is at the very heart of the racing industry and within easy walking distance to IMS. I will be back with more on this purchase and how PRI in Indy will be the centerpiece of a completely new direction for PRI.

As you have certainly read in these pages and saw at the December Show, PRI is expanding our reach from trade show and media company to a strong industry membership and advocacy organization. Throughout the Show, PRI Membership opportunities were everywhere. And our first-ever "Save Our Race Cars Rally" was a huge success in driving involvement with the PRI Membership, as well as driving donations to the new PRI PAC (a 501C4 organization incorporated in Indiana).

The challenges of 2020–21 have made all of us stronger, and we are now stronger as an industry. I want to wish you and your family the very best for the 2022 racing season, and I will see you at a race track nearby. Thank you. PRI

"THE PRI TEAM EVOLVED THE MEDIA OPPORTUNITIES AT THE SHOW THIS YEAR AND COMBINED THIS EFFORT WITH THE MOST COMPELLING INNOVATIONS IN RACING—ALTERNATIVE POWERTRAINS."

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Here's to all the racing successes throughout 2021 and that 2022 brings many more! Congratulations to everyone for your efforts this past year! MAHLE is here to support you with only the best products available! GREAT WORK!

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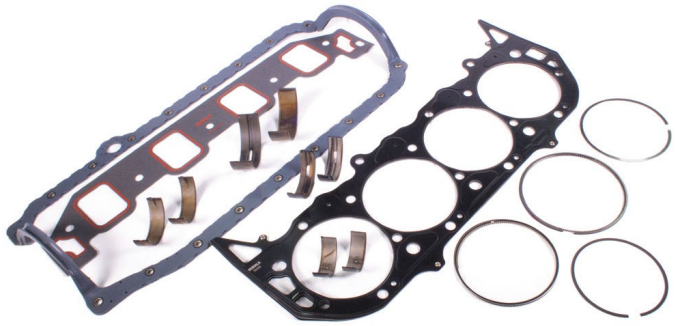

MAHLE

FROM THE EDITOR

DAN SCHECHNER
dans@performanceracing.com

Three things I think as we break in a new year (following proper break-in procedures, of course):

1) I THINK THE MOMENTUM FROM last month's PRI Trade Show is going to propel this industry into a period like no other. Since early 2020, every racing business and operation—no matter how large or small—spanning all form and level of motorsports, has dealt with unique challenges and unanticipated speed bumps along the way. And while we're not out of the woods yet (i.e., stubborn labor shortages, supply chain backups, etc.), there's still good reason for optimism throughout the performance marketplace. As noted above, nearly 1,000 premier manufacturers and service providers recently showcased their latest go-fast parts before tens of thousands of buyers and media in a way that shouted, "We're back!" while transforming the Indiana Convention Center and Lucas Oil Stadium once again into the mecca of motorsports. It was an astonishing display, and if I were a wagering man I'd put my last Andrew Jackson on the prospect that PRI 2022 will be yet another Show for the ages.

2) I THINK YOUR MOTORSPORTS business stands to benefit tremendously from the industry-focused coverage we've got planned throughout *PRI Magazine* and across our digital properties in 2022. Popular columns like *Ask the Experts*, *Stop Doing That…Do This Instead*, and *Make the Case* are back with leading subject-matter specialists on hand to answer questions, offer guidance, and present compelling arguments on both sides of a hot-button topic to help business owners advance their operations and make well-informed decisions on how to best serve customers and grow their market share. Returning, too, are our award-winning feature articles on the racing segments, parts, equipment, and issues that matter most to motorsports professionals…. What you've come to expect in these pages. But we'll also be rolling out a slew of fresh-for-'22 content in the coming months as well, including exclusive data and in-depth reporting from PRI's market research team, expanded top product and service picks, troubleshooting and technical articles from the deepest bench of expert sources in the game, behind-the-scenes dispatches from this year's edition of the iconic PRI Road Tour, previews of new PRI Trade Show features and exhibitor specials, and much more.

3) SPEAKING OF WHAT'S NEW, I THINK you're really going to enjoy reviewing each month's Membership section of *PRI Magazine*, where we'll share the important work of our dedicated advocacy teams based in Washington, DC, and across the nation; provide useful tech tips and education from our industry-leading partners; and check in with PRI Members on the projects and initiatives they're hard at work on, including exclusive updates from their factories, shops, and showrooms, how they're embracing new opportunities, their outlook for the near- and long-term, and much more. To set the stage, our January Membership coverage begins on page 122 with a visit to newly minted Antron Brown Motorsports and its do-everything namesake, who this year looks to add a fourth NHRA Top Fuel crown to an already overcrowded trophy case. Hmmm, if I were a wagering man I'd say…. Anyway, be sure to keep an eye on this space for the latest on all things PRI Membership.

Here's to a prolific and prosperous 2022 racing season! PRI

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Michael Bartholomew, Kevin DiOssi, Richard Dole, Driveline Studios, Del Holbrook, IMSA, Michael L. Levitt, Chris Simmons

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MEMBER

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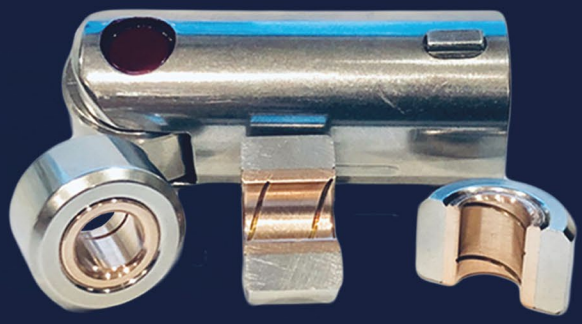

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Anyone who's ever been to a Duck X Productions race knows they're an event like no other. And the recent Magic 8 Shootout on opening night of No Mercy 12 at South Georgia Motorsports Park in Valdosta, Georgia, was no exception. With its latest edition sponsored by PRI, the Shootout pits the top eight qualifiers in each of Duck X's Radials vs. the World, Limited Drag Radial, Pro 275, and X275 classes. And the competition didn't disappoint. Pictured here is the Procharger-equipped-by-Proline Racing '69 Camaro of Ken Quartuccio, which bested the field in Pro 275 with a 3.83 pass at 193.54 mph. For more on the last leg of PRI's iconic Road Tour–Version 2.0, see our coverage beginning on page 42.


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ASK THE EXPERTS

SPARK PLUGS

Conditions particular to high-performance engines, and how to spot them on a spark plug, often aren't included on manufacturers' websites. Fortunately, our sources have the answers on how to read and when to pull your plugs.

By Drew Hardin

Anyone who has learned automotive fundamentals knows what a spark plug does. A savvy racer or engine builder also understands what a spark plug can do as an effective, if low-tech, diagnostic tool.

"Looking at a spark plug indicates what's going on in the engine," explained Don Ward of E3 Spark Plugs, Ponte Vedra, Florida. "It will tell if the engine is burning oil, if the plug is too hot, or if the plug is too cold."

Problems with the air/fuel ratio, ignition timing, detonation and "other various ways to get into trouble" can also be seen on the spark plug, said Jeff Boehler of Autolite, Rochester Hills, Michigan. Diagnosing those conditions means knowing what to look for when reading the plugs. It also requires proper prep before pulling them.

"Racers are trying to achieve the most horsepower, so they should read the plugs with the engine at full power," Boehler said. "Start with a fresh set of plugs and go out and do a wide-open-throttle run, not a run with different driving cycles."

"People try to read a set of spark plugs after they've been idled on, and that makes the spark plugs look smoky. It's hard to tell what's wrong," Ward said. His advice: Shut off the engine while it's at the top of the rpm range—just after the finish at a drag strip or going into turn 3 on an oval track—coast back to the pits without starting the engine again, and then pull the plugs and read them.

READING FOR RACERS

Tech tips about reading spark plugs are a staple on plug manufacturers' websites, but most of those are directed at street-driven vehicles, Boehler said. They show problems "related to long-term, over-the-road applications. They're not geared for racers." Both he and Ward discussed conditions particular to high-performance engines and how to spot them on a spark plug.

"Look at the insulator part of the plug for fuel, and look at the ground wire part for timing," Ward said. "Where the insulator tip—the white part sticking out of the shell—goes down and starts to get fatter, there's a radius where a light gray ring will be visible. That's the fuel ring. The lighter it is, the less fuel there is. It should be about a pencil thick. The bigger that line is, the fatter the motor is. If it goes down into the bottom where it seats around the shell, then it's way too fat." If the fuel ring "looks oily and grimy, there's oil in the cylinder."

The spark plug's ceramic or porcelain tip "will be white or very slightly off-white if the fuel is right and the heat range is right," Boehler said. "If there are black specs on it, there may be detonation or pinging going on that's knocking some carbon loose off the pistons."

The tip of the side electrode is the spark plug's hottest point, Boehler said. That heat will discolor the side strap. "See how much discoloration there is from the free end and how far the discoloration travels along the side wire. Most racers want to

Spark plugs provide clues to various engine conditions, noted our source from E3 Spark Plugs. Shown, from left, are cases where a plug has been idled on for an extended period of time; oil is present in the cylinder; the fuel mixture is a little fat; the plug is too cold for the engine; and the engine is lean.

Here you can see the light color ash burn profile coming down the leg of the ground electrode, i.e., discoloration on the ground strap electrode indicating it has been driven on. "It's not a clean cut," said our source at E3 Spark Plugs. "I could not read this plug."

"RACERS ARE TRYING TO ACHIEVE THE MOST HORSEPOWER, SO THEY SHOULD READ THE PLUGS WITH THE ENGINE AT FULL POWER."

have that discoloration line stop about halfway back. That way they know the side wire is getting hot enough, but not too hot, meaning the engine's making good power."

The shade of the discoloration isn't important, Ward said, unless it's red. "Heat dulls the plating, so it will be a bluish green color most of the time. When it starts turning red, that means there's a lot of heat in the ground strap." Taking timing out of the engine will reduce that heat. If it isn't remedied, "it's going to burn up a piston."

CHANGING PLUGS

When asked about how often spark plugs should be changed, Boehler noted that "spark plugs are relatively cheap compared to the rest of the engine. Probably the best approach is to put fresh ones in at every big race event."

"For an oval track racer, after a couple hundred miles on a set of plugs the sharp edges of the electrodes will start to round off," Ward said. When that happens "the required voltage is going to increase, and the spark starts to degrade."

Drag racing is different, he noted, due to the on/off nature of the engine's cycles. "When the motor heats up and cools off repeatedly it anneals the ground electrode, which makes the metal brittle, especially where it's stressed in the bend. That makes it easier for the ground strap to break off. For that kind of racing, they should inspect the plugs every four to five races at least, and replace the plugs as needed."

Unless it's a Top Fuel car, Boehler said. "With nitromethane, they usually never run a plug more than one run. The spark plugs are being pounded so hard, with all the detonation and crazy combustion going on with that fuel, that a fair number of them fall apart in the run." PRI

SOURCES

Autolite
autolite.com

E3 Spark Plugs
e3sparkplugs.com

STOP DOING THAT...DO THIS INSTEAD

MOUNTING RACE TIRES

This essential yet often overlooked component to race preparation is easy enough to master when following the correct procedures.

By Jim Donnelly

It's hot. It's late. And the hauler isn't even fully loaded yet to head for the track. Part of the hurry-up, to-do list may involve racking some fresh rubber for the night. Like everything else, it has to be done quick.

Right there, stop, because that kind of thinking is asking for trouble. A lack of proper focus, or the right procedures, when mounting race tires can damage the tires, the wheels and, potentially, a lot more than that. This essential, but sometimes overlooked, element of race preparation is quite easy to get right when following the correct practices. Ideally, they need to start before reaching for a tire.

The wheel is no less critical than the tire when it comes to proper mounting practices. First, make sure that the wheel is fit for competition in the first place. Any racing wheel is subject to loading and impacts that can lead to damage. Damage can also result from incorrect mounting practices. John Harris, trackside service manager at Appalachian Race Tire in Maryville, Tennessee, said his crews see bead damage and scarring on wheels, especially those sent to non-trackside shops without the right experience. He stressed that wheels should always be inspected for cracks and other damage, with wheel weights removed and rubber marbles scraped away, making sure no debris is stuck in the barrel. Any such excess can inhibit the mounting equipment from properly gripping the rim, and possibly damage the tire's bead or sidewall.

Harris advised that tire mounting should become a regularly practiced team discipline. It can take time for the manufacturer's crew to handle mounting at the track on a race night. To compensate, Harris recommends racers invest in second and even third sets of wheels, to create a "Race, Spare, In-Service" cadence. Tires should be dismounted on a regular schedule

so the wheel's bead surfaces can be cleaned—using Scotch-Brite pads and brake cleaner, Harris suggested—of dried mounting lube and corrosion. A less-than-clean wheel can also be difficult to balance properly because weights may shift.

Racing tires require a gentle hand when mounting, because they're generally softer and gummier than street rubber. Mike Crutchfield of Phoenix Race Tires in Chattanooga, Tennessee, said demounting any race tires requires care, and plenty of soapy water, to prevent damage. That's because the wheels usually have a deep drop center and safety lock or hump to negotiate. "The difference in the physical size compared to street tire/wheel combos makes for a more challenging process when trying to use a standard tire machine."

Too much lubrication, like most things done to excess, can pose its own problems when tires are being mounted. Toyo Tire USA Corp. of Cypress, California, completed a performance test of four tire brands, including its own, after mounting and balancing them using a Hunter GSP9700 machine. The tires were mounted on OEM steel or aftermarket chrome wheels using a paste lubricant on the bead and seating area. By indexing the valve stems to the rims, Toyo confirmed that excess lube caused the tire to slip on the wheel, by 3 inches in one case.

Harris said that Appalachian Race Tire uses a very limited amount of lubricant, either Magnum Super Lube or Tip Top

Racing tires require a gentle hand when mounting, because they're generally softer and gummier than street rubber, according to our sources.

Experts stress the importance of following manufacturer guidelines for mounting, even in seemingly obvious cases like directional tires.

"A LACK OF PROPER FOCUS, OR THE RIGHT PROCEDURES, WHEN MOUNTING RACE TIRES CAN DAMAGE THE TIRES, THE WHEELS AND, POTENTIALLY, A LOT MORE THAN THAT."

Paste, and mounts tires dry if it's within manufacturer specification.

Crutchfield said the lubricant should be applied only to the wheel's bead sole, using a sponge, while keeping the bead lock area and outer rim dry.

Both Crutchfield and Harris repeatedly stressed the importance of following manufacturer guidelines for mounting, even in seemingly obvious cases like directional tires. Crutchfield said he's seen drag racing competitors neglect to install tubes, against factory guidance to use the tire with drag-approved tubes only. Another problem is installing the tube upside down by putting the valve stem in the wrong location. That can cause the tire to appear deformed, with lumps and soft spots across both the sidewall and tread.

Proper inflation practices are crucial. Harris said Appalachian recommends that tires be inflated only with compressed air that has been passed through a desiccant-based drying system or, better yet, compressed nitrogen, to best reduce humidity inside the tire. That moisture can lead to inconsistent or spiking pressure levels inside the tires, where internal temperatures can surpass that of boiling water under race conditions. A source at Toyo Tires said low-profile tires intended for alloy wheels may require higher mounting pressures because of tighter bead-seat tolerances. If more than 40 PSI is required, Toyo recommends dismounting the tire, re-lubricating and repeating the process.

In Harris's view, standard balancing and indexing procedures are sufficient for racing vehicles on purpose-built circuits. Eccentricity associated with radial force variation (RFV) generally isn't sufficiently pronounced to justify specific measurement or corrective adjustments. PRI

SOURCES

Appalachian Race Tire
racetire.com

Phoenix Race Tires
cokertire.com

Toyo Tire USA Corp.
toyotires.com

MAKE THE CASE

WEBSITES VS. SOCIAL MEDIA

Establishing an online presence is practically obligatory for small businesses today, but where are those efforts—and investment—best utilized for companies in the racing industry? Websites and social media pages fundamentally serve two different functions, and while having both is probably the best solution, some may find that the benefits of focusing on one or the other ultimately suits their needs.

By Bradley Iger

WEBSITES ADVOCATE:
Jason Dodge,
Black Truck Media

With a brand website, you have the ability to completely control the content and the messaging. You get to decide how your brand is presented to the world.

Social media is more of a two-way street. It's a vehicle to engage with your audience members, whereas your website is more about generating awareness for your products and services. It's where you explain why I should do business with you. That's not really the type of platform that social media should be.

There is also a number of things that a website can provide that social media cannot. Your company's presence in Google searches, for example, can be incredibly valuable. And then there's e-commerce. Having a catalog of products and all the information in one place means your customers don't have to sift through social media posts to find what they're looking for. You can also integrate e-commerce software like Shopify or Magenta into it, which can in turn be synced up to social platforms like Facebook and Instagram. That presents an opportunity for potential customers to discover your brand through those channels as well.

"HAVING A CATALOG OF PRODUCTS AND ALL THE INFORMATION IN ONE PLACE MEANS THAT YOUR CUSTOMERS DON'T HAVE TO SIFT THROUGH YOUR SOCIAL MEDIA POSTS TO FIND WHATEVER IT IS THAT THEY'RE LOOKING FOR.

As we saw in early October, social media platforms can be susceptible to outages. If that's the only place where your company has a presence, you might be dead in the water until those services are restored. So from a brand perspective, you have to ask yourself if it's a good idea to put all of your eggs in one basket. It's also important to be aware of the fact that there's been a push in the tech world to do away with third-party cookies. If and when that happens, what's really going to be important regardless of platform is your customer data, and the most effective way to collect that data is through your website.

Some brands might look at how much revenue they're generating from social media platforms like Facebook and wonder if it's worth putting the effort into their website. It's like that old adage, "The grass isn't greener on the other side—it's greener where you water it." What if you started to focus some attention on search engine optimization, or your email marketing and customer data capture? Maybe the grass will start to grow there a bit more, too. What you tend to find is that those customers are even more engaged with your brand and will potentially buy more, so the lifetime value of that customer becomes much greater.

Lastly, there's perception to consider. If you are, for instance, a local chassis manufacturer that services sprint and circle track racing, you're able to own your voice. Websites have become the new business card. They legitimize the business in the eyes of potential customers. Even a small, low-cost site can make a big difference in that respect.

SOCIAL MEDIA ADVOCATE:
Corey Perlman, Impact Social Media

"YOU SHOULD BE AS PROUD OF YOUR SOCIAL MEDIA PROFILES AS YOU ARE OF YOUR PRODUCTS."

Facebook and Instagram are two of the most popular websites in the world in part because they're addictive. So if you're thinking about ways to stay top-of-mind with customers and prospects, you have to consider whether they want to go to your website, or if they want to see what your company is doing through social media. The whole idea here is to meet them where they want to be, and many people are already checking these platforms a dozen times a day or more.

Not only do you have a feed aggregator automatically delivering content that's relevant to them, you also have mobile apps and other built-in services that allow them to have constant access to these platforms in a variety of different ways. What are the chances that I'm just going to pull out my phone and bring up your website unless I'm specifically looking for something? Just based on common habits, it's far more likely that I'm going to connect with your company through social media than through your website.

But it's also something that you need to take seriously if you want to do it right. You should be as proud of your social media profiles as you are of your products. How your business presents itself though social media should impress me.

In some ways social media platforms like Instagram have become even more visually appealing than websites are. Between posts, videos, images, stories and reels, I can see a full narrative story about a business. A website tends to be more one-way communication, and that doesn't provide a customer with a lot of incentive to keep coming back to have a look around, whereas a constant flow of new content is the name of the game with social media. That provides a lot of different opportunities to expand on that narrative to humanize the brand by showing us things behind the scenes or illustrating what your business's culture is all about.

I also think that there's now more opportunity for a small business to have an effective social media ad campaign than ever before. Targeting customers based on things like interests, geography and demographics is very difficult to do with traditional advertising, but that can be done in a really effective and economical way on these social media platforms. We have seen really good results for small businesses that have sponsored ad budgets of $200 to $500 a month.

It's something I highly encourage companies to start doing if they're not already using sponsored ads. It's very hard to use Facebook, Instagram, and other social media platforms as marketing tools without an ad budget. Organically building an audience is a lot tougher today than it used to be.

I'm also a big believer in prioritizing specific platforms rather than trying to maintain a bunch of different profiles. For this industry, I definitely think Facebook and Instagram are the best bets. Instagram is dominated by 25- to 35-year-olds, and Facebook caters to the 35-and-above crowd. Platforms like TikTok might also make sense for this industry, but I would be very careful about going into that arena without a clear strategy. It's a very young demographic, and you need to have someone who understands the etiquette doing the marketing if you want it to be effective. PRI

EDITORS' CHOICE

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

CARBON PTR INTAKE MANIFOLD

PERFORMANCE DESIGN

performancedesign.com

The new Carbon pTR intake manifold from Performance Design in Auburn Hills, Michigan, not only dresses up the engine bay with its high-strength carbon-fiber construction, but it also offers tunable velocity stacks.

The intake is available for LS3, LS7 and select cathedral-port applications in the LS family. Performance features include 16 nitrous-nozzle bosses, two MAP sensor locations and NPT ports for accessories such as a purge solenoid or brake booster. It's designed to run a choice of three different injector lengths, and the manifold can be installed with the throttle body facing forward or rearward.

For optimum tuning flexibility, the intake runner length can be changed. The manifold comes with 9.0-inch runners, which are close to stock. But 8.0- and 6.5-inch runners can easily be swapped in.

"If someone is looking to increase the peak power rpm, such as drag racing applications, the short runner will tune well with an engine that is designed to turn and tune at higher rpm," said Caleb Newman. "The long runner gives a great balance of torque and power for most applications."

The intake base is constructed of glass-reinforced nylon, making for a 10-pound weight savings with the carbon-fiber plenum. The composite materials also reduce heat soak to the fresh-air charge. *—Mike Magda*

FT200 KIT

FLAGTRONICS

flagtronics.com

The FT200 is the in-car component of a dedicated race track safety system from Flagtronics of Mechanicsville, Virginia. This receiver gathers messages and race track conditions sent out by race officials for instant response by the driver.

"It's part of a whole system that also incorporates the race track, corner workers and directors," explained Aleric Sanders. "The in-car unit will change from green to yellow when they enter that zone. There's also a sign board in that area that will change from green to yellow."

The FT200 will be required in all cars racing the Champ Car Endurance Series in 2022, and other sanctioning bodies are looking at the system.

"It's certainly most effective when all the drivers have it," noted Sanders. "Crew chiefs could be yelling 'green, green, green' in their headsets when in reality there's still a yellow out. This brings the same communication to all the drivers at the same time."

The system could also be used to send messages directly to a single driver. "We can individually message cars from race control," said Sanders. This would be effective if, for example, race officials want to black flag a car, but the driver misses notices on the track.

Other parts of the system include remotes for the corner workers and electronic sign boards. The system can be custom tailored to suit any size or configuration of track. *—Mike Magda*

SYNTHETIC RACING POWER STEERING FLUID

CHAMPION OIL

championbrands.com

A full synthetic power-steering fluid (PSF) designed for racing competition is now available from Champion Oil of Clinton, Missouri.

"This fluid reduces temperatures and delivers consistent steering response in competition applications," said Karl Dedolph. "It has exceptional low-temperature flow to reduce initial drag on the power steering pump."

With a 230 viscosity index, which is higher than conventional power-steering fluids, the Champion PSF offers anti-wear properties that can help protect critical components of a racing system.

"It keeps performance vehicles in circle track, road racing, off-road, asphalt, drifting and autocross working optimally," said Dedolph.

The formula features anti-foam agents to prevent pump cavitation and anti-oxidant properties to help stop sludge buildup.

"It's a full synthetic fluid that provides improved thermal stability for less pressure drop as the temperature rises," said Dedolph. "It also offers high-temperature foam resistance for better cooling and improved steering precision."

In addition to using its full synthetic PSF, Champion Oil recommends frequent inspections of the fluid in the system for color changes. A dark fluid signals time for a change. Also look for dirt, debris or sludge in the system, a sign the system may need to be flushed. *—Mike Magda*

GODZILLA H-BEAM CONNECTING ROD

K1 TECHNOLOGIES

k1technologies.com

Ford's 7.3-liter Godzilla engine is a definite candidate for a performance swap, so it won't be long before racers are modifying the engine for competition purposes. K1 Technologies in Mentor, Ohio, has developed an H-beam connecting rod constructed from 4340 chromoly steel to handle those higher stress loads.

"The stock rods in most V8s are able to handle upwards of 450 horsepower and 6,000 rpm," noted Matt Polena. "Past that, reliability begins to decline. As we see more builds hit the drag strip, the need to replace the factory connecting rods will become apparent."

The K1 forging offers improved strength through better-aligned grain flow. The forging is shot-peened following machining to reduce potential stress risers. Rod length is 6.319 inches center to center. The H-beam design is also a critical factor in improving strength.

"From the factory, the Godzilla comes with powdered-metal, cracked-cap connecting rods that will hold up to a mild increase in power," explained Polena. "The K1 rod uses a 4340 material that's higher quality than OEM. Plus, these rods also feature ARP 2000-series bolts, which is a large benefit over the factory bolts."

The ARP bolts are nominally rated at 220,000 psi tensile strength. *—Mike Magda*

COUNTERSINK DEBURRING TOOL

SHAVIV USA

vargus.com/shaviv

"It's one of those tools that people ask for only after they realize they need it," said Nick Prohl, referring to the Shaviv countersink deburring tool (PN 90072).

The tool features the Mango II ratcheting handle and the F20-style blade.

"Sometimes a shop needs a tool that can do multiple holes very quickly," noted Prohl. "Traditionally, countersinks used for deburring are turned with just hand power. With this tool, we use a ratcheting mechanism to take the torque out of the hand. It's a lot easier with less chatter when it comes to deburring the edges of a hole."

The tool is used for heavy-duty chamfering and countersinking rough hole edges that can be found on engine blocks or other critical components on a race vehicle. It weighs 6.2 ounces and features an ergonomic handle, FR ratcheting blade holder, and a blade that is constructed from high-speed steel. It can be used on ferrous and nonferrous materials, including aluminum, brass, cast iron, copper, hardened steel, stainless steel, and even plastic.

It is one of many Bolingbrook, Illinois-based Shaviv products designed for hand deburring chores.

"These tools can do just about anything as long as there's access to the workspace," said Prohl. *—Mike Magda*

TRAVEL CASE CHARGING SYSTEM

AMERICAN ELECTRONICS INC.

americanelectronicsinc.com

Designed to meet the needs of a busy race promoter serving many tracks, the Travel Case Charging System from American Electronics of Greenwood, Indiana, supports up to 12 radios that can be charged from a single AC outlet.

"This is a product that's important to the facilities that put on the races, especially the modern-day promoter who travels from track to track," said John Stiles.

The heavy-duty case is constructed from diamond-plate aluminum and features individual chargers compatible with the Freedom 16-channel, two-way radios produced by American Electronics.

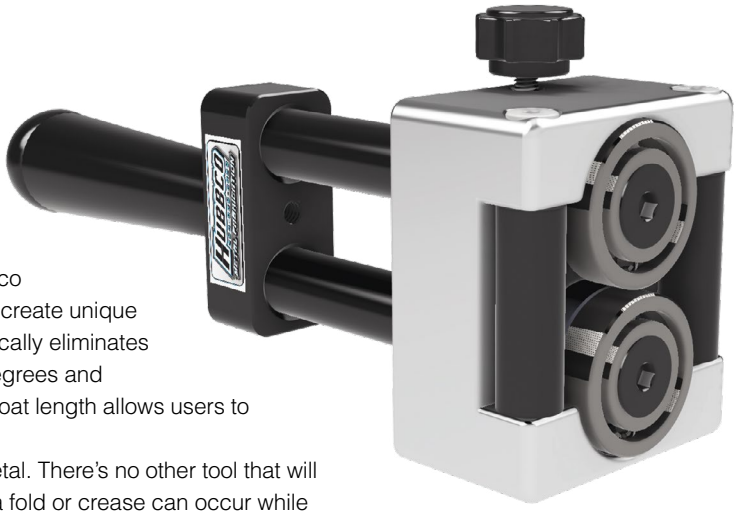
"More than 200 of these cases and radio systems are used by different types of tracks and facilities," noted Stiles. "They can put all their radios in one case, plug it in at the hotel and be ready for a race the next night. It's a piece that's very important for the facilities that put on the races."

Stiles said the system is valuable for even grassroots-style events where a landowner may open his property for an occasional off-road event; however, it is targeted to meet the communication needs of active sanctioning bodies, track promoters and track staffs. *—Mike Magda*

EDGE ROLLER

HUBBCO METAL FABRICATION

hubbcolifts.com



Metal body fabrication is indeed both an art form and a craftsman's skill that few truly master. Working with curves is one of those talents that will separate the experts from the novices.

Helping bridge that gap is the handheld Edge Roller from Hubbco Metal Fabrication in Grandville, Michigan. This tool allows users to create unique 3D profiles on the edge of 18- to 22-gauge sheetmetal, which basically eliminates the need for a sheetmetal brake. It will bend edges from 0 to 90 degrees and features a throat depth from .25-inch to 3 inches. The extended throat length allows users to create multiple profiles on top of existing hems.

"The more profiles there are, the more strength there is in the metal. There's no other tool that will do all this alone without a brake," said Lucas Hubbell, noting that a fold or crease can occur while shaping an arc with traditional methods. "The roller bearings in the tool enable the formation of lines and folds on a curve."

The Edge Roller construction features alloyed steel finished in durable black oxide. Sealed ball bearings provide smooth operation and keep debris out. Finally, the body is machined from 6061 aluminum, and the rollers are anodized to prevent galling and gouging. *—Mike Magda*

NEWLY APPOINTED

KASH SINGH

This veteran Pikes Peak racer has upshifted to the role of Global Ford Performance Enthusiast Marketing Manager, where he will tie together "our past, present and future with our customers."

By Steve Statham

How does one go about stepping into a new position at a global automaker just as the world's economy grinds to a halt? That was Kash Singh's challenge in 2020. He had barely assumed the reigns as Global Ford Performance Enthusiast Marketing Manager before the pandemic put a halt to travel, motorsports events, and car shows of every kind.

Although it has been more than a year since he assumed the role, in many ways 2021 was his debut. The job entails plenty of in-person outreach to die-hard Ford loyalists, the kind of fans who flock to the car shows and track events that were in short supply last year. Among other job duties, he oversees the Ford Performance Racing School program.

Born in Fiji and raised in Southern California during the great sport-compact boom, Singh is a USC graduate. He joined Ford Motor Company in 2004, making several stops along the corporate path to his current position. He is a hands-on enthusiast and has raced at the Pikes Peak International Hill Climb every year since 2011. He's currently running a turbocharged 2017 Mustang GT in the annual mountain classic. We caught up with Singh at Barrett-Jackson Auction Company's auction in Houston, Texas, late last year.

PRI: You were barely on the job before the COVID shutdowns took place. How did you adapt?
Singh: We started off fresh in January when we did the big show at Barrett-Jackson in Scottsdale. I decided to do Autorama in Detroit, and March 12 the rug was pulled out from under us. That's when we went to work-from-home because of what was going on. Obviously, this is a great job with some of the events I get to do now, but then I was sitting there wondering, "What are we going to do now?" There were no group events.

At Ford we had to get creative about how to continue to communicate with our enthusiast customers, but also be cognizant of what was going on with COVID. In the heart of the pandemic, a lot of events did cancel. Other events continued; we had maybe two or three events we participated in. But we were extremely cognizant of COVID, with a lot of procedures in place. We followed the guidance of the local county. We tried to push through. We went a little more digital. We held our first digital car show. Instead of us being at car shows, we held one on our Ford Performance website.

"HOPEFULLY, WE BUILD THE VEHICLES THAT YOUNGER PEOPLE WANT TO BUY AND HAVE THE FEATURES THEY WANT."

KASH SINGH

TITLE:
Global Ford Performance Enthusiast Marketing Manager

ORGANIZATION:
Ford Motor Company

HOMETOWN:
Seattle, Washington

FAST FACT:
Kash Singh was an extra in the original *The Fast and the Furious* movie. Producers found him and his custom wide-body 1995 Honda Accord while recruiting at local car shows. The pay? A whopping $12 per hour plus free gas.

For me personally, I still had an opportunity to meet people at some of the smaller events. I actually spent more time on the road. Since last April, I put close to 45,000 miles on the road, driving. No one else was on the road. I was able to drive to a lot of events for safety reasons. Instead of getting on an airplane, I decided, hey, I'll drive. "Boss, it'd be much safer if I drove a new GT500 to an event." (Laughing)
PRI: How will your past experiences serve you in this new role?
Singh: I think the most important part of it is, I'm an enthusiast. Enthusiasts get influenced so many ways. How did you fall in love with cars? Was it a TV show that got you hooked? Was it a family member? Was it a car you saw on the road? In my case it was a family member. I can thank my cousin. While I was in junior high, he took me to a car show, and there was a candy apple red Lamborghini. Fell in love with the car, had to get the Countach poster on the wall. And then one thing after another. In high school I saved all my money from odd jobs to get my first car. Growing up in LA in the late 1990s and early 2000s, we were more centered around the sport-compact market.

I started building that car and did a lot of car shows. I also made a lot of friends in the industry. So I might be unique in the sense of coming into Ford with that experience in compacts. I know what enthusiasm is. I am an enthusiast. When I show up and speak, it is from the heart. I'm very passionate about this space.
PRI: What are you most looking forward to as things ramp back up?
Singh: More events! Especially with everything that went on in 2020, it's nice that

as we get out safely, we get back to what I consider normal life. I know the term "the new normal" has been thrown out there, but we loved cars before, we love cars now, we will get together in the manner that best suits for that, whether it's racing, at an auction or Mustang gatherings. I'd like to get back out and talk to folks. My job position is, how do I tie together our past, present and future with our enthusiast customers?

PRI: What do you see as the biggest challenges in this job?

Singh: Initially it's to get vehicles back on dealer lots the way we're used to. Then also getting folks back out to events, where they feel safe to get out to events. Once the borders open—we've done a lot of events in the US where a lot of folks from Canada come down, or up from Mexico, or even Europe. Pebble Beach is one of those. We were at Pebble Beach Monterey Car Week. I understand the crowd was great, but still we didn't have a lot of folks from foreign countries coming to visit because they couldn't.

PRI: How do you plan to engage the younger generation?

Singh: It's the younger generation, but also the generation that's adopting electric vehicles. Hopefully, we build the vehicles that younger people want to buy and have the features they want. That's basically cellphone based. That's what the younger generation is used to.

We should also expand the electric side of it. I'm an enthusiast guy—Shelby GT500, Ford Performance Vehicles, Raptor, there's a huge demand for them. But then you look at the Mustang Mach-E. That customer base has demands of that vehicle as well. It might be a little different from the consumer who wants big V8 power, but they're just as enthusiastic, and they love their vehicles. So it's attracting younger, but also this newer demographic that's popping up.

PRI: What have been your most gratifying professional accomplishments?

Singh: I go back as an enthusiast. Take the company, the job aspect out of it. As an enthusiast, planting the seed in someone who wasn't into our lifestyle or sport, whether it's in motorsports, car shows or just car meets. It's seeing the light in their eyes. "Oh my gosh, I'm really interested in what you do now." And then at some point, "It's your fault that I went and bought this fast car." Or, "I bought tickets to this race because you got me into racing."

PRI: Is there anyone in the motorsports industry who inspires you?

Singh: Everybody wants to leave their mark on the world. And I say this without any plug for anybody: Carroll Shelby. At the end of the day, he was a man who was a racer, a team owner. For all the laurels that everyone has talked about, everybody tries to emulate him at some point. You've got folks in the industry now who I think look up to Carroll and see what he did, how he was able to create a car company in his own right. All of us want our name across a car, but to have that kind of impact, Carroll would be one of those folks.

PRI: How did you get started racing at Pikes Peak, and what are the special challenges of building a race car for that venue?

Singh: My progression was the import world, a little drag racing, a little bit of road course, not much. Then I bought a 350Z. In Southern California, a lot of folks were into spirited canyon driving. I got into that aspect of it and liked that. I got hired by Ford after that. I loved the way the '05 Mustang looked and in 2006 purchased an '06 Mustang. Then the GT500 came out, and I saw a white one with blue stripes—America's racing colors. I really fell in love with it and was fortunate to purchase one in '08.

So I'm sitting in San Antonio watching a TV talk show about the Pikes Peak Highway, and I thought, "Oh, it'd be kind of interesting to go race that." On a whim, just thought that. Three years later I'm racing my GT500 at my first race at Pikes Peak.

The challenge of Pikes Peak is the mountain itself. You've got competitors, but the competitors are a brotherhood, a sisterhood. It's all family. Everybody wants to help each other make it to the top of the mountain on race day. Your challenge to yourself is, make it to the top, hopefully with a good time, and get a donut. It's all about that donut at the top. You really have to manage cooling—that is probably the number-one concern for racers up there at high altitude. The density of air is low, and you want to make power, too. And then braking. One-hundred-and-fifty-six turns, twelve-and-a-half miles, you're going to use the brakes quite a bit. PRI

INDUSTRY INSIGHTS

JOHN DOONAN

IMSA's president addresses various factors influencing the sports car sanction today, including how it effectively coordinates with 18 auto manufacturer partners, a new global set of regulations for one specific class, and a true ladder system that offers opportunities for drivers and team members alike.

By Jeff Zurschmeide

John Doonan always wanted to work in sports car racing. From his teen years helping out with his father's fledgling race team through a college and graduate school education in business administration, his goal was always clear.

After college, Doonan rose through the ranks to lead Mazda Motorsports in its glory days of both amateur and professional competition. Now he's working the same energy and vision for professional sports car racing as president of IMSA. From adopting hybrid prototype racing cars to integrating the latest sports cars into an existing framework, Doonan keeps his focus on productive partnerships to make sure there's room for automakers, parts suppliers, teams, and drivers around the IMSA table.

Doonan took over as president of IMSA in 2019, just in time to see much of racing shut down in the wake of the pandemic. But rather than sit idle, Doonan and IMSA used the time to make plans for the continued growth of professional sports car racing with new, relevant machinery and a global plan of attack to allow teams and automakers to race the same cars in Europe, America, and around the world. Doonan recently sat down with PRI to discuss his current job and everything he's learned in almost two decades devoted to the business of sports car racing.

"NOW THAT WE HAVE GLOBAL CONVERGENCE ON THE RULES, THESE TEAMS, THESE DRIVERS, AND THE ENGINEERING TALENT CAN START OUT AT THE EARLY STEPS OF THE PYRAMID AND ACHIEVE A BUNCH OF DREAMS FOR YOUNG MEN AND WOMEN TO SEE MOTORSPORTS ON A GLOBAL SCALE."

Among John Doonan's first major challenges as IMSA president was steering the organization through the difficult onset of the pandemic. He is seen here, at left, with 2020 LMP2 Champion Patrick Kelly. All photos courtesy of IMSA.

PRI: You have devoted almost your entire career to sports car racing. Was that always your dream, or did you discover it along the way?

Doonan: I always wanted to be in the sport some way or another. I thought I wanted to be a driver initially, just watching my dad and all of his buddies race starting in the early 1970s and throughout the 1980s. But really, I got passionate about the business side of the sport in the mid-80s. At that time several of the guys that my dad raced with started to "go pro." They went into things like the Star Mazda series or IMSA RS series, or ultimately some went into World Challenge. So in my spare time in high school and then college, I was building out these very rudimentary sponsorship proposals, but that was where my passion started for partnership.

PRI: Did you find that working in the business side of motorsports, where the sausage is made, was different from what you expected it would be?

Doonan: Growing up around the grassroots side of the sport, I knew that that's what drove the business because I had studied Mazda so much that I knew that customer racing really drove the ability for several manufacturers. Toyota did it that way, Nissan did it that way. So when I got there, it was a validation of that business model. When I got that opportunity at Mazda, it was time to execute and continue to model what we did there based off of what I had seen those other OEMs do so successfully.

"WHEN IT COMES TO THE WEATHERTECH SPORTSCAR CHAMPIONSHIP, WE CAN WELCOME MANUFACTURERS FROM AROUND THE WORLD THAT KNOW THAT MAYBE OUTSIDE OF CHANGING NUMBER PLATES AND REQUIRED SERIES DETAILS, THEY CAN COMPETE WITH THE SAME EQUIPMENT."

PRI: Did anything surprise you when you started working in racing?

Doonan: I always knew taking a program to the top level of the sport was no small task, and it was going to take a lot of resources on the financial side. You have to realize how hard it is to build a proper value equation for corporate partners. That was a big learning curve, and I was honored to have a lot of folks who coached me on what it was really going to take to make sure that the programs were sustainable by true value, whether that was television broadcast value or on-site fan activations and things like that. The biggest surprise was the reality of what it took to be at the top.

PRI: Your time at Mazda coincided with the best days so far for that brand in American racing. Spec Miata became an SCCA national class in 2006, right after you took over as director. Then, there was the entire ladder program with Road to Indy, Road to 24, the MX-5 Cup series,

and the iRacing program. Are there any of those that you can point to and say, "That was my baby. That was my project and I did those things?"

Doonan: It was all a team effort, to be candid. I'm proud of what we did, but it was never in any way just about me. Robert Davis was a great visionary. I was honored to learn from him. We had a really good, small group of passionate racers running a car company. Most companies say, "We go racing, we sell cars." And in our case it was, "We sell cars to afford to go racing."

PRI: When I look at IMSA today, I see that it now has a pathway to Le Mans. That has a very familiar ring to it. So, I assume that's something you brought to IMSA when you came over?

Doonan: There was a lot of work by a lot of people before I got here. I think there was always this vision that you could start out in an IMSA single-make championship, like Porsche Carrera Cup, or Ferrari Challenge or Lamborghini Super Trofeo; fortunately we were able to add MX-5 Cup into that

Before becoming IMSA president, John **Doonan was head of Mazda Motorsports,** giving him valuable insight on race-team management and the OEM side of professional racing.

No matter if you are at the track....
at the Oval, at the strip, or in your shop.

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mix, and get your feet wet in a single-make series. Then you can step into a downforce car and go into Pilot Challenge where there is multi-class racing, and then ultimately move up to the WeatherTech series.

So there is natural driver development and, frankly, engineer development and team and mechanic development. We're seeing more and more teams that have a Porsche Cup program, then go up into Pilot Challenge and into WeatherTech, like John Wright of Wright Motorsports. Team Hardpoint, one of our newer teams, is doing that. Compass Racing has done that. A lot of teams use this pathway. Now that we have global convergence on the rules, these teams, these drivers, and the engineering talent can start out at the early steps of the pyramid and achieve a bunch of dreams for young men and women to see motorsports on a global scale.

PRI: People tend to think of these ladder programs as being for drivers, but you're saying it's also for those people who are running a business, or anyone who wants

One of John Doonan's, at right, biggest accomplishments at IMSA has been the consolidation of international rules. Now he's looking at where EVs like this Hyundai ETCR will fit.

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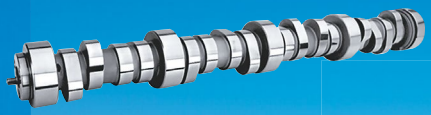

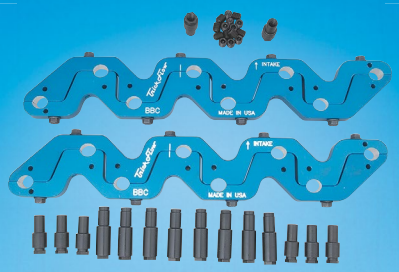

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to make a living in racing?

Doonan: You're 1,000% correct. I think what's so rewarding to see here at IMSA now is whether you're a driver, on-the-box engineer or strategist, a mechanic, a PR person, or a team owner—if you have a racing dream, it can become reality by starting out at the grassroots level, and then finding the right pathway to the top. It's way more than just driver development. Today you're seeing team owners in some of our single-make championships finding a way to grow their business at the higher levels.

PRI: At IMSA you're working with a lot of different automakers. Do you think your time at Mazda gives you better insight into what they need?

Doonan: One of the values I wanted to bring to the table was the fact that I had walked in the shoes of a participating OEM for 17 years, and [I had] the perspective of operating a race team. Even though the OEM program I represented was a "factory" team, it was small enough that I had to

John Doonan grew up in a racing family, fueling his lifelong passion for motorsports. He feels IMSA should be a platform for career development in all disciplines.

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operate it like it was my own personal team. You get to understand budgets and things like that right out of the box in terms of lodging and travel and salaries and spares and all those types of things.

PRI: Diving in a little more deeply into what's going on in IMSA these days, there's some exciting stuff. The Le Mans Daytona Hybrid class, for example. You have announced Cadillac, Acura, Audi, BMW, and Porsche participation. That's a good list of heavy hitters. What does this class mean for the WeatherTech series?

Doonan: We have 18 OEMs that are partnered with IMSA overall. Then you have five of them participating in the top category. It's an opportunity for those OEMs to bring their brand and their styling to the table and tell more of a brand story. Obviously, an additional part of that brand is the powertrain. So they get to choose their engine. For us and for the OEMs, it's that first step toward alternative power when we add in the hybrid system.

We've done it in what we like to consider a cost-effective manner. In order to run at the top, you choose one of four chassis constructors. You style your body to tell your brand story, you choose your engine, and then we have a single source or, I don't like the word, but a spec hybrid system. For us it's essentially Daytona Prototype International 2.0.

"MORE THAN JUST FACING IMSA, I THINK ACROSS THE AUTO INDUSTRY, ONE THING THAT IS A CHALLENGE BUT IT'S ALSO A MAJOR OPPORTUNITY, IS IDENTIFYING THE NEXT GENERATION OF OUR AUDIENCE."

The extra icing on the cake is the partnership with the ACO and the FIA. We've now found a way for LMDh to be a global set of regulations, such that the OEM can choose to compete with the same equipment in IMSA competition and in places like Le Mans and in the World Endurance Championship. Once again, it's about cost efficiencies and the ability to design and develop one car that's eligible for any of those series around the world.

PRI: Was it tough to hammer out that agreement to get FIA and ACO and IMSA all on the same page and working with the same cars?

Doonan: Any time you do something that's global, any time you do something that has that much at stake, it definitely takes a lot of work. Frankly, it started with a vision of DPI, and that starts with our chairman Jim

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France and his vision, but then it became a homework assignment for the technical team. That's both the IMSA technical team, the ACO, and the FIA technical teams to find a way for this platform to be able to compete globally and compete on the same level playing field with the Hypercar platform.

In the end it's best for everyone to have the rules be aligned. If you look at a company like Michelin developing a tire that is eligible for competition all over the world, that's pretty impressive. When it comes to the WeatherTech SportsCar Championship, we can welcome manufacturers from around the world that know that maybe outside of changing number plates and required series details, they can compete with the same equipment.

PRI: Are you looking forward toward all-electric competition?

Doonan: We are definitely studying it. We all believe we're still in the entertainment business, so whatever we do, we want to have it be exciting for our audience. We also want to be relevant with all of our platforms, and that is really driven by our 18-plus auto manufacturer partners. We want to make sure that when we're putting on a racing championship, it's cost-effective, it can be used as a marketing tool or a laboratory to showcase their technologies. Those are really the three components, and we are looking at ways that we can do that, perhaps in a consumer-identifiable demonstration race. So it'll be driven by the market, but we are studying a bunch of options there and we'll see what the next two, three, five years holds in that regard.

"IT'S CERTAINLY OUR HOPE TO BE A PLATFORM FOR PEOPLE WHO WANT A CAREER IN THIS BUSINESS. I WOULD SAY A SUSTAINABLE CAREER."

PRI: What do you think are the biggest challenges facing IMSA today? What keeps you awake at night? And do you have a plan to meet those challenges?

Doonan: More than just facing IMSA, I think across the auto industry, one thing that is a challenge but it's also a major opportunity, is identifying the next generation of our audience. You and I are passionate about cars, we're passionate about the motorsports industry, and I think it's incumbent on us, all of us, to try to continue to tell stories, put on unique events, and introduce our passion for the sport and for automobiles in general to the next generation. That's obviously getting our product in their hands, whether that's through social media, digital advertising,

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the television broadcast that we have on NBC. It's also getting them to come to one of our race events or taking our cars to pre-event promotions.

We did an awesome event called Thursday Thunder at Long Beach in September of 2021, where a bunch of IMSA cars were on display, I think 10 or 12 of them total. It was the night before we were on track. We were seeing families and young people there taking in that content. It gives me energy. Then I think we need to continue to simplify our message in the sport in general. The multi-class racing that we have in IMSA is something that we are passionate about, with GT cars and prototypes. We have to continue to educate that new audience on how exciting it is, and also have them fully understand what is happening in the show that they're seeing.

PRI: To turn that last question around, what do you think are the most exciting opportunities in sports car racing? What should we be looking for on the horizon?

"WE HAVE 18 OEMS THAT ARE PARTNERED WITH IMSA OVERALL."

Doonan: There are two stages for us. It starts in 2022 with GT racing. We have taken a leadership position around the world by having FIA GT3 specifications drive our GT category in 2022 and beyond. So we'll have GTD or GT Daytona PRO, which allows pro driver lineups, and then GTD as we know it today, which is a combination of a pro driver with an amateur driver, or driver rating of a bronze or silver. That really drives both the customer side of GT racing and a team that wants to run a pro lineup, that might have a little bit more corporate support from an OEM.

Then in 2023, with stability in the GT category, we welcome in the new prototype category at the top. We're excited about that future and I think we're going to continue to gain momentum with all the storytelling around the different brands that are competing. All of us are really hyped and have a lot of energy about 2022 and 2023. Then, I think 2024 is where we hit our full stride. When we see all the manufacturers that have committed to run in the top category will be on-site. So the future is very bright.

PRI: Is there anything we haven't covered that you'd like to tell our readers about?

Doonan: I think within the audience of PRI Magazine, there's a variety of folks that play different roles in the industry. It's certainly our hope to be a platform for people who want a career in this business. I would say a sustainable career. Regardless if they're working at a supplier to the industry or whether they themselves are a participant, whether that's on a race team or in another manner, IMSA wants to be a place for people to pursue a long-term career in motorsports, and we're excited about playing that role. PRI

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EXCLUSIVE COVERAGE

PRI ROAD TOUR

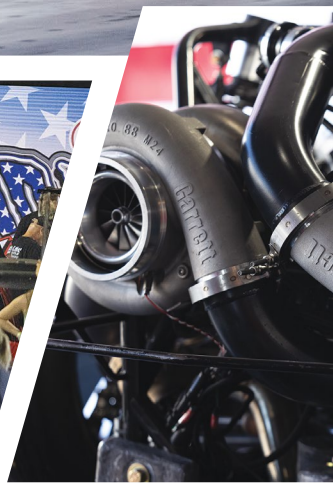
From slinging dirt to the echoes of slinging slots, the PRI Road Tour concluded its second trip across America highlighted by several iconic go-fast locales. In this fourth and final installment of our coverage, we begin with a bucket-list dirt track event in Upstate New York, followed by a trip Down South for the second largest drag radial event of the year—No Mercy 12—where PRI called attention to the Recognizing the Protection of Motorsports Act of 2021 (RPM Act) through its title sponsorship of the event's leadoff competition—the Magic 8 Shootout—followed by the legendary Indianapolis Motor Speedway for an event that at one time could be considered heresy: driverless vehicles at the Brickyard?! Finally, the cross-country road trip wound down as the horsepower ramped up in fabulous Las Vegas for one of the NHRA's signature races. For complete coverage of all stops on this latest edition of the PRI Road Tour, visit performanceracing.com/roadtour.

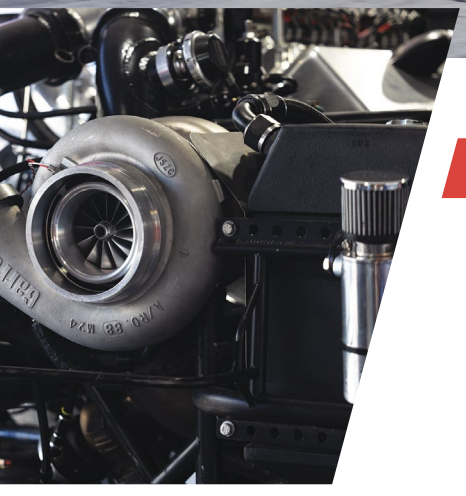
By Dan Schechner, Editor

NAPA AUTO PARTS SUPER DIRT WEEK

From New York to Iowa, from California to the Carolinas, dirt track racing is one of the most popular genres of motorized competition in North America. Why? Easy: accessibility and affordability. There are thousands of events at some 1,500 tracks across the continent. The events support local competitors while offering national recognition. Classes range from karts up to 900-horsepower open wheel monsters. And importantly, racers can be competitive at a reasonable cost—drivers have a legit shot at earning a share of the purse, which at the most recent NAPA Auto Parts Super DIRT Week was up to $50,000. Super DIRT Week happens at Oswego Speedway, a stone's throw from Lake Ontario by the tiny town of Oswego, New York. Over last year's Columbus Day weekend, "The Steel Palace" converted annually to "The Clay Palace" hosted some great competition, from the Billy Whittaker Cars 200 feature, to the DIRTcar 358 Modified Salute to the Troops 150, to the DIRTcar Sportsman Chevy Performance 75, and several others.

PRI ROAD TOUR

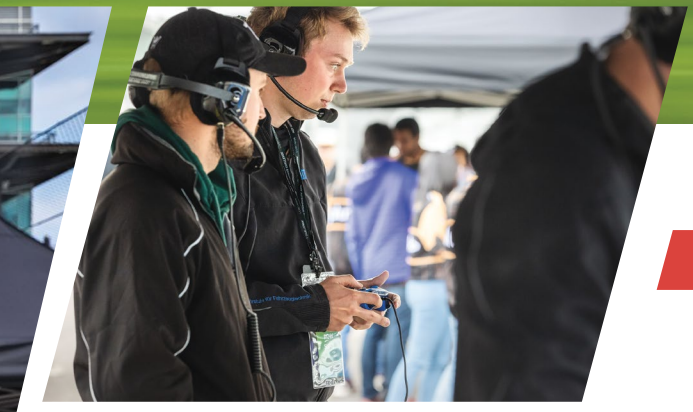




MAGIC 8 SHOOTOUT/NO MERCY 12

Amateur racers and the businesses that support them know how to put on a great show, lay down some quick runs, and have a good time in the process. While it might not be IndyCar, IMSA, and NASCAR, the competition is no less real, and the drivers and teams are no less competitive. The difference is scale, but don't be mistaken: These smaller events are still "majors" to the racers and fans who participate in them. Proof positive was Duck X Productions' four-day event in October at South Georgia Motorsports Park known as No Mercy 12. While the PRI Road Tour has visited several races across the US, PRI was a pivotal asset in this event as title sponsor of the Magic 8 Shootout—an opening night of action where the top eight drag racers in four classes battle it out non-stop under the lights. PRI and Duck X Productions teamed up to support the event and raise awareness for the Recognizing the Protection of Motorsports Act of 2021, a bipartisan effort to protect Americans' rights to modify and convert street cars, trucks, and motorcycles into race-only vehicles.

PRI ROAD TOUR



INDY AUTONOMOUS CHALLENGE POWERED BY CISCO

On a recent fall weekend at the Indianapolis Motor Speedway (IMS), the familiar sound of two-liter turbos could be heard echoing around a fairly empty Brickyard. But this was no ordinary session, as driverless Dallara-produced AV-21 vehicles lapped IMS with top speeds exceeding 150 mph in the landmark Indy Autonomous Challenge (IAC) powered by Cisco. In all, the competition consisted of nine separate teams. Specs for the autonomous cars were established by students from Clemson University's department of automotive engineering, who worked with pros from Dallara and engine provider Energy Systems Network to develop the car and the basis of the technology all nine teams would use. Mechanics and engineers from Juncos Hollinger Racing worked with the IAC teams to put their cars together. To qualify for the purse, cars were required to leave pit lane, run a warmup lap, then take two flying timed laps, and finally a cool-down lap—the latter involved navigating around several inflatable barriers to test cars' maneuverability. Alas, only four teams managed to complete first-round runs, and ultimately advance toward the winner-take-all $1 million prize.

PRI ROAD TOUR

DODGE/SRT NHRA NATIONALS PRESENTED BY PENNZOIL

If you follow the NHRA traveling circus, you probably know there's not another event on the schedule that has the same feeling as Las Vegas. In between runs you can see sponsorships being evaluated, old relationships ending, and new affiliations taking shape ahead of the 2022 season. The drama puts extra pressure on drivers and teams gunning for championships, or fighting to retain their rides for next year. In fact, if you had a scorecard you could track the corporate big shots in attendance. Many fly out a few days before the SEMA Show to soak up the sun and catch some great racing before they spend four straight days doing business on the Show floor. Their presence is a force keenly felt by drivers and teams. And, rising to the many challenges present, the racers in Vegas did not disappoint. Multiple records and milestones were achieved over the three-day weekend in late October, which also served as NHRA's 1,000th event to date. PRI

SUPPLY PAIN

When it comes to sales forecasting for the 2022 racing season, a solid outlook is decidedly difficult to pin down.

By Steve Statham

Talk about a moving target.

As this is being written in early November, record numbers of container ships are loitering off the coast of California, suppliers can't keep racing parts on the shelves, Help Wanted signs are everywhere, and things may very well get worse before they get better. Demand is surging, yet supply is locked down in a chokehold that would make a professional wrestler proud.

How does a business forecast sales for the 2022 racing season? Consult astrological charts? Read entrails, like an old-school shaman? Flip a coin?

Things may not be that dire yet, but there's no easy way for motorsports businesses to forecast the inventory they'll need for the upcoming racing season. With shortages happening in almost all areas of the sport, even relying on long-established business relationships with suppliers is no guarantee of getting a clear picture of parts availability.

"There is no working with suppliers to ensure anything. Because they can't ensure anything. Nothing. It's the most frustrating time I've ever had in 48 years of doing this, as far as parts go," said Mike Johnson of JMS Racing Engines, El Monte, California. "It's dragged on for so long now that we can't even get estimated dates on when parts will be available. I have two high-end race engines that have completely missed the racing season because I can't buy a block or a pair of cylinder heads. When I call, they used to say, 'Oh, we're looking at 90 days, we're looking at 120 days.' Now they say, 'We don't know.'"

"The forecasting is impossible. We do the best we can," said Paul Banghart of GAT Racing, Tucson, Arizona. "It's a little scary to get way ahead of the curve because if we get way ahead on something and have a ton of them in stock, and then all of a sudden somebody gets a bright idea and changes a rule, now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Pandemic-related supply shortages are gripping all aspects of motorsports, delaying shipments and driving up costs, even for parts that are relatively commonplace. Seen here is Watson Ruppel Performance.

we're stuck with 150 tires that can't be used.

"So far, so good," Banghart continued. "We've been keeping up, but it's definitely been hard. We've had to say no to people this year more than ever before. 'Nope, I don't have it. And nope, I can't get it.'"

Given the interconnected nature of the motorsports supply chain, a shortage in one area can send ripples through entire racing series. Boss Chassis, in Belleville, Illinois, specializes in midget and micro chassis. "There are only a few manufacturers for the rearends that we run. Same with the steering gears," said Austin Brown. "If any of them have issues, everyone would have issues."

Despite delays and shortages, our sources indicate that racers are still keeping the throttle wide open when it comes to ordering parts. "We haven't seen the parts shortages discouraging a lot of folks from building engines or racing yet," said Heath Watson at Watson Ruppel Performance, Sarahsville, Ohio. "Racers are very

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The industry's dependence on overseas manufacturing is intensifying the supply-chain crisis. Companies such as Medieval Chassis are finding relief in using domestic manufacturers.

passionate, and most of them are going to find a way to get on the track, even if there are more challenges to do so."

Part of that ongoing demand is undoubtedly related to people wanting to get back to "normal" life following the lockdowns of 2020. But a contributing factor could very well be that many racers are opening their wallets now because they realize inflation is running rampant, and things will only cost more in the future. If that's the case, it's going to be hard for manufacturers and suppliers to get back ahead of demand in the short term.

OUT OF ORDER

In this environment, businesses have no choice but to adapt as best they can. "Our parts-ordering process has definitely changed. We try to look ahead and order parts early," said Watson. "We are also investing a lot more time in locating parts and often pay more for them when we finally find what we're looking for. Prior to 2020, common parts were stocked at nearly every distributor we deal with. Now we often must check with all our distributors, and with several websites and do Internet searches before we might find the right part."

Having plenty of sales data on hand always helps, but data from normal years has limited use in this economic environment. "I'm a pretty big proponent of looking at the macro sense of the economics," said Jesse Olson of Medieval Chassis, Mayer, Minnesota. "Obviously, we have a lot of background information in our online sales, as we have our own online store. We use all the Google Analytics to see month-by-month, quarter-by-quarter, where we've been sitting year-over-year and try to forecast that in for our build schedules when it comes to our chassis, parts sales, things like that. With us being a manufacturer, we produce a lot of the parts that we sell in-house, a lot of the bolt-on accessories and so forth.

"From the macro sense, we're just watching what's going to happen after the beginning of the year," Olson reported at the close of 2021. "I don't think anything is going to change. We're on the up right now. People basically want to get out and work on their cars and get going for next year already. Usually we see a lull of about a month between the last week in October to about the first week in December. Guys have harvesting and will be in the field, or deer hunting, and so forth. This year we have not seen that at all. Every week it's just more and more and more."

Although parts of all sorts are in short supply, certain items kept being mentioned by our sources. "Our biggest challenge right now is with a certain few products like tires, which is a huge one," said Banghart. "Sheets of aluminum are huge problems for us right now. Assuming that things are going to be held up, assuming what normally comes in a week or week-and-a-half will be four to

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"RACERS ARE VERY PASSIONATE, AND MOST OF THEM ARE GOING TO FIND A WAY TO GET ON THE TRACK, EVEN IF THERE ARE MORE CHALLENGES TO DO SO."

five weeks, we're just trying to forecast that. It's obviously really hard. We're calling the suppliers every so often to ask if they have any information. Sometimes you get a good answer, sometimes they don't have a clue."

"What I'm hearing from the manufacturers is that a lot of the time they can't get the material," said Johnson. "It's widespread, through pistons, connecting rods, cranks, heads, blocks. There's a shortage of valve springs. It's crazy."

It's not just the parts that are delayed. "Even the powder coaters are so backed up that they can't give you a date, and they don't have employees so they can only do one certain thing," said Brown. "It's just about everything we deal with. It's hard to even give a customer a date if it can't all be done in-house."

"A lot of stuff that we do is not necessarily cookie-cutter stuff. So we're trying to find a balance of what we think we're going to need," said Trevor Hutter of Hutter Performance, Chardon, Ohio. "In some instances, when we use a part off the shelf, I can reorder it immediately, knowing that it can take sometimes 12, 14 or more weeks for stuff. If we're using something that I'm pretty confident we're going to use again, I'll just reorder it right away. But, man, the stuff that we need to custom order, we have to warn people ahead of time. We used to be able to pay for expedited stuff. Some people aren't even doing expedited at all because everybody wants everything expedited."

These shortages are reminiscent of the first few months of the pandemic, when grocery shoppers encountered empty shelves. "What's happened in the industry,

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Some customers still don't understand the magnitude of current supply-chain issues. "We have to warn people ahead of time," explained our source at Hutter Performance.

I want to call it the Toilet Paper Syndrome," said Johnson. "It just creates more of a shortage because of the hoarding. And I'm guilty of it too! It's like, 'Oh, no main bearings for big block Chevy. Oh, there's four sets.' I buy them all. It's just so amazing to me that the manufacturers are so far behind and can't get caught up."

DOMESTIC VS. IMPORT

There's another conversation that industries both large and small will have after the supply chain cyclone stops wreaking havoc and some semblance of predictable sales forecasting returns. That conversation revolves around the accepted economic wisdom of just-in-time delivery models reliant on the unhindered flow of global trade. That model has enriched many, but it's a model that relies on nothing ever going wrong.

It's inevitable that people will talk about sourcing more American-made parts and forming domestic supply chains that are less vulnerable. Some of the businesses we spoke with pointed out that partnering with more domestic suppliers has relieved some of the parts availability pressure and helped with sales forecasting.

"I've always been a very big proponent of buying domestic, and it seems like the domestic items are available," said Medieval Chassis' Olson. "They're not the cheapest, and racers don't always like that. But the domestic sources are typically available. Aside from a couple of larger items—hub assemblies, things like that that we can't control—everything else we source domestically."

According to Olson, the difference between locking in domestic sources versus foreign suppliers isn't just an improvement at the margins. "It's dramatic," he said. "Something as simple as, say, rearend snouts. In the past, what everybody did was source them overseas to get the cheapest price possible to make the biggest margin. Well, as things have stopped as far as the imports go, the domestic sources have opened up, and they're on the shelf. We have changed some suppliers on that front, knowing what was coming. With some items, we are taking it upon ourselves to create a domestic source so that option is out there for the racing industry."

GAT Racing's Banghart also reported that buying domestic has helped ease some of the supply pressure. "There are probably three or four companies we deal with that manufacture onsite and ship straight out. Honestly, I would have to say, they're pretty good," he said. "Those three or four companies that build stuff and ship it, where it doesn't go to a warehouse first, their fill rate is probably better than something that I buy from overseas."

The search for domestic sources can often drive businesses to take another look at their local industrial scene. "On my end, I haven't

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Raw materials such as tubing are also seeing the effects of global shortages. This has continued to drive up costs, with frequent price increases occurring throughout the year.

had an issue with getting metals, aluminum and tubing," said Boss Chassis' Brown. "We have a big supplier in St. Louis that's maybe 20 or 30 minutes from us, so I don't have to have it shipped in, I can just drive there and get it myself. Obviously, the prices have increased, and they try and let us know, but it's just so unknown."

2022 SEASON

As for what racers should expect for the 2022 season, the outlook is still murky. But there are a few things safe to predict. For one, it's going to be more expensive.

"I'm telling them to expect price increases on everything, which we are absolutely seeing, and increased lead times on everything," said Banghart.

"Any time there's a shortage, prices are doubling and tripling," said Johnson. "There's another problem that all of us are dealing with. We all have a parameter of a quote in our heads. We've been doing this long enough so if a guy says, 'What do you think it'll run?' we have an idea.

"Right now, a crankshaft has gone up 30%. But they've done it three times this year," Johnson continued. "Typically, in this industry, we would get a price raise on parts around February every year, 3%, maybe 4%. We got price raises in February of 4%. I got another price raise in June of another 6%, and I just got letters that parts are going up again. And every one of them is saying 'due to the cost of materials.' It makes it really hard to be able to even quote anything right now."

"On steel, we've seen about a 10% cost increase in total, which for us is a lot," said Olson. "Most other manufacturers, I'm guessing, are probably seeing a 30% to 40% cost increase. Again, just because of the volume that we run through here, our costs are pretty limited as far as increases.

"Aluminum is going to be the big one," he continued. "We're seeing 10% month-over-month here since March. That is not going to stop until probably March of 2022. A sheet of aluminum is going to be close to $200 here by the time all is said and done. That's going to get pretty hard for modified guys, and dash kits, things like that, on other cars. The other side of it are the labor costs and all the indirect costs—powder coating has gone up, consumables have gone up, welding gasses have gone up."

On a more positive note, it's likely racers can look forward to rules stability from the sanctioning bodies, as any abrupt changes to the rulebook could run into the reality of parts that comply simply aren't available. "I've seen a little bit of easing up on allowing a different tire for an event or two," said Banghart. "IMCA now allows grooving of tires because of the tire shortage. They figure people get more life out of them."

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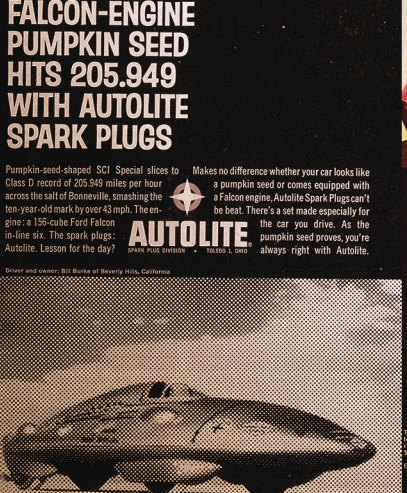

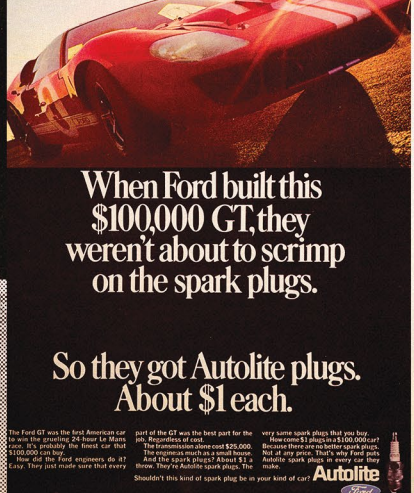

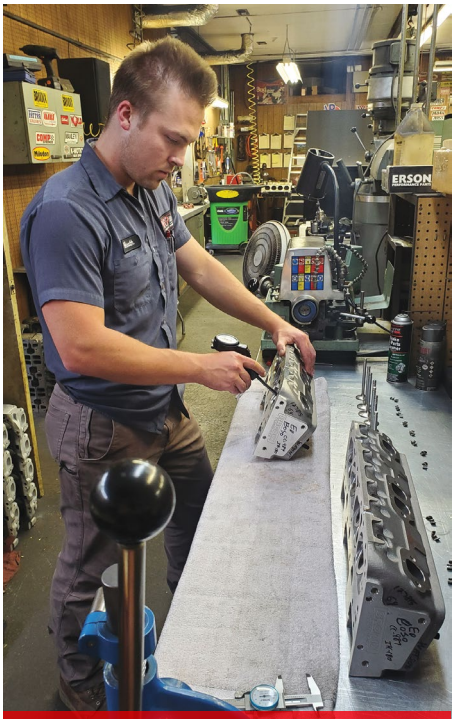

Despite setbacks, business is brisk at most shops. "We haven't seen the parts shortages discouraging a lot of folks from building engines or racing yet," noted our source at Watson Ruppel Performance.

So what can racers do to prepare for the 2022 season? For one, start planning sooner. Don't wait until three weeks before the season starts to begin work on the race car.

"We have seen several acting sooner to get their engines pulled and begin the rebuild process earlier in the offseason than in previous years," said Watson. "That will be helpful in getting things back to them in plenty of time for next season. We often don't know what parts will be needed until we tear down and inspect the engine. The sooner we do that, the quicker we will be able to order the parts that may be backordered or hard to find.

"We are talking with our customers about parts availability issues, but most of them already know about it to some extent from their own research or talking with other racers and gearheads," Watson added. "Shortages are happening in every industry, so I don't think it is a surprise to many people anymore. Most people are

understanding of that."

"The more pre-planning you can do, the better off everyone is going to be with how long it takes to get stuff," said Hutter. "People call up and say, 'Oh, we don't need it for a month.' Well, okay, that's about a quarter of the time it's going to take to get the parts you need."

With shortages likely continuing for the foreseeable future, racers may need to dust off or relearn some old skills. "The racer will need to be prepared as much as they can, as far as getting their spares and whatnot together," said Brown of Boss Chassis. "They may have to go back to not being able to just purchase products right off the shelf. It would be neat to see racers build their own parts again." There was a time when racers, out of necessity or simple ingenuity, took a more hands-on approach to making parts themselves, he said. "We may see more teams start doing that."

In the meantime, racers and suppliers both will have to grin and bear it. Johnson of JMS Racing gave us the forecast for the winter: "The frustration level is everywhere. I have frustrated customers, which frustrates me. I call the manufacturers. I'm frustrated so I get on one of them. They're frustrated from getting bitched at all the time. It's just a frustration chain now." PRI

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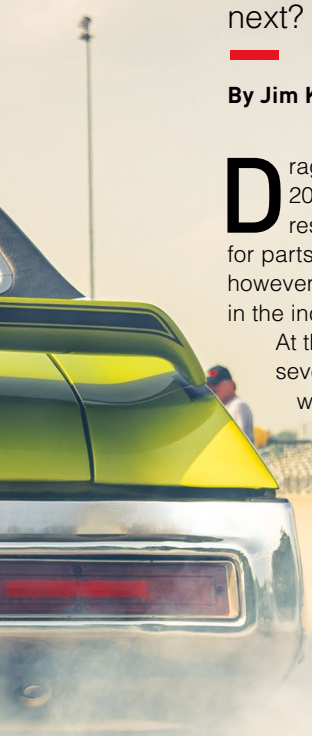
GOAL PLANNING

The last 12 months brought a resurgence in drag racing following a dismal 2020. What's next? We asked industry power players to share their goals—and challenges—for 2022.

By Jim Koscs



Drag racing roared back to life in 2021 after a dismal 2020 season that was dragged down by pandemic restrictions. Recovery released pent-up demand for parts, professional builds and opportunities to race, however, and those factors drove a business boom for many in the industry.

At the same time, ripple effects from the pandemic, severe weather events and a backlog of container ships waiting to unload their wares disrupted the global supply chain. Availability of some parts and materials tightened just as demand was rising, driving inflationary pricing.

With this confluence of market forces in view, PRI spoke with several players in the drag racing world to check in on their realistic goals for 2022. Forget New Year's resolutions; these sanctioning bodies and businesses want to keep the pedal to the metal, and here are their strategies.

FIREBIRD RACEWAY

Founded in 1968 by Bill New and his wife Ellanor, Firebird Raceway in Eagle, Idaho, remains a family operation managed by their sons, Scott, Brad and John. The NHRA member track packs plenty of history. Scott New said 2021 was a "comeback year that exceeded all expectations" after the challenging 2020 season. "We were making changes on the fly through the pandemic."

Following an extensive repainting and facility freshening in the fall, New said the top goal for 2022 is to take a more proactive approach to sustain the track's youth programs. "We have Junior Dragster and the more recent Junior Street," he said. "A lot of today's Top Fuel and Pro Stock drivers started in Junior Dragster." (Scott New participated in the track's youth program when it launched in 1976.)

Increased engagement on social media will be key for both growing track business and supporting the youth program. The track had been a bit behind the curve in that realm, New admitted, but now, social media has allowed the track to greatly extend its reach.

While fondly recalling the days of high-energy radio announcers and the sport's famous "screamer" radio spots, New said he is realistic about today's more targeted opportunities via social media. He indicated that the media newcomer has in large part replaced mailing flyers and schedules to racers and households. "That's how we did it for the first 40 years, and it was very expensive," he said. "We are also doing more with our e-mail list, sending e-blasts and schedules."

New believes that having three generations of the family involved in the track operation is not only a point of pride, but also a business advantage to marketing as it continues to tilt more toward social media. Even with increased social media efforts, however, New acknowledged that a key challenge for the youth program is finding an enthusiastic teacher who loves the sport to act as a liaison. He is addressing that issue with personal outreach to high schools in western Idaho's Treasure Valley.

NHRA

Brad Gerber of the NHRA in Glendora, California, is optimistic for 2022. "We are aiming to get back to where we were in 2019 and surpass it in some areas," he said. The sanctioning body has numerous projects scheduled for 2022, including its first video game in 15 years, adding a betting platform, and developing secondary programming with "an award-winning media company."

While Gerber said trusted partners are handling those ventures, the NHRA is internally focused on boosting its Youth and Education Services (YES) Program as a key vehicle to help grow the sport and the automotive performance market. Following the US Army ending its sponsorship in 2017, and the NHRA reconfiguring the program to be more career-focused, it grew by nearly 35% through 2019. Gerber explained that adding a virtual component, with online learning featuring videos that students could follow at home, was a necessary response to pandemic restrictions, yet resulted in continued growth.

"Students who completed the modules could earn complimentary tickets for NHRA Friday night events," Gerber said.

The reconfiguration not only helped maintain program momentum but also boosted interest from parents and teachers. The online aspect also enabled the program to continue beyond the school year. As a result, the NHRA engaged with 30,000 students in 2020, a record according to Gerber.

Even with the return to in-person events, the NHRA's YES Program will retain the online element. Gerber projected that this combination, plus member tracks providing youth programs on the local level, will further boost teen engagement. Representatives from the program's main partners, Mopar CAP (Career Automotive Program), Western Technical College and Ford Performance, attend in-person events to talk to students about careers in the NHRA and the automotive performance marketplace.

"We see this going to potentially 40,000 students in 2022. That is a realistic goal for the year," Gerber said.

For 2022, the NHRA plans to step up its Youth and Education Services (YES) Program, which has been reconfigured to focus largely on careers in drag racing.

PROMEDIA

ProMedia in Santa Ana, California, runs the National Mustang Racers Association (NMRA) and National Muscle Car Association (NMCA), each conducting several drag racing events throughout the year. ProMedia's Rollie Miller III conveyed his optimism for a strong 2022 season, citing goals of expanding race classes and reaching more people via social media. The company will also continue its support for the RPM Act.

Miller said the company will continue to evolve the NMRA's event production, following trends in the street car market while promoting safety for competitors. On the NMCA side, he said the organization is

ProMedia-owned NMRA and NMCA are launching into the new year with plans to expand race classes and add more opportunities for new and vintage muscle cars.

adding more opportunities for both modern and vintage muscle cars, including new dedicated Stock Eliminator and Super Stock Eliminator classes.

"We also have an explosion in the street market with the program that we host for Dodge/Mopar and its HEMI Shootout, as well as the TorqStorm True Street class," Miller explained.

Miller expressed confidence that "great planning, organizing and execution" will help deliver those goals. "For us, the 2022 season began in early spring 2021, and it is a constant effort to keep on target."

Miller also cited a newly expanded staff as instrumental to achieving 2022 goals. "Like many small businesses, we had been running lean since the Great Recession," he said. "It has taken great effort to keep our expenses in check so we can put those resources into hiring the right people for the jobs."

He credited his staff's market savvy in continually developing new goals. "We have a dedicated staff immersed in this hobby and sport, and we meet regularly to discuss pre- and post-event issues and create solutions," he explained. "We also work extensively with aftermarket manufacturers and racers to make sure that both of our racing series are the best they can be. There is a lot of feedback, notes taken from analyzing the market on a regular basis, and we have a great connection with our customers."

Miller said he enters 2022 optimistically but with eyes wide open facing the challenges of inflation and a competitive

job market, along with the race promoter's constant foil—unpredictable weather.

"After doing this for 23 years, we continue to prove our stability and show our skills in navigating rough waters," he said.

To grow the NMCA/NMRA audience, Miller said ProMedia plans to expand social media efforts. "We are working with more influencers to help bridge the social media world with the drag racing segment and promote an anti-street racing message," he said.

INTERNATIONAL ROLL RACING ASSOCIATION

Chris Harris launched a new sanctioning body to get racers off public roads and onto professionally run tracks, turning a public nuisance into a bona fide motorsport. Sound like a familiar story? Harris's International Roll Racing Association (IRRA), based in West Palm Beach, Florida, is sanctioned under the IHRA and is the first sanction for the sport. It zoomed from 25 members in 2019 to about 300 going into 2022.

The International Roll Racing Association has enjoyed explosive growth in the last several years. For 2022, the organization is looking to expand its geographic reach.

Harris's main goal for 2022 is a smooth expansion of the IRRA from its original Florida base and its Northeast Division into more regions. The IRRA is adding a new Southwest Division at Tucson Dragway and a Texas track to be named, and Harris expects membership to grow significantly as a result.

Roll racing, as it is run at IRRA races, is heads-up competition with two cars side-by-side starting from a 40-mph roll. A spotter triggers the green light to race, and the first car across the finish line wins. The IRRA currently has four classes, all based on mph capability. The race field

The IRRA is the first sanction for roll racing. As such, one of its challenges for the new year will be to continue building awareness and earning credibility for the sport.

is diverse, from 300-hp Honda Civics to 2,000-hp Dodge Hellcats and even a few Lamborghinis. Many of the cars are street-driven, though some are trailered. No wheelie bars are allowed.

IRRA members get licensed to race and obtain $100,000 of excess medical coverage. Fueling the sport's growth in large measure, according to Harris, is that it attracts young racers and young spectators. Yet, he said it appeals to a wide range of drivers and ages because the rolling start is both easier to master quickly and less stressful on a car's drivetrain.

Each IRRA event includes a "Fun Run" where anyone can give roll racing a try, which Harris said helps draw new members. "We'll get a 75-car field for competition. Add in the Fun Run, and it's about 300 cars per event." After running seven races last year, the IRRA held its National Championship at zMAX Dragway in Concord, North Carolina.

Harris said his current challenges are twofold: explaining what roll racing is and then defending it as "real racing" to skeptics. "To some people, roll racing looks drastically different from drag racing, but it's really not that different."

He addresses both challenges by personally meeting track owners and selling them on the benefits of adding roll racing events. So far, his personal approach has been working, and as this recently sanctioned series grows, he finds that part of his job is getting a little bit easier.

MULLIS RACE CARS

Founded by Bill Mullis and Ed Richardson

and then built to a higher level by Brian Forrester, Mullis Race Cars in Wells Fargo, North Dakota, had been defunct for five years until Glenn Gordon purchased and relaunched the renowned dragster maker in early 2021. "The name recognition absolutely helped get it going," Gordon said. "After some initial market hesitation, our schedule is filling up quickly. Right now, the drag racing industry is strong and driving hard."

Gordon, also a principal in G&J Performance Fabrication, is confident that the current demand is an opportunity for success while acknowledging some challenges ahead. Having upgraded the Mullis dragster design to add strength, Gordon has turned his attention to 2022 goals. These include launching a side-steer roadster in the spring, with G&J "hitting the market hard" with Top Sportsman-type door cars.

Gordon explained that having G&J as a partner company helps make the new Mullis operation far more self-sufficient than before. G&J, which also does fabrication outside the racing business, adds machining, laser cutting and powder coating capabilities. "We're now making the chassis and fiberglass and carbon fiber bodies in-house," Gordon said.

Another key to achieving 2022 goals is having a combined workforce of seven employees at Mullis and eight at G&J. "We pulled in some very talented people, including one of Forrester's former chassis builders," said Gordon. "And there are a lot of 'tuner kids' in this area. They're very talented." Additional workforce growth is possible in 2022.

Beyond building improved and new race cars—but certainly related to that—Gordon said streamlining the operation to achieve tighter production scheduling is a top goal. Central to that effort will be a new 6,000-square-foot addition to the work space. Mullis currently leases another shop, and the new space will bring everything under one roof.

While supply of parts and raw material is an ongoing challenge for the industry, Gordon said some early planning helped the revived Mullis brand deal with those issues. "When we started, we stocked enough for 40 cars—a year and a half of chromoly and laser parts," he said. "Now, when we order chromoly, some sizes are 45 weeks out."

Finally, Gordon wants to complete the new Mullis branding in 2022, including a new website and building up the Facebook presence. He sees both as critical to marketing and believes the streamlining steps he is implementing will provide the time to focus on those efforts.

BES RACING ENGINES

Beginning as Bischoff Engine Service in 1985, BES Racing Engines in Guilford, Indiana, is now a top drag racing engine builder. Currently, owner Tony Bischoff has 18 employees plus himself; his wife, Jeanie, is the bookkeeper. Bischoff feels he has had one of his best years ever, and he is now focusing on goals to streamline the

business and “reduce stress” for 2022.

“We’ve been busier than ever,” Bischoff told PRI. “A lot of people want to go racing.” He acknowledged the same issues that other builders are facing, including higher prices and longer wait times for parts.

Since most of his business comes by word-of-mouth, Bischoff said marketing is not a challenge for BES, and that he does very little advertising. He outlined three goals for 2022.

First, as one means of aligning supply with demand, Bischoff said he raised the labor prices in his quotes by 10% this past fall. For parts pricing, however, he is only passing along his increased costs. For 2022, his goal is to hold to that structure. While acknowledging that he has not seen many others do this, he feels confident that it will not become an obstacle for his customer base, nor a challenge for him.

“The idea is not to turn away customers,” he said.

Second, he is delegating more of his work. “All we do are custom engines, and it takes a lot of my time,” Bischoff said. “I am grooming some long-term employees to take on some of my management duties.”

With a focus on drag racing, BES Racing Engines owner Tony Bischoff is “busier than ever.” For 2022, he’s adding a new building and streamlining his team’s operations.

Third, to efficiently handle the heavy but welcome workload, Bischoff is adding a new storage building in 2022, freeing up more of the 15,000-square-foot shop for building engines. Regarding parts supply, Bischoff said he has adjusted, as best as possible, by planning ordering further ahead. He believes the challenge of aligning parts availability with the build schedule could become easier with the other new measures he is implementing.

MCLEOD RACING

Racing’s resurgence in 2021 put McLeod Racing in Anaheim, California, in a “very good place” for 2022, reported Krista Baldwin, who directs marketing and social media efforts while also ramping up her own Top Fuel dragster racing program. With guidance from her grandfather, legendary drag racer Chris Karamesines, a.k.a. “The Greek,” Baldwin expects to compete in 10 races for 2022, double what she did in 2021.

Back at the office—or home office, as it had been for quite a while—Baldwin gave an optimistic business outlook for 2022, citing goals that she said the company is well positioned to achieve. McLeod Racing is part of the Wharton Automotive Group, owned by Nitro Funny Car racer Paul Lee, with other companies

including FTI Performance and Silver Sport Transmissions, the latter acquired in summer 2021.

"We are not finished with acquisitions," Baldwin said. "Paul has a five-year plan. Our main goal for 2022 is to continue to provide quality engineering and products for what people are asking for."

What many customers want, she explained, are parts suitable for 2,000-horsepower street/track cars. "Customers are pushing OEM vehicles to the limits, and we have to be there to help them go to the next stage, developing drivetrain components for those applications," she said.

Pandemic-related shutdowns actually helped bolster business, according to Baldwin. "More people were working on their cars, and that increased demand for parts. It seems there are more cars, there's more horsepower and more racing."

Baldwin shared a goal to expand McLeod's footprint in off-roading with the addition of the company's new off-road and R&D specialist, Will Baty.

"This market is just jamming right now," Baldwin said. "We also came out with the Silver Sport 4050 transmission and are working on more applications for that."

Critically, Baldwin said the "normal challenges" of finding new markets and pinpointing the right products to create are all "handled pretty well" right now. She acknowledged that the biggest challenge—one that can be both fun and frustrating—is keeping up with social media. She has taken on that task for all the Wharton companies, as well as Lee's racing page.

"It all seems to change weekly," she said, adding that guesswork is not sufficient to tackle the challenge. "A precise media plan makes it all work, but we also have to be versatile and respond to whatever the algorithm might be that week. It is absolutely critical." PRI

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UNDERSTANDING THE BIG-MONEY BRACKET RACING PHENOMENON

With seven-figure purses at stake and social media fame awaiting the victors, high-dollar bracket races have become can't-miss events for drivers and fans alike. Here we examine how this trend came to be and what organizers are doing to ensure its ongoing success.

By Bradley Iger

High-dollar bracket racing isn't exactly a new concept. The idea first emerged decades ago. Yet recent trends have put these events on the radar of an increasing number of would-be participants and spectators.

"This used to be something that was almost exclusively put on by individual race tracks," said Luke Bogacki of Luke Bogacki Race Services, Carterville, Illinois. "When I was racing with my father back before I was even old enough to drive, I don't remember a single event being put on by an outside promoter."

That dynamic began to change in the late 1990s, Bogacki said, with the success of George Howard's original B&M series. "At some point it really shifted to racers promoting events. There's been a bit of a comeback over the past few years where tracks present events like these, but by and large, the most successful races these days are events like Peter Biondo's Fling races, Randy Folk's annual million-dollar race and the SFG races that Kyle Riley puts on. Those are all racers putting on those events, and I feel like we, as racers, have migrated to those because they're built on the premise of giving racers what they want."

Bracket racing has benefited from promoters—oftentimes racers themselves—putting on competitor-friendly programs. "These guys set out to put together the kinds of races that they themselves would want to attend, a weekend where there's not only a lot of money involved, but also a lot of racing," said our source with FRBR Promotions.

Andy Anderson of FRBR Promotions in York, Pennsylvania, said that it took more than just the chance to bring home big prize money to fill the staging lanes. "These guys set out to put together the kinds of races that they themselves would want to attend, a weekend where there's not only a lot of money involved, but also a lot of racing. The prospect of traveling once and racing three or four times brought these opportunities to the everyman."

GOING BIG

While it takes a holistic approach to design an event with the potential for lasting success, there's no question that increased visibility has helped drive the popularity of big-money bracket racing in recent years.

"A lot of people have that fear of missing out, and I think that quite a bit of it has to do with Motor Mania TV streaming all of these big-money races," said Jake Hodge of Final Call Promotions, Franklin, Kentucky. "Four or five years ago, there might have been just a couple of huge races that had streaming coverage over the course of a race season. These days there are weeks and weeks of back-to-back coverage of these events."

The sky-high purses undoubtedly play a role in the continued growth as well. "The ratio between the top prize money and the entry fees has changed, and that's also a big part of why we're seeing it blowing up right now," Hodge added.

Josh Morgan, who promotes the Star Spangled Banger event at Kil-Kare Raceway in Xenia, Ohio, said that the formats of the events also contribute to their ongoing appeal. "People are more willing to go to an event where they can spend two or three days—or more—racing for more money rather than traveling around to a bunch of smaller, one-day races. For me personally, getting the family, the RV, the trailer and everything else together to drive to the track and only race one time for $65 to win $1,200 is not as attractive as the scale that these bigger events are using. A lot of other people feel that way, too. To be able to race for a whole weekend for $400 or so and be in the running for $10,000 or more, it's pretty obvious why these races are getting so much attention."

MAKING THE MATH WORK

Bogacki said that, even as recently as five years ago, the purses at these events weren't commensurate with the amount of money it took to cover the costs of building a competitive race car, traveling and paying entry fees. "That began to shift pretty monumentally around 2015 or so, and it has reached heights that I never imagined we'd see," he said. "I think 2020 was a bit of an

"THESE DAYS THERE ARE WEEKS AND WEEKS OF BACK-TO-BACK COVERAGE OF THESE EVENTS."

aberration in that we had four 'million dollar' races, including two that paid a guaranteed million. I never thought I would see that in my lifetime, and all of them were successful. Many of us just didn't have a bunch of different options for things we could do last year, so a lot of people were able to kind of stockpile money, and they were chomping at the bit to do something."

Although last season may turn out to have been a bit of an anomaly in that regard, Hodge said promoters are getting savvier about making these events look affordable, which increases car counts and facilitates higher prize money in turn. "I promote an event in Ohio that had two $10,000-to-win races, and we had 511 racers show up for it," he said. "A few years ago, The Million was $2,000 to enter and it guaranteed one hundred or two hundred thousand dollars. Now they've adopted the SFG [Promotions] concept, where it's $1,500 to enter and guarantees a million dollars. So it's cheaper to enter, and the potential winnings are much higher. That's why they had more than 700 entries this year."

It's the scale of these events that allows for such astronomical payouts, Morgan added. "That big prize money is coming almost exclusively from the entry fees. People are showing up. And the event organizers' end usually comes from those entry fees as well, along with buy-backs. Sponsors typically contribute with product."

Anderson noted that buy-backs are becoming a greater contributor to event revenue. "They help a lot. When there are strong payouts, buy-backs tend to bring in a lot of money, and they can also help make up the difference if an event ends up with a lower car count than expected."

Hodge reported that most racers at the premiere big-money bracket races use buy-backs to stay in the running if they're eliminated in the first round. "I usually figure that 70% of entries are going to buy-back just as a safe number," he explained. "It's normally around 85%, though. Using a race

According to one promoter, requiring racers to register and pay their fees months in advance tends to limit car counts. "Want a lot of race cars to show up? Open the gates to everyone," he said. Photo courtesy of Chris Simmons.

like The Million as an example, it costs $350 to buy back on Wednesday, Thursday and Saturday, so that's $1,150 there. It's $500 to buy back for the million race on Friday. So that's $1,650 on top of the original entry fee. And on Friday, the buy-backs are used quite a bit. If a racer pays $2,000 to enter a race, they're probably going to go ahead and pay another $500 to buy back in if need be."

Yet Bogacki is quick to note that payouts tend to favor structures that will grab headlines more than anything else. "The most successful events generally have guaranteed payouts. Everybody knows exactly what they're getting into when they sign up. When Howard first introduced The Million, it was an attention getter, but it was always rooted in the notion that it would pay a million if the event pulled in four or five hundred cars, something that wasn't really feasible for a number of years. Instead, they would very plainly lay out on the event flyers what the purse paid if there were 200 cars, 300 cars and so on. The payout structure in this type of racing has always been extremely top-heavy, though. Back in the

day, it wasn't uncommon to see a race that would pay $10,000 to win and $1,500 to the runner-up. Today it's more like $100,000 to win and $10,000 to the runner-up. So the scale has increased, but the ratios are pretty similar. As racers, we're often guilty of fixating on what an event costs to enter, and what it pays to the winner."

THE RECIPES FOR SUCCESS

With so many events now vying for racers' attention and participation, Anderson said that the most successful races offer something that goes beyond the prospect of a big pay day.

"It's an opportunity to create a sense of community," he said. "People want to go to an event where they're going to get in a ton of racing and have a good time on track,

"I THINK 2020 WAS A BIT OF AN ABERRATION IN THAT WE HAD FOUR 'MILLION DOLLAR' RACES, INCLUDING TWO THAT PAID A GUARANTEED MILLION."

Whereas large payouts do tend to draw well-heeled bracket racers, "they also tend to keep the locals away," said an event promoter for Kil-Kare Raceway in Ohio. "We hold our events on our home track, and these folks are our friends," he explained. "So the goal for us is to make sure everyone has a good time, and to put together something where the racers feel appreciated."

but it needs to extend out from there. Things like pit parties and side events like reaction time challenges help to create an overall vibe for the event. We find that people feel more inclined to be a part of these events whether they turn on win lights or not because they know it's not going to be just another weekend at the track. It's going to be an experience. To get people to spend their vacation days and hundreds of dollars, they have to feel valued. The grassroots guys are the heart of drag racing, and for the guy who scraped together $400 to do this because it was on his bucket list, this stuff is huge."

Because these events are multi-day commitments, many racers bring their families along as well. "We always have extracurricular stuff going on around the event," said Hodge. "A family-friendly environment is going to be more successful. We have bounce houses for the kids, and some events during the summer will have water slides so they can cool off during the day."

Morgan said that racer attendance ultimately comes down to the types of competitors promoters want to attract. "It depends on the niche that they're after. Really big payouts attract the heavy hitters, but they also tend to keep the locals away. It's important to keep the local racing community happy, though. We hold our events on our home track, and these folks are our friends. We want them to keep coming back. So the goal for us is to make sure everyone has a good time, and to put together something where the racers feel appreciated."

That, in turn, creates an environment that's enjoyable even for the folks who don't end up on the podium. "Don't get me wrong, I love the thrill of chasing after the insane money and everything like that," said Bogacki. "But there's an element of that where things just get really intense, and it's easy to get swept up in that. So recently I feel like there's been more of an emphasis on outright fun. Organizers are now asking themselves what they can do to make these events enjoyable, win or lose. That's a wise move."

Hodge offered a few pieces of advice for would-be event organizers: "Pre-entry requirements—where racers register and pay their entry fees months in advance—

"IF YOU CAN RACE FOR A WHOLE WEEKEND FOR $400 OR SO AND BE IN THE RUNNING FOR $10,000 OR MORE, IT'S PRETTY OBVIOUS WHY THESE RACES ARE GETTING SO MUCH ATTENTION."

tend to scare people off. Want a lot of race cars to show up? Open the gates to everyone. And whatever is on the flyer needs to be followed to a T. A lot of people base their decisions on where they're going to race on what is on the flyer. Deviations from that can lose the trust of the racers."

Bogacki agreed that laying out the ground rules in no uncertain terms and sticking to them are absolutely critical. "To do these types of events on a long-term basis, it's really as simple as doing what you say you're going to do. Having been on both sides of the equation, the biggest mistake that promoters make, in my opinion, is not putting all the rules and procedures on paper. The more that is set down in black-and-white, the less room there is for interpretation—or misinterpretation. It just makes things operate so much smoother." PRI

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BEATING THE STREET?

Race tracks, sanctioning bodies, and promoters have long sought to convert street racers into legitimate track competitors. Here's a look at some of their efforts and programs, the impact they're having, and the challenges that remain.

By David Bellm

After witnessing far too many tragedies as a result of street races, Sheriff Marcos Lopez of Florida's Osceola County is determined to raise public awareness of street racing and its dangers.

He teamed with a drag strip to host a racing event that would attract attention to the cause, while offering street racers an introduction to the safer, legal world of organized racing at purpose-built tracks.

Lopez isn't the first to organize such an event. For more than a decade, tracks, sanctioning bodies and promoters have created events and programs carefully aimed at attracting street racers and steering them toward competing on race tracks. But are these programs actually working? Can they convert street racers into dedicated track competitors over the long term? Are they making a dent in the problem of street racing?

These are tough questions that need to be asked.

To find the answers, we reached out to a variety of industry sources, including sanctioning bodies, tracks and promoters. Their insight shows not only the scope of the problem, but the multi-faceted approach it demands.

THE OTHER PANDEMIC

Street racing has been steadily growing for more than a decade and has reached alarming levels. According to online insurance website Insurify, the national average of drivers who have received a street racing violation is about 6 per 100,000 drivers. Several states have even higher rates; North Dakota leads the way with 41 per 100,000 drivers.

Yet that statistic represents just the relative few who got caught. The actual number of active street racers is certainly far higher than that at any given time, making street racing a massive challenge for tracks, sanctioning bodies and promoters to attack by themselves.

Furthermore, evidence shows that street racing activity has jumped even higher during the pandemic. With many people working from home, roads were emptier than usual, making them appealing settings for impromptu races. At the same time, social activities of all kinds were cancelled due to COVID-19, leaving many car enthusiasts with few other outlets for entertainment.

Photo courtesy of NMCA

Organizations and race tracks that focus on production-based cars are in a strong position to attract street racers. Doing so, however, often requires educating them to alleviate any apprehension.

The difference is striking. According to a May 2021 Associated Press article, Dallas, Texas, police received almost twice as many calls in 2020 for street racing as they did the year before: 8,441 in 2020, up from 4,867 in 2019. The article also reported that New York City received more than 1,000 street racing complaints in six months during 2020, nearly five times as many as the same period the year before.

Besides the far-reaching effects of the pandemic, the reasons for street racing's leap in popularity come from a variety of other factors. "To some extent, the closing of a lot of race tracks is part of the cause," observed Lonnie Grim of NHRA, Glendora, California. "But probably a bigger factor is the general interest in hot rods. Nowadays, more than ever before, you can take a fairly late model car, and with some hand tools and a little bit of money, you can roll a 1,000-horsepower car out of your garage."

While those factors may contribute to the problem, our sources say those effects are dwarfed by the influence of popular media, namely "The Fast and the Furious" movie franchise and the "Street Outlaws" cable TV show. "It's all because of the TV shows," said Chuck Sundstrom of Go Fast Entertainment, Gilbert, Arizona. "We saw that with drifting years ago with 'Fast and Furious.' That's when drifting really took off and people were building those cars and drifting them on the streets. Now we've seen that with drag racing in the last five, six, seven years with 'Street Outlaws.'"

Of course, it can be argued that shows like "Street Outlaws" merely depict a reality that's already there. That may be true to some extent. But consider this: "Street Outlaws" attracts more than a million viewers per episode.

"EVERYBODY HAS TO INVEST IN THE IDEA WITH AN OPEN MIND AND FIND CONCESSIONARY VALUE IN THE FACT THAT IF WE CAN MOVE THAT ACTIVITY OFF THE STREET AND ONTO THE RACE TRACK, IT'S A WIN-WIN FOR EVERYONE."

THE THING ABOUT STREET RACERS IS...

For years now, race tracks, sanctioning bodies and promoters have worked tirelessly to provide appealing venues for street racers, in the hopes that they'll leave behind the dangers of street racing and convert to responsible track competitors. The trend of staging these types of organized track events for street racers actually began decades ago, before street racing reached the mammoth proportions of today.

"In 2000, our executive vice president and general manager, Chris Blair, was working as a drag strip manager at Las Vegas Motor Speedway," recounted John Bisci of World Wide Technology Raceway, Madison, Illinois. "Las Vegas had a terrible illegal street racing problem. Chris looked at some ways to make it an event, but not feel like your aunt and uncle were watching over your shoulder. That became what we called Midnight Mayhem. We had a tremendous turnout."

Since then, race tracks throughout the nation have jumped in with similar events. These programs vary in their specifics, but they typically feature a range of entertainment options for young street racers. Often included are drifting, DJs, light shows, and other energetic youth-oriented elements.

The common denominator between all these events is the cool factor. "If it's too organized, it becomes a Chuck E. Cheese birthday party," said Bisci. "It should be as underground and hip as possible."

Along with the vital cultural and entertainment aspects of track-based street-racing events, there are some other key elements that these programs address. For one thing, street racers often avoid race tracks because they don't know anything about the techniques, terminology and expectations of competing on a race track. It can be intimidating for the inexperienced, which can be a barrier to participation.

In response, street-racing programs at tracks usually take on an educational function, reaching out to participants in a friendly, non-intimidating manner and teaching what it takes to race successfully at an actual drag strip. "We found that a lot of these guys have never been to a drag strip," said Rollie Miller of NMCA, Santa Ana, California. "So we need to spend extra time with them. We'll even walk them up on the starting line and show them the stage beams, the water box and other things they need to know."

By taking street racers under their wing and easing them into the culture of organized track competition, these events are making believers out of street racers across the country. The payoff is evident in the crowds that flock to these events, with car counts often numbering in the hundreds.

WHERE THE DREAM ENDS

So with all these things going for track-based street-racing events, why is street racing thriving? Given the focus of the events, the young demographic that participates in and attends them, and the strong car counts they typically get, it's almost beyond question that these events are introducing a significant number of street racers to organized competition. It would be almost impossible for them not to.

Yet all evidence points to the fact that street racing is more popular than ever.

The difficulty in getting to the reasons why is, in part, a problem of accurately gauging the real impact that track-based street-racing programs are having on street activity. Street racers are, after all, "outlaws." There isn't any official census of them. And having engaged in illegal driving activities, they're usually somewhat wary about even showing up at an organized event that typically has security, track officials and police roaming the pits.

Many race tracks host events aimed at converting street racers into legitimate track competitors. While the overall impact may be hard to measure, there is optimism in the industry to transfer these speed activities to designated facilities.

Track officials and promoters understand street racers' intense desire for privacy, which they acknowledge and respect as one of the conditions it takes to attract this crowd. "They just show up," said Bisci. "And then when they're done or when they're tired, they leave. We don't bother them."

Street racers' need for anonymity

The NHRA's YES Program is designed to familiarize young people with all aspects of drag racing. The Junior Street component of it enables even non-licensed drivers to make drag strip passes.

essentially obliterates any chance for a headcount. And just going off of the overall car count or ticket-gate numbers wouldn't necessarily be accurate either. There's no way to tell which participants do or don't actually race on the street.

Because street racers intentionally fly under the radar in that way, the only group that might be able to quantify the number and overall effect of street racing are law-enforcement agencies. But even they struggle to make an accurate count.

Complaints police receive about street racing often get tagged as "miscellaneous" reports in record-keeping systems, and crashes that result from racing tend to be filed under general causes like "speeding" or "reckless driving."

It's safe to assume, then, that most statistics regarding street racing err significantly on the low side.

Regardless of the actual numbers, track-based street-racing programs should only be seen as one tool in the fight against street racing. They have to be part of a combined effort that includes law enforcement, media and local government, as well as the street racing community itself. "It's all about people putting forth the effort on both sides," said Grim. "Everybody has to invest in the idea with an open mind and find concessionary value in the fact that if we can move that activity off the street and onto the race track, it's a win-win for everyone."

Sadly, tracks and the street-racing events they host are often the voice in the

wilderness. While some of our sources have gained solid cooperation from local law enforcement, many report that police don't seem to care about the programs. The ones that do want to be involved are often hampered by lack of resources.

"We haven't had much luck with local law enforcement agencies," said Sundstrom. "I've tried. The Phoenix Police Department actually has a street racing enforcement group now. We talked about our different programs, but they told me right up front, 'We'd love to do something with you, but we don't have the time or the ability.'"

Ozzy Moya of South Georgia Motorsports Park in Adel, Georgia, echoed that sentiment. "Honestly, it's hard getting Sheriff's departments to cooperate. Some of them just don't want to be any part of it."

Instead, municipalities and law-enforcement agencies tend to place their hopes for combatting street racing on increased legislation and more aggressive enforcement. To that end, a significant number of major US cities have recently passed tougher street racing laws, while police departments are stepping up patrols aimed at potential street racing activity.

> *"WE FOUND THAT A LOT OF THESE GUYS HAVE NEVER BEEN TO A DRAG STRIP."*

Such measures could be effective components in the effort to control street racing. However, there seems to be little if any thought given to where those street racers should go when their clandestine activities are shut down.

Some of our sources report a similar apathy from local news media. News outlets often express little or no interest in these events, except occasionally as a brief tag at the end of a tragic street racing incident they report on. "Although street racing is a big deal in Phoenix, I think there are just too many other things to cover at the same time," observed Sundstrom. "So it gets put on a back burner until somebody gets hurt, unfortunately."

Without this combined effort, tracks, sanctioning bodies and promoters face an impossible task. They don't patrol the streets, they aren't the parents of these racers and they don't enforce the law.

All they can really do is offer a safer, legal venue for street racers.

THE SUNNY SIDE OF THE TRACK

Despite these challenges and setbacks, the sources we spoke to are optimistic about their efforts and believe strongly in their potential to make a difference. "In the last four weeks, we've probably seen 300 to 400 new street racers at our events," Moya reported in October. "I believe that once these guys do it, they'll get hooked on it. They realize they can do it at a race track without getting a ticket and going to jail or causing harm to somebody else. It's been very positive."

Sundstrom has also seen solid evidence of success with his programs, including the NHRA licensing program he runs in conjunction with his track-based street-racing events. "We've gotten 43 drivers their NHRA licenses. Out of those 43 there were only three or four that were actual drag racers. These are people that go and goof around and have fast cars and stuff, and they just come to the program because it looks cool."

Even though many of these programs struggle to get mainstream-media attention, like so many other aspects of youth culture nowadays, word of mouth amplified by social media is ultimately as powerful, if not more. "If we get 20 people in the first race, they go tell all their friends at the next race and more people come out," said Sundstrom.

As for Sheriff Lopez's efforts in Florida, he's demonstrating that law enforcement can be part of the solution, and that doing so can have profound effects. He helped organize the Take it to the Track program, which centered around four weeks of drag racing at Orlando Speed World in October 2021. The program attracted 200 racers from the area, bringing widespread exposure to the dangers that street racing poses.

Equally important, the event sent a message to other law-enforcement agencies that this is a cause that needs attention. "I love the buy-in from the other agencies, it feels like we got what we wanted out of it," Lopez told the Osceola News Gazette. "We've highlighted the awareness of illegal racing."

Moya, who helped organize the Take it to the Track program, offered a similar take on the event, and noted the media interest that the prominent sheriff was able to attract as well. "Once you get one sheriff on board, it seems like all the other ones jump on, too. And Sheriff Lopez got every news station out there, including the Spanish-language ones."

Granted, translating this kind of energy into something compelling enough to lure racers off streets and onto tracks is still a tall order. The carefully contrived fantasy of street racing that "Street Outlaws" and "The Fast and the Furious" movie franchise portray have all the potent drama and scintillating thrills that the best TV and movie producers can pack into them.

HELPING TURN A CORNER IN THE FIGHT AGAINST STREET RACING

An Idaho-based organization has formed one of the first-ever mobile drag racing venues in the state. M.M.A.S.V. Racing (pronounced Massive Racing) was founded by Hayden Horne and Tom Tillotson following the closure of Snake River Dragway in Gooding, Idaho, in 2019.

"That track had been there for decades, so there was a huge group of people that didn't have anywhere to race. These are the out-of-their-back-pocket weekend warriors, so they couldn't travel," Horne said.

Another goal of the organization was to help cut down on illegal street racing in the area. "We also have a huge street racing problem here, so we figured we could kill two birds with one stone," he continued. "Law enforcement are all for it. They back us 100% since they don't want to see drag racing accidents. They've said they notice a decline in street racing on the nights we meet."

With support from county officials and local law enforcement, the group builds and tears down a 1/8-mile circuit near the Hub Butte Landfill in Twin Falls County. They use basic drag strip equipment, including a tree, staging beams, MPH radar systems, a finish line, and a computer and printer. "We also have a volunteer EMT-trained firefighter with a truck and first responder equipment on-hand, with ATVs for quick response," Horne said. "We're fully insured; it's legally sanctioned racing."

"We set up a school bus with music. The atmosphere is just having fun. There are serious drivers with a competitive nature, of course, but it's like a huge family," Horne added.

Required car and driver safety equipment include an approved helmet, a race jacket (or long shirt), long pants, closed-toed shoes, safety harness (or seat belt), mounted batteries, and two throttle return springs.

Events feature bracket, grudge, or heads-up categories—depending on what racers demand that day. "You can't go to a track and ask what class to run, but we get to pick and choose," Horne said, adding they've seen up to 80 cars and 200 spectators in a day. "I have a 1969 Nova that I race for fun, and everyone wants to grudge match it."

Looking ahead, the group is planning to purchase a scoreboard and is working with county officials to secure another road "with a better track surface," Horne said. "That's the thing with a mobile strip: we can go anywhere as long as we have permission."

The efforts mirror a similar initiative in San Antonio, Texas, where local police have teamed up with Alamo City Motorplex to combat dangerous street racing. With the idea of working from the inside, police officers had conversations with illegal racers, convincing them to compete in a controlled environment, i.e., Alamo City Motorplex.

Those that mention the San Antonio Police Department (SAPD) collaboration at the gate receive a discounted ticket and entry fee. The required driver safety gear is a helmet, pants, and closed-toed shoes.

"PRI applauds the efforts of the SAPD and Alamo City Motorplex. Collaborations like these make a serious impact on the local communities' safety," said PRI Vice President of Government and Legal Affairs Daniel Ingber.

The campaign comes after Texas passed laws to help cut back on illegal street racing, including raising the offense to a Class A misdemeanor. Authorities will also now be able to impound vehicles and punish donuts and burnouts made on public spaces.

"It's vital racers follow local laws not only to protect themselves but also those around them," Ingber said. *—Laura Pitts*

Car counts are generally strong at track-based street-racing events, bringing greater awareness to the problem and fostering a word-of-mouth cool factor.

It's tough to compete with that, especially with a reality full of "uncool" things like ambulances, guard rails, officials and police officers all in plain sight.

No matter what, there will always be a significant number of street racers that even the best track programs can't convert.

"Some street racers are in it for the thrill of doing something illegal," said Bisci. "When you're a young person, that's a big draw, like leaving your parents' house and lighting up a smoke, or going behind the garage and drinking beer, or something like that. It's just the thrill of doing something illegal.

"We'll never completely erase the problem," he admitted. "But we offer a safe alternative." PRI

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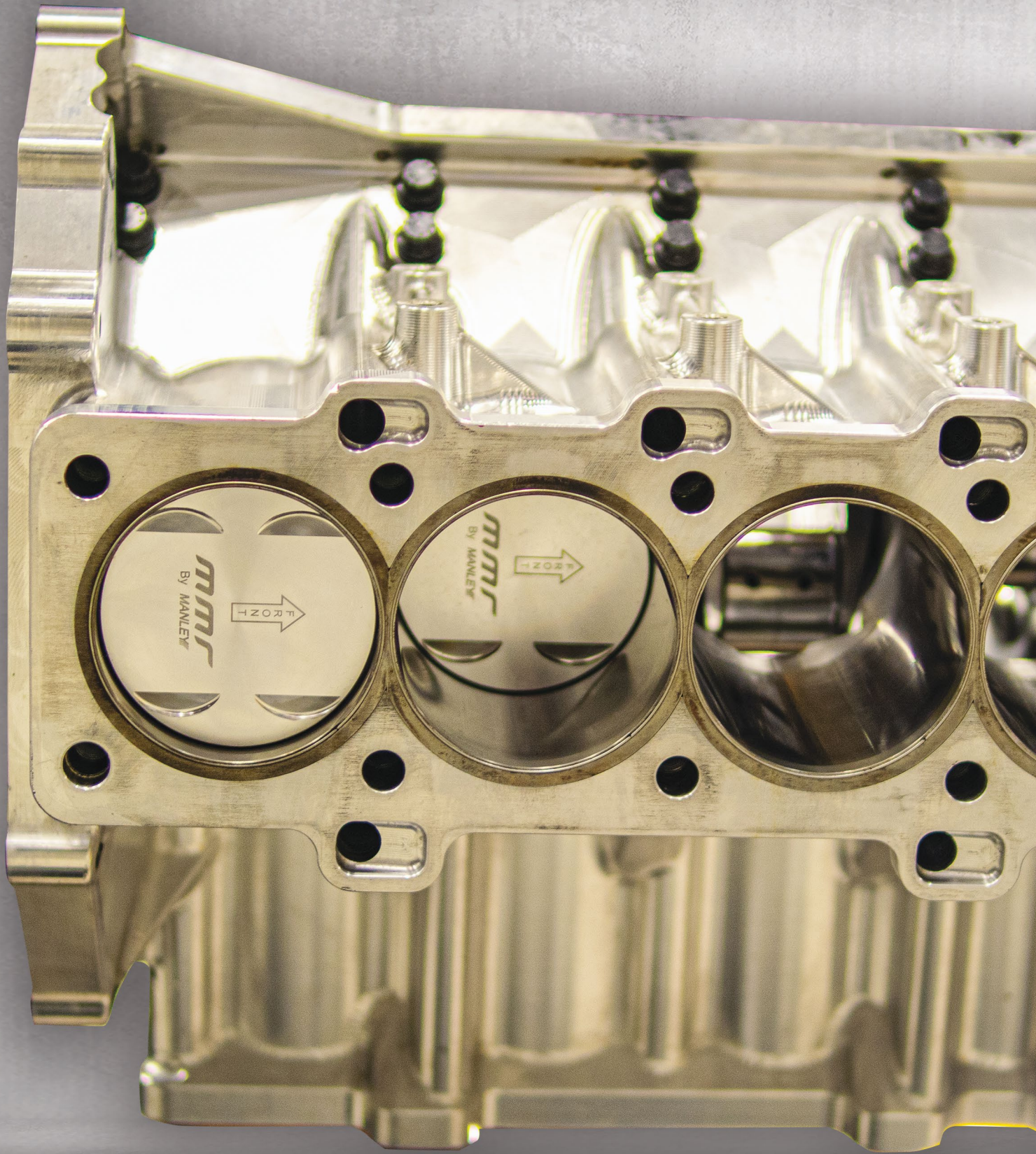
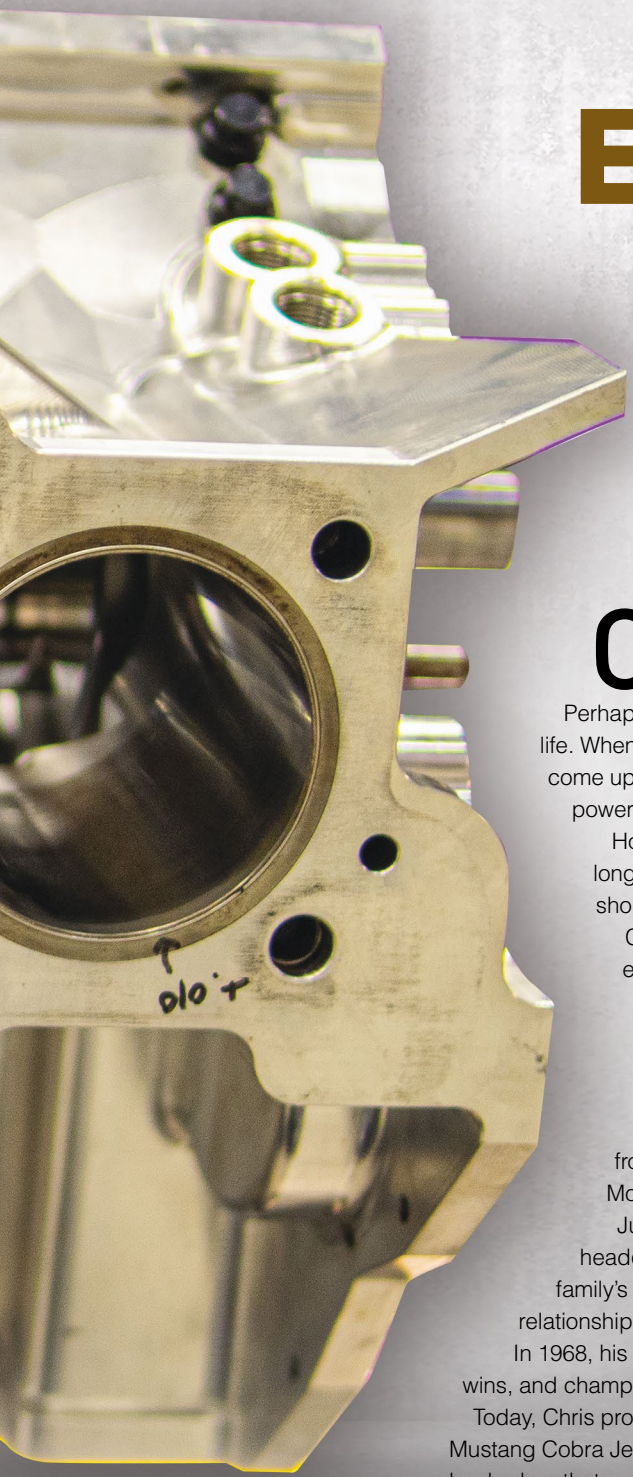

By MANLEY

BUSINESS PROFILE

HOLBROOK RACING ENGINES



FOLLOWING A LONG FAMILY HISTORY OF RACING SUCCESS GOING BACK TO THE 1960S, HOLBROOK RACING ENGINES HAS EARNED ITS PLACE AMONG THE GREAT ENGINE BUILDERS BY COAXING REMARKABLE POWER FROM FORD COYOTES AND OTHER POPULAR ENGINES.

By David Bellm

Chris Holbrook is clearly in his element. Despite the whirlwind of activity that whips through his shop every day, he speaks on the phone with a relaxed, easygoing manner that sounds more like someone at a picnic.

Perhaps that's not surprising. He's been around racing and engine building literally his whole life. When asked if there's an engine combination he's built that seems "unusual," he struggles to come up with an answer. He's pretty much seen it all, built it for racing and dyno'd it to glorious power figures.

Holbrook is a racer to the core. He learned by watching his dad, Carl, ply his trade in a long string of successful Super Stock drag cars. Eventually, Carl Holbrook opened an engine shop, serving a wide array of race and street customers.

Chris followed in his father's footsteps, rising through the ranks of drag competition, eventually winning the 1999 IHRA Pro Stock championship. Shortly after that accomplishment, "around 2005," he launched Holbrook Racing Engines, building engines that continue to power his customers into the winner's circle year after year.

THE BLUE OVAL CONNECTION

Located in Livonia, Michigan, Holbrook Racing Engines is about a 45-minute drive from Milan Dragway and some two hours from Summit Motorsports Park and US 131 Motorsports Park.

Just as significant, the shop is also a short ride from Ford Motor Company's Dearborn headquarters. The Blue Oval brand has always held a prominent place in the Holbrook family's efforts. "I think from my Dad and me running Ford products all our lives, that's where the relationship started."

In 1968, his father bought a Mustang Cobra Jet and began racking up a potent string of records, wins, and championships in NHRA Super Stock, earning him the nickname, "Captain Cobra Jet."

Today, Chris proudly carries on that legacy. In 2013 he teamed with Watson Racing to campaign a 2013 Mustang Cobra Jet, culminating in a win at the NHRA Nationals in Indianapolis. The following year, he backed up that success with a 2014 CJ that won that year's NHRA Best Engineering award.

Through these efforts, Holbrook gained valuable information on the Coyote V8 Mustang, what it's capable of, and what it takes to win races with it—wisdom he gladly passes on to customers.

Chris Holbrook, at center left, lives a life devoted to racing, running a busy engine-building business, campaigning a string of successful drag cars, and grooming his son, Del, to continue the legacy.

Recently, Holbrook began campaigning a 2000 Mustang. "This is our first year out with the car, so we're still getting used to it," he said. "It's in an eighth-mile class, and 4.52 has been our fastest ET. We actually set the speed record for NMCA at 161 and change."

Besides its record-setting performance, his latest car has another thing in common with his previous Mustangs: Coyote V8 power. With the on-track experience he's gained with this engine, his shop has become the go-to for racers looking for an edge with it.

Accordingly, Holbrook said the Whipple-supercharged Coyote V8 has become the shop's bread-and-butter engine combination, making up a large percentage of the jobs they're working on at any given time.

"I think the Ford Coyote is a growing market in general," said Holbrook. "But it's also been coming our way because we ran a lot of the NHRA Factory Stock Showdown. Our team and some customers did quite well with it. Now we're kind of switching over into NMCA and NMRA and running some of their classes with the Ford Coyote engine, and we're again doing well. So our business is just following that."

Holbrook also handles warranty work on Ford's crate engines. "If the customer has an issue, the engine comes here," he said. "We take it apart, and then Ford engineers come over and evaluate everything to determine if it's the customer's fault, something wrong with a part or an assembly error."

Even with these strong connections to Ford products, Holbrook doesn't have an exclusive relationship with the Blue Oval brand. At any given time in his shop, there are plenty of other street and race engines being carted around, waiting for the Holbrook magic. "We'll do an LS engine for the street, a Coyote for the street, a small block Ford, small block Chevy, big block. We do a wide variety," he explained.

Chris Holbrook has built a reputation for modern Ford race engines, such as this billet-block, tall-deck Coyote V8, but the shop will tackle practically anything customers bring in.

"THERE ARE ABOUT 50 TO 70 ENGINES IN OUR SHOP AT ANY GIVEN TIME."

ENGINE CENTRAL

For the amount of work that goes through Holbrook's shop, one might expect the facility to be something more monumental. Granted, at roughly 7,000 square feet, the brick-faced industrial building Holbrook and his team work out of isn't a tiny corner garage. But then Holbrook casually mentioned how much he and his crew work on day after day, year after year: "There are about 50 to 70 engines in our shop at any given time. We're definitely out of space."

To do the work, Holbrook and his crew rely on proven equipment they've used for years. "For honing, we use a Sunnen hone with diamond stones, and we have a Sunnen line hone," he said. "Then we have a Serdi head-seat machine and an RMC machine that does the block work."

While many shops are making the leap into CNC equipment, Holbrook has taken a more conservative approach, sticking with what he knows best. That said, he doesn't rule out switching to CNC. "We definitely want to get into more of the CNC stuff," he said. "Matter of fact, my son is taking CNC machining in college right now, so hopefully our plan is to get more CNC equipment."

The most important piece of equipment in the shop just might be the SuperFlow engine dynamometer, which is in almost constant use. "If we build a complete engine, I always push to put it on the dyno," said Holbrook. "And we have some outsource customers who bring their engines in, and we dyno and tune them."

POWER PEOPLE

Like any other proven business, the success of Holbrook Racing Engines largely comes down to the people doing the work every day. For that, Holbrook relies on a lean staff of dedicated pros.

Holbrook runs the day-to-day business,

Holbrook Racing Engines maintains a brisk workflow despite having a relatively small staff. The crew is a mix of specialists and generalists, allowing them to handle varying demands effectively.

with administrative help from his wife, Holly. Out in the shop, he relies on a mix of specialists and generalists. “There are a couple of guys who do whatever needs to be done, one guy who does a lot of the block machining and cylinder-head work, and then we have two guys who do a lot of the assembly.”

Despite the relatively small headcount and the high volume of work going through the shop, Holbrook’s crew enjoys a pretty standard 8-to-5 workday, with three or four extra hours on some Saturdays.

Holbrook learned a long list of things from his dad, but his methods of supervising people aren’t among them. Instead, he developed his own, lighter touch for motivating and managing his team. “I grew up working for my dad, and I loved him to death,” he recalled. “But if you were one minute late punching in, he reamed you. And lunch was from this time to this time—or else. I don’t want to be that strict. I try not to burn my crew out.

“We have a good time here,” he added. “A happy, fun shop is a good running shop. If everybody’s pissed off at the boss, it just doesn’t help productivity.”

Holbrook's emphasis on keeping things light has paid dividends in terms of retention, a necessity in an industry that depends heavily on a limited pool of specialized craftsmen. "It's a tough business," he admitted. Because fewer and fewer people are taking up the trade, "you've got to keep the people you have who are good and give them something to work for. One guy has been with me pretty much since I opened. The other ones have been here eight to 10 years."

THE BUSINESS OF RACING ENGINES

With nearly two decades in business, and a highly visible racing program of its own, Holbrook Racing Engines is well established in motorsports, particularly in drag racing. This gives the business the luxury of a steady demand year in and year out. "We get our customers mostly by word of mouth," explained Holbrook. "A lot of that is because of our racing program. It goes back to that old saying, 'Win on Sunday, sell on Monday.'"

To augment the publicity from racing, Holbrook Racing Engines is the presenting sponsor of the NMCA Muscle Car Mayhem in Bradenton, Florida. Other than that, Holbrook professes to do little or no actual marketing for his business. The same goes for his online promotional activities, which for the most part get lost in the ongoing hustle of getting work through the shop and into customers' hands.

"We need to do more online marketing," said Holbrook. "But to be honest with you, we're always so busy. We just don't have time for that. You just do the day-to-day things, and that other stuff gets forgotten."

There's an even more urgent problem facing his business: parts shortages brought on by the pandemic. "I spend my days chasing down parts, wondering how to get them and asking how fast we can get them," he said. "We've got jobs waiting."

"IF WE BUILD A COMPLETE ENGINE, I ALWAYS PUSH TO PUT IT ON THE DYNO."

Chris Holbrook knows that success in both racing and business is always a team effort. To keep his crew motivated, he relies on a light, easygoing management style.

Amid these challenges, he's grooming the next generation of his family to play a role in the Holbrook legacy. In particular, his son Del is taking an active role in the shop and its racing endeavors. The 18-year-old just graduated high school and is jumping full-force into the action.

Besides studying CNC programming and trying his hand at race-track photography, Del pilots a recently built Ford Mustang with a naturally aspirated Coyote engine, competing in NMRA and NMCA Open Comp. "We're getting his feet wet in it before we get into heads-up racing," said Holbrook.

With a past full of accomplishments, a shop full of work and a family that keeps involved in all of it, Chris Holbrook is in an enviable position. While he continues to enjoy the fruits of his labor, racers throughout the country put his engines to work setting records, pummeling competition and pushing the boundaries of drag performance. PRI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HAPPY DAYS

With cam designers constantly pushing the limits, valvetrain engineers have stepped up their game to keep engines content.

By Mike Magda

Keeping the valve springs "happy" is an excellent summation of the direction that camshaft and valvetrain development has taken over the past decade. Valvetrain failures used to dominate conversations in garages and engine shops, but those grumbles have slowly been silenced by a number of factors, including better materials, extensive testing and improved manufacturing processes.

"We've never stopped working on parts," said John Partridge of Bullet Racing Cams, Olive Branch, Mississippi. "Of course, we're always looking for power, and valvetrain control is the biggest issue."

The valvetrain has been drawing more attention in recent years, even though the camshaft is the drum major that directs the marching band of valvetrain components.

"It's the entire combination," added Nolan Jamora of Isky Racing Cams, Gardena, California. "More people have dynos, and we get really good feedback and know the range where they want to dial in a little bit more."

"But the cam guys are always pushing the limits," noted Trip Manley of Manley Performance Products, Lakewood, New Jersey.

NO CAMSHAFT TOO BIG

Camshaft manufacturers are able to push those limits to unexpected extremes because of improvements in lifter design, pushrod stiffness, valve-spring durability and lighter but stronger valves. They're also beefing up camshaft construction with tougher steel materials to reduce camshaft twisting and bending that interferes with the optimum timing of valve events or creates unwanted harmonics in the system.

"A lot of guys are upgrading their camshaft materials, even in classes like Top Sportsman and Top Dragster," said Guy Aguayo of Crower Cams & Equipment Company, San Diego, California. "They're going from 8620 steel billet to 9310 cores. It seems like there's no such thing as a camshaft that's too big. Guys are going over 1-inch valve lift on a regular basis. They're getting to just under what a Pro Stock engine would use."

Callies Performance Products in Fostoria, Ohio, has seen this trend in upgrading cam cores as it offers two popular types to the industry, including tool steel and induction-hardened, or carburized, 8620 steel.

"Tool steel is in a class of its own," said Brook Piper. "But a lot of guys like the induction-hardening because that's what the OEMs do. It's less expensive and good for a variety of applications. So, it all depends on what they like."

The Callies cores are rough machined to the proper bearing size and lobe pattern before race shops and cam companies finish grind to the exact specs. Piper said the company is slowly starting to finish-grind more cams for a wider customer base. Most of the current finish-grinds are for users who need a high number of similar cams at once, such as a Top Fuel team.

So much attention is paid to camshafts these days because it is a significant part

CAMS FOR DRIVERS

Developing and tuning an engine to suit a specific driver's tendencies instead of building for maximum horsepower is a rather common strategy in today's team garages. Camshaft designers are all too familiar with such requests, yet there are many nonbelievers.

"I had one guy, the only time he didn't finish dead last was if somebody broke or crashed," recalled Eric Bolander of Howards Cams, Oshkosh, Wisconsin. "We listened to him on how he thought he drove. Then I listened to his boss to find out how he really drove."

Bolander's team put together an engine package on paper that everyone thought was "totally screwed up," but the young driver finished second the first time out with that engine setup.

"We gave him a really predictable cam that worked with his right foot," explained Bolander. "It didn't make him jerky, no matter what he did. It really got him to be smooth and fast."

Over at Isky Racing Cams in Gardena, California, Nolan Jamora said he always asks about drivers' styles. "You could say it might differ from track to track," he noted, "but rarely will they switch styles that they grew up with. That is something we consider when grinding a cam today. One guy isn't going to need as much coming out of a corner and he'll want more midrange. Whereas another driver will want to run full throttle right up to the turn, jam the brakes and pull out with all the torque we can give."

Drag racing also has its distinctive challenges.

"We have different grinds for No Prep racing," said Jamora. "We have Pro Mod and Outlaw engine combinations that are the same but with totally different cams because of what they're experiencing, track-wise."

Road racing presents a more taxing task to the cam developer because there are so many more variables. Yet the key is keeping the engine strong coming out of the turns. Billy Godbold of COMP Cams in Memphis, Tennessee, said designing an engine around the driver starts first with the engine and application basics.

"Once the engine configuration and operating requirements are understood, we start to focus on the driver." Godbold, who runs an LS-powered BMW in road-racing events, speculated on a theoretical race between himself, a "talented" driver and a "phenomenal" driver, such as Tony Stewart or Kyle Larson, and how the engine builder should think about driver abilities in the turns. The key is understanding the gears and operating rpm that each racer would utilize for the same turn—and understanding how the resulting cam specs will be "rather surprising."

"The cam for me and a Kyle Larson would be very close to the same," theorized Godbold. "I would be exiting the corner at a lower speed in third gear, and he might come out 15 mph faster and in second gear. If I shifted down to second, even at the lower speed, I would probably get into the throttle too fast and spin the car.

"A very good, yet not exceptionally gifted driver would come out of the same corner 10 mph faster than me but 5 mph slower than Kyle," he continued. "They would have the throttle control to be able to control all the available torque in third gear, but not the car control to be shifting faster all the way back to second and running through the gears."

Through a collection of charts that compare engine rpm, speed in each gear and exit speeds, Godbold put together a strong case that shows how different types of drivers can take advantage of specific cam designs that are sometimes very close together in cam strategy. Consider the following: "For the talented driver faster than me, the only reason he does not want an extra 33% wheel torque in second gear is all the shifting required takes away his concentration on the racing line. He's faster not shifting as much as Kyle Larson but also needs the added 5% to 15% torque we can give him in the 4,000–5,500 zone with a later exhaust opening and earlier intake closing. Sure, that will take away a few percent from 7,000–8,000 rpm, but he is only there at the end of the long straights and will have better lap times and set up passes more easily with more grunt coming off the corners at lower rpm.

"For Larson or Stewart, they're not even thinking about shifts," continued Godbold. "They just blip the throttle as the engine approaches the redline and their right hand executes the shift almost like an involuntary response. These drivers only see that 4,000–5,500-rpm zone in the pits or during the victory lap. Giving them more in the 6,500–8,000 zone is paramount for best lap times." *—Mike Magda*

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of the engine's overall power potential, and it's a hardware component that can easily be changed and tested. Very few engine builders will change piston design, intake-manifold dimensions or cylinder-head porting without having first tested a variety of cams.

"Everyone is looking for an edge. Three or four horsepower used to be a butt whooping in Cup racing. Now it can be a butt whooping at the Chili Bowl or something like that," added Chris Straub of Straub Technologies, Piney Flats, Tennessee. "I tell them that cylinder pressure creates torque at the end of the day. Torque and rpm create horsepower."

Ironically, one of the keys to gaining a small valvetrain edge lies in the cylinder block. Straub recalled an engine builder telling him that a Straub camshaft was off by six degrees when installed, even though the cam had checked out perfect on a Cam Doctor. Straub asked about the block and discovered it was one that had a reputation for inaccurate lifter-bore positions.

"Long story short, one intake valve out of eight was correct on the camshaft lobe because the lifter angle was correct in the block. The other seven were wrong, and they varied from as much as four degrees advanced to three degrees retarded," said Straub. "Correcting the lifter-bore angles can mean 30 horsepower. That's a big difference."

Engine builders are taking advantage of the latest CNC technology to ensure accurate lifter-bore angles and positions. They're also increasing the lifter-bore diameter to support roller lifters with larger wheels, which in turn allow more aggressive lobe profiles. But those new lobe profiles can also be hostile to the valve spring on the opening cycle.

"If we can keep the spring from going into flux, we can do a lot more on the closing side," explained Partridge. "Basically, it's a design thing where we're tweaking how aggressive we get at low lift and how much we move it in the middle to keep the spring from getting excited. If we can keep the spring happy, we'll make more power. As soon as that spring gets unhappy, it's going to lose power."

"It's tough to figure out the ramp speed with bigger cams. Sometimes the ramp speed can be a bit slower with cams that have a large base circle," said Aguayo, noting that these discussions generally

Cooperation with engine builders often leads to innovation. Isky Racing Cams can develop specs and grind cams "in about 30 minutes," according to our source at the company.

cover big-displacement drag racing engines. For circle-track racers, the strategy often focuses on not allowing the engines to overpower the track. "If they can keep from spinning the tire out of the corners, that's ideal. For some drivers, the camshaft and engines are so aggressive that they keep spinning the tire. We need to tone them down a little bit. But the big sprint-car engines, they still use a big camshaft."

CUSTOM CAMSHAFTS

Tailoring camshafts to specific events, tracks and drivers basically means that most racing cams are custom made for engine builders. That process requires an enormous amount of information.

"Sometimes, people are a little surprised by the questions when they call our tech line," said Billy Godbold of COMP Cams, Memphis, Tennessee. "Clearly, we will want to know about the engine, but they wonder why so many questions about the vehicle, track and driver specifics?"

Godbold described a detailed process, noting that the information required goes well beyond physical dimensions (including rod-to-stroke ratio), understanding all the airflow characteristics (both intake and exhaust), compression ratio and fuel type. In fact, even piston design has a strong influence on cam choice and will be considered by the tech reps.

"Perhaps the most important thing we will then ask about has to do with piston-to-valve clearance," said Godbold. "Many engine builders can accommodate large valve reliefs, but these will often greatly reduce combustion efficiency. With an unrestricted engine that has great headers

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For more info: *iskycams.com*

The dramatic improvements in valvetrain technology seen in the last few decades come mostly from extensive failure analysis, improved materials, and exhaustive testing. Photo courtesy of Manley Performance Products.

and a well-tuned intake, the engine may well want as much overlap as you can throw its way for maximum airflow and filling [the cylinder]. But the big reliefs required can hurt combustion efficiency, more than offsetting our potential gain in flow. Understanding these factors is hugely important."

The application basics are then covered in full detail. "We always ask about rpm, but in general it is difficult for more engine builders to focus on where the vehicle performance matters the most," said Godbold. "These types of considerations are often even more important in circle-track racing. Races can be won or lost on restarts, so we often ask multiple questions about the competition. Knowing where we are going to focus will greatly change how we set the exhaust opening and intake closing, and perhaps even the overlap we select. Every form of racing has very similar needs, which all require attention to 'torque curve shaping.'"

Once these factors have been established, driver styles will be considered (see sidebar on page 98) to help determine the camshaft's general specs. Finally, there are valvetrain limits and durability targets to consider. Key details include valve weight and pushrod/rocker-arm stiffness.

"We sometimes have the customer check his lift with full open load versus just checking a valve spring to calculate system stiffness, especially in combinations that are very well developed," said Godbold, adding that the number of engine cycles are then considered. "It would blow your mind to compare the cycles on a NHRA Top

Fuel run versus something like a five-mile Bonneville pass. Circle track and events like Drag Week move that decimal place over several more places."

CRITICAL ELEMENT

After all those calculations, the valve spring is the last critical element to be considered (see sidebar on page 104).

"Knowing the rocker ratio, general installed height and coil bind height, our technicians will be sure not to leave way too much or too little room at max lift," added Godbold. "Finding the right combination requires a full systems approach."

Working directly with engine builders who have dyno facilities and strong testing programs prompted Isky to purchase a new cam grinder to help reduce turnaround times for custom camshafts.

"We can come up with the grind specs, send them over and grind the cam in about 30 minutes," said Jamora. "An engine builder could call up and tell us to add a couple degrees duration and put in three degrees of advance—we can do it that quick."

Key to the program's success is having enough cores in stock and having enough notice to finish the grind before the last shipping service pickup. Isky has also refined its popular bushed-lifter program by narrowing the choice of materials for the bushings to just two. Also, oiling strategy has been modified to increase durability, and the line has expanded to hydraulic rollers in many popular engines.

"We do lifters for Harley-Davidsons now," added Jamora. "That's how well the bushed lifters have spread to different applications."

Victory 1 Performance has moved all of its titanium valve manufacturing under one roof, shortening turnaround time and improving responsiveness to customer needs.

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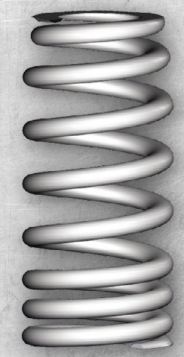

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For more info: *summitracing.com*

For open or unrestricted engines, cam suppliers have considerable flexibility. Some classes of racing, however, have limits on cam design, such as restricting the amount of total valve lift or requiring a minimum vacuum to control aggressive lobe overlaps.

"With some guys, we have to wrap their heads around the fact that we're not making the best cam for the motor. We're making the best cam for the rules," noted Eric Bolander of Howards Cams, Oshkosh, Wisconsin. "Sometimes it's just a matter of getting good feedback from the customer about what the car is really doing and where the driver actually wants his power. Engines make about 3,500 rpm of good power, and that has to come from somewhere."

Bolander recalled a customer who complained that his car was "lazy" at the drag strip, and he wanted a new camshaft that provided more torque.

"He calls back to tell me that he launched the car, put it on its back bumper and tweaked the quarter panels," said Bolander. "He thought I was responsible because I gave him a cam with so much more torque. I said I am just the cam guy, not the driving instructor."

ADVANCED COMPUTER SIMULATION

Camshaft designers have generally relied on experience and a few math formulas when determining the specs for a customer. However, advanced computer simulation software now assists that operation at some shops. For example, Bullet Racing Cams is using a very sophisticated modeling program developed in Europe that has proven to be quite accurate.

"We took that information and ran it on a Spintron to see if it was accurate, and it was," said Partridge. "We can take into account a lot of things, such as valve and rocker weights, spring rates, contact points. It's really a lot simpler than running on a Spintron. We found it tells us more than the Spintron does."

What Bullet is looking for goes back to keeping the valve springs happy. Partridge can make incremental changes in lobe design to see how they affect the entire valvetrain. The more information that the engine builder can provide to feed the computer program, the more accurate the engine model will be. Since Bullet works mostly with drag racing and circle-track teams, the research is more focused.

"We're too small to be everything to everybody," said Partridge. "It all trickles down. A guy with a high-end bracket car wants his stuff to be just as happy as the guy with a Pro Stock motor. We try to pass on the technology."

Most recently, Bullet has been studying boosted applications and learning how to leverage lobe-design strategies developed for naturally aspirated engines.

"It all goes back to keeping the valve spring happy," said Partridge. "We were able to take engines running at 10,500 and get them to 11,200 rpm just by doing some tweaking. We've focused a lot on supercharged engines because that's a big part of the market for us."

While software keeps Bullet moving forward, extensive dyno testing is helping Cam Motion in Baton Rouge, Louisiana, develop new cam strategies. One connection sometimes overlooked by engine builders is the relationship between the cam and the intake manifold runner lengths. The company recently conducted exhaustive dyno tests with a 6.0-liter LS engine equipped with stock 706 cathedral-port cylinder heads. Tests compared the factory intake manifold with 11-inch runners against an Edelbrock Super Victor with a carburetor and sporting runners about 6 inches long. Standard 1 7/8-inch diameter tubular headers were used for all tests.

Junkyard Dog and Titan King cams were tested, and both had similar lift numbers and exhaust duration. The only difference was that Titan King closed the intake valve four degrees later than the Junkyard Dog version.

"The long runner plastic intake appreciated the later intake valve close event much sooner than the shorter runner Super Vic intake," explained Steven Balusik. "The 47-degree IVC (intake valve close) camshaft did not surpass the 43-degree IVC cam until 6,500 rpm when used with the short-runner Super Vic. Whereas the later 47-degree IVC camshaft caught up to the earlier 43-degree IVC cam at 5,100 rpm when using the long-runner OEM plastic truck intake. The shorter runner intake had more power under the curve with an earlier intake valve close event."

Cam Motion conducted a similar test with LS3 rectangular-port heads, and the results were similar. "However, the larger cross-sectional port and larger valve of the LS3 head needed less duration than the smaller cathedral-port head to achieve the same rpm levels and power peaks," noted Balusik. "As you can see, camshaft design has an intricate relationship with intake manifold and cylinder head design. This is why we offer different camshaft designs for single-plane manifolds, and we commonly recommend different cams for different cylinder head designs."

VALVETRAIN CONSIDERATIONS

Valve selection strategy is quite a bit simpler than picking springs or firming up cam numbers. Everyone wants the lightest valve possible that is also strong enough to withstand the competitive elements. Rules often restrict titanium, so stainless steel is the next choice. High-heat, high-boost and high-cylinder-pressure applications may need Inconel for the exhaust valves.

Regardless, valve manufacturers have their favorite, and sometimes proprietary, alloys. Some offer different alloys to serve different applications and price points. They also have tricks to reduce weight, such as undercutting the stem, dishing the valve face or hollowing out the stems. Finally, there are coatings to improve durability.

"Coatings are becoming more prevalent. We'll use a CrN coating on the seats of titanium valves, which allows you to run steeper seat angles and increase the

SPRING INTO ACTION

Increased efforts in valve-spring development have also led to more precise strategies in selecting the correct spring for a particular application. There certainly is no shortage of choices, with single, dual, triple, beehive and conical designs on the market, sometimes all from the same company with considerable testing to help validate the recommendation.

"People ask about loads, but we find that the spring mass and frequency are at least as important as the seat and open loads," suggested Billy Godbold of COMP Cams, Memphis, Tennessee. "Valve springs and the camshaft profile are very much dancing partners. The profile leads, requiring the valve spring to follow along at low lift and then control the system at high lift. Finding the right combination requires a full systems approach."

Jack McInnis of Erson Cams in Louisville, Kentucky, confirmed that rationale. "The primary factors when selecting valve springs in a racing engine are valve lift and rpm range along with the aggressiveness of the camshaft profile," he said. "As engine rpm increases, so does inertia—resistance to changes in speed and direction of the valvetrain components. The valve springs play a critical role in maintaining control of those changes."

Striving for the smallest diameter spring that will work is also proven advice, as long as the spring is strong enough to keep the lifter in contact with the camshaft.

"The larger the coil, the more amplification of harmonics," said Chris Straub of Straub Technologies, Piney Flats, Tennessee. "Wire diameters go up in some cases or are smaller in some cases. But the actual size of the valve-spring OD has come down because of improved materials, and we've learned a lot as far as harmonics. Because a larger coil amplifies harmonics, we want to keep that down to a minimum."

The topic of harmonics is a perfect segue into what many believe is the key element of selecting valve springs: the desired clearance between the spring coils at full lift. In other words, what is the measurement at full valve lift before the coils actually touch or bind together? The following sample of quotes from industry leaders shows there are both aggressive and conservative approaches to this topic.

"At maximum valve lift, most engine builders want the valve spring to be within .050- to .060-inch short of coil bind," said McInnis of Erson Cams. "This almost coil-bound condition returns the coil spring to a uniform, stable shape on every closing cycle. If there is excessive space between the coils, the spring will be unstable."

"Endurance valve springs have to run lower stress rates than a drag race spring, but almost all valve springs need to be run within .080-inch from bind at max lift to dampen coil surge at high speed," explained Godbold of COMP Cams. "This can be difficult to understand, but because of the distance to bind and installed height parameters, running 0.550-inch lift camshaft with a 0.675-inch spring or 0.750-inch camshaft with a 0.900-inch spring can be almost as hard on your valvetrain as trying to run the other way around."

"When I grew up in the shop, we were taught .070- to .100-inch clearance before coil bind," said Straub of Straub Technologies. "Well, that's the length of a football field these days. I mean, we've got people bringing the intake to almost zero—actually stacking the spring because that takes all the harmonic effect out. There's no reverberation on the valve spring whatsoever. On the exhaust, they're still keeping it in the .050- to .060-inch range. So, minimal coil bind is actually advantageous in some cases." *—Mike Magda*

Valvetrain materials continue to evolve. Tool steel is gaining popularity for camshafts, alongside induction-hardened 8620 steel, observed our source at Callies Performance Products.

flow," said Manley, noting that materials haven't changed much over the years, but the manufacturing process has improved. "Manufacturing is really dialed in. Everyone has tightened up their acts with machining, finishes and really tight tolerances."

"We're doing more with the nitride coating on our Black Lightning line of stainless valves," said Ian Levitt of QualCast, Nashville, Tennessee, noting heavy-duty applications are driving much of the development. "The demand is for diesel and natural gas engines, both stationary and off-highway applications."

Victory 1 Performance, based in Mooresville, North Carolina, recently moved its CrN coating process in-house to put the complete titanium valve manufacturing under one roof. This move shortens turnaround time, since all valves are custom made there. However, when a valve does fail, manufacturers are quick to work with the engine builders to identify and solve any problem.

"Most of the time, customers don't have access to failure analysis, whether metallurgical or physical," said Derek Dahl of Victory 1 Performance. "We've seen just about everything when it comes to engine failures. We have had the great opportunity over the years to work with some of the most innovative and curious engine builders."

One area where weight isn't much of a concern is the pushrod. They keep getting as large as the block and heads will allow. Right now, the fattest is 3/4-inch in Pro Mod, but everyone is striving for the strongest, stiffest pushrod available to reduce valvetrain stress and harmonics. Trend Performance, based in Warren, Michigan, is known for producing some of the strongest pushrods on the market, yet other components that work with the pushrods were leading to failures.

"We were noticing fail points around the radius of the pushrod tip," said Steve Rhodey, adding that the rocker adjusters on some pushrods were extremely hard. "We also noticed tooling marks on the adjusters, which were assisting the problem and causing severe galling."

Manufacturing a tool-steel tip solved some problems, but Trend continued to see problems when open seat pressures exceeded 800 pounds. So the company developed its own line of adjusters with a material that was more compatible with Trend's pushrods, as well as other pushrod manufacturers' products.

One expanding market for pushrods is diesel. "The Powerstroke market has been huge for us," said Rhodey. "There are a lot of bulletproofing kits going around, like stud kits and head gaskets. We have an upgrade to one-piece, 4130 chromoly pushrods that measure 11/32-inch diameter." Some engine builders are asking for tool-steel valve retainers and locks, he added, due to the increased stresses on the valvetrain in boosted applications.

"We're also seeing a new interest in tool-steel retainers," agreed Ed Doyle of CHE Precision, Newbury Park, California. "The concern is not so much about how much they weigh, but how much more life can they give the customer. We can get these retainers close to titanium, but they will never be as light." Recent development at his shop has focused on new products for the Gen III Hemi and new Ford 7.3-liter Godzilla V8.

At the end of the day, valvetrain technology has improved vastly in the past couple of decades because of extensive failure analysis, improved materials and exhaustive testing.

"Today you can build a 1,000-horsepower street engine," said Manley. "It's pretty reliable because of all the years that people broke engines and learned from it!" PRI

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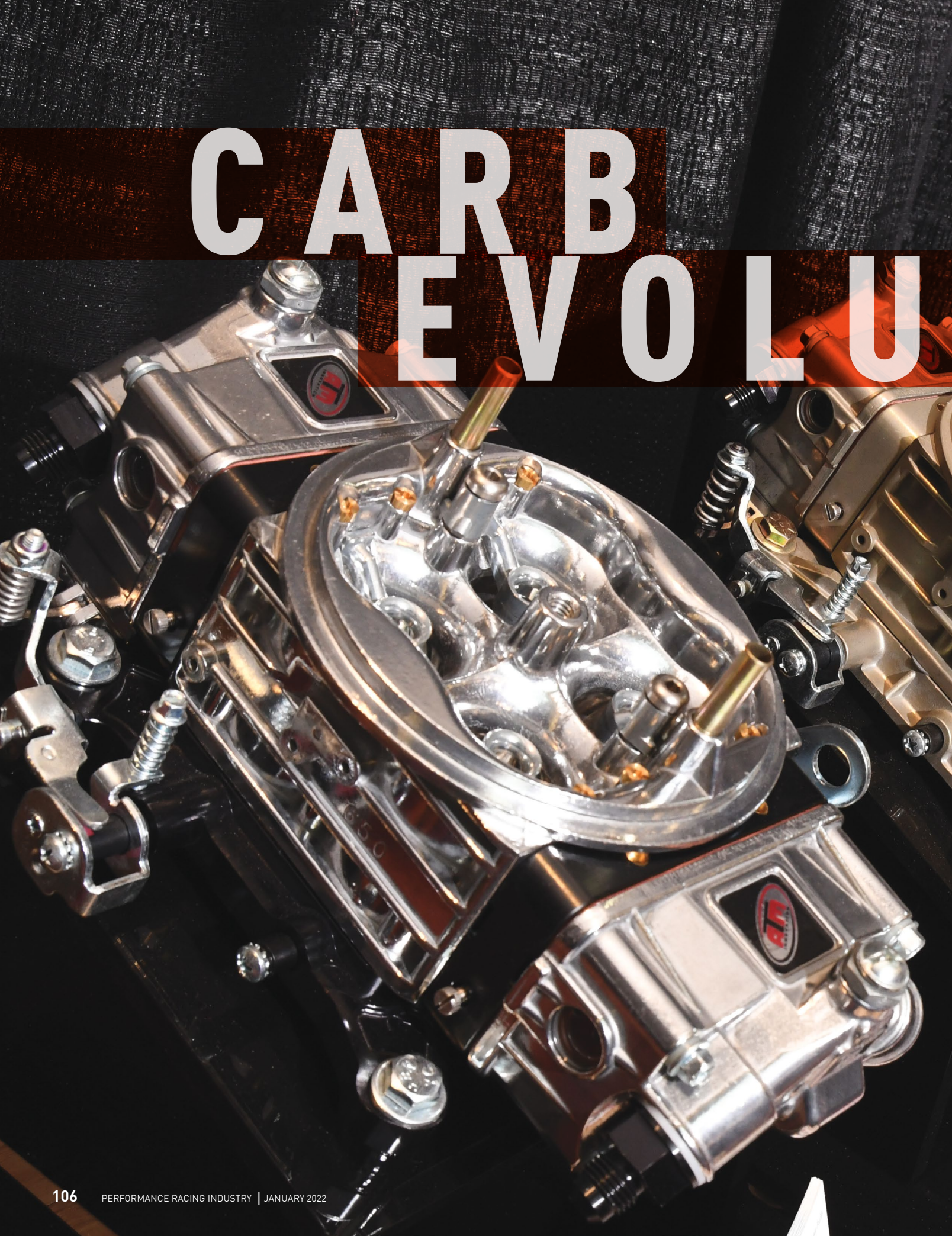


TION

Manufacturers keep up with race engine changes through constant R&D and on-track testing. Here's a look at what's new, plus tips on whether to rebuild or replace a worn component.

By Drew Hardin

For some racers, electronic fuel injection represents the cutting edge of engine induction technology. That case certainly can be made, given the large number of tuning parameters that are precisely manipulated by the latest computer software. Yet for others, that complexity doesn't appeal. Instead, they compete—and win—using some version of a device that has been called a "controlled fuel leak."

"Most of our customers have tried fuel injection, but they don't want to tune all the time, they just want to race," said Trevor Wiggins of GET'M Performance, Alvaton, Kentucky. "A carburetor just works, and it's really easy."

"A carburetor can make more torque, more horsepower, and use less fuel than EFI," said Dave Braswell of Braswell Carburetion, Tucson, Arizona. That remains true, he said, even as drag racing V8s continue to grow in size and output, and can spin at 10,000 to 11,000 rpm.

Meeting the needs of these evolving powerplants requires never-ending R&D on the part of carburetor manufacturers. "We're constantly changing and trying different things," Braswell said. "It's the only way to stay ahead of the game."

What follows is the latest information on carburetor development from Braswell, Wiggins and other leading manufacturers.

'THE SKY'S THE LIMIT'

While AED Performance in Richmond, Virginia, "can build a carburetor for just about anything," said Jeff Harris, "we focused a lot of our R&D this year on high-end drag race applications. We were a class sponsor of PDRA's Extreme Pro Stock class, working with a couple of those teams and a couple of the guys in the Pro Outlaw 632 class." One of the company's owners, Jay Brockwell, traveled with the Pro Stock teams "and did most of the R&D in person at the track."

The result is a new billet bowl that can better "control the fuel in the bowl before the carb can meter it," Harris explained. "It makes the fuel that the metering block sees and the fuel that you're trying to meter more consistent. It keeps it from aerating, keeps it from sloshing from one side to another."

Working at the track was a crucial part of the development process. "G-forces change things. Running something on the dyno versus getting something to run on the race track are two completely different things in the carburetor world. On the dyno it sits still. But with these Pro Outlaw 632s and Extreme Pro Stock guys, you're talking some really quick 60-foot times. You need to control the fuel as the car leaves, to make the launch more consistent. So we're working not only on control in the bowl, but also the quality of the fuel charge to the combustion chamber itself. We are constantly winnowing in on it to make the best piece we can."

Another factor that proved invaluable to development at the drag strip was data acquisition, Harris added. "We're able to take that data at the track and make changes accordingly. It makes a big difference in making sure the engine is optimally tuned for each customer. In some cases, without that capability, we could be leaving anywhere from 10% to maybe 20%, on the high end, of power on the table. Even if it's 10%, 80 horses out of 800 is a big deal. And again, something that may not show up on the dyno would definitely show up under load and at speed on the race track."

Real-world R&D goes hand-in-hand with the company's CNC capabilities to continually develop its carburetor components. Harris said, "We are constantly evolving our metering blocks and producing different sizes of billet bodies. Those are the kinds of things that the CNC world allows us to do. The sky's the limit. We can machine things better and better to fit each application. Each carburetor is as custom as we can make it."

'REFINED EVERYTHING'

"We've refined everything we've been making," Braswell said about his company's R&D efforts. On the circle track side, "We recalibrated for the 602 and 604 crate motor classes. We make five carburetors for each of those engines, depending on the fuel they're using: pump gas, 110, CHP, E85, ethanol and methanol. We change the venturi diameter and throttle-bore diameter for the different fuels. Also, the metering plates have a different calibration to optimize their performance with those fuels."

Refinements have also come to the carburetors for Late Model open engines. "Late Model motor development in the last 10 years has happened so rapidly, it's a moving target. What worked last year doesn't work as well this year, so we have to come up with a better product to improve driveability, torque, and horsepower as cylinder heads and displacement change."

For drag racers, Braswell has updated its carburetors "mostly with metering changes." Changing metering plates on the carburetors for some Competition Eliminator engines "was worth two- to three-hundredths in the 60-foot, which is significant. We're incorporating those changes across the line into different classes."

REBUILD OR REPLACE? EXPERT TIPS ON CARBURETOR CARE

When is it time to rebuild a carburetor? "Usually power or driveability will start to drop off, or you'll develop a flat spot when you get on the throttle," said Dave Braswell of Braswell Carburetion, Tucson, Arizona.

"If it doesn't idle right, or you hear it miss from time to time, that's an opportunity for a rebuild," offered Trevor Wiggins of GET'M Performance, Alvaton, Kentucky. "For drag racing, if you go and deck the motor on a two-step and it doesn't deck clean, something's not right."

"If the engine is consuming a lot of fuel, or it's leaking a lot of fuel, or it just doesn't have the performance peak that it used to, most likely that's time to rebuild," said Tyson Rinehart of Holley Performance, Bowling Green, Kentucky.

"You'll see your performance drop or fall off," added Dennis Grzebyk of PROFORM Parts, Warren, Michigan. "Times or miles per hour will change for the negative. That usually means something's clogged, there's sediment in an orifice, or possibly a bad power valve."

Jeff Harris of AED Performance in Richmond, Virginia, brought up another kind of clog: "Fuel cell foam is one of those things that people never think of. It deteriorates over time and ends up in the carburetor."

Simple neglect also can be the root cause of carburetor problems. "I've had customers who rebuilt their engines several times and didn't touch the carburetors," Braswell said. "Then things aren't working as well, and they wonder what's going on."

Several different indicators can help racers identify when it's time to rebuild a carburetor. "Usually power or driveability will start to drop off, or you'll develop a flat spot when you get on the throttle," said our source at Braswell Carburetion, who documented this 4760-series alcohol carburetor rebuild. "The customer didn't maintenance the carburetor," he noted, "and needed to have it sent in to be rebuilt."

One easy thing racers can do to improve a carburetor's longevity is to drain the float bowls when the car is on the trailer, Braswell said. Otherwise, "the fuel in the float bowls bangs on the needles and seats. It wears parts out just going down the road."

"It's never a bad idea to do maintenance through the year," Harris said. "At the end of the year, pop the carburetor off, clean it out really well, freshen it up with a new set of gaskets, and have it ready to go for next season. Two hours on a Saturday with a can of carb cleaner and some gaskets may save you some headaches."

Certain race fuel types can also cause trouble. "Q16 will actually eat the metal as it goes through," said Rinehart. "It will take anodizing off and make passages bigger over time. That will take a toll. Q16 is...an effective fuel, but it's not a friendly fuel."

"Alcohol is very corrosive compared to gasoline," Wiggins said. "If alcohol sits in the carburetor, it will start working on the floats, making them heavier. Alcohol will work on where the anodizing isn't as thick, and it will start to corrode. Then the carburetor won't respond accurately. It won't idle accurately. The motor won't do a burnout accurately, or it won't run down the track accurately."

To keep that from happening, "every two to three years, we tell our customers to ship our carburetor back and we'll rebuild it for free," Wiggins said. "It's more important to me that my carburetors run good than the time it's going to take me to tech it when it starts to act stupid. We want our carburetors to run good, and we want our people to win."

Under most circumstances, rebuilding, rather than replacing, can cure a carburetor's ills. "Usually you can rebuild a carburetor to the end of the earth," Grzebyk said. "With billet stuff, you'll probably have that carburetor forever unless you outgrow it. But if you're working with an outdated carburetor, with old technology compared to what's available today, that's a good time to replace your old one."

Damage can also get to a point where a carburetor has to be replaced rather than rebuilt. "This newer gas with a lot of ethanol in it will eat on some of the metal almost like electrolysis," said Rinehart. "It will pit the metal. If you get excessive pitting, that will turn into holes. That's when it has to be replaced. It's not going to get any better at that point."

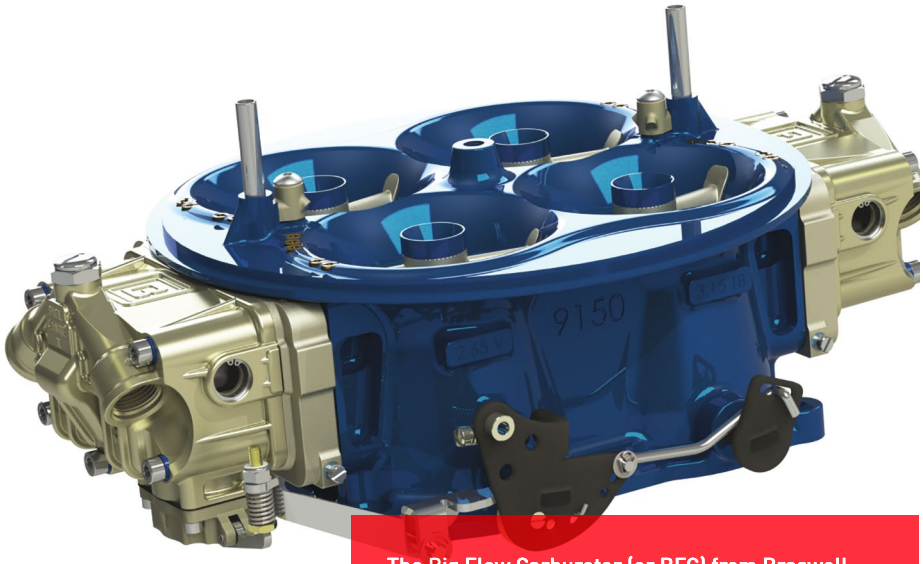
Braswell is also redoing the tooling for the B-7520 two-barrel carburetors "to go to a 2.700-inch butterfly," he said. These are used in Mountain Motor Pro Stock, Top Sportsman, and other big-inch classes. "Big motors used to be 600 or 800 inches. Now

Damage isn't the only reason to replace a carburetor. Years of use can also just wear one out, said Wiggins. Beyond excessive wear, the most common reason to replace a carburetor "is if you change the situation," he said. "If you change the motor size, change cars, change fuel, it might be easier to replace it. If you're going from gas to alcohol, for example, and your cast carburetor has a cast bowl that is not coated, alcohol will eat up the castings. Alcohol or E85 will not eat up billet or anodized products in the same way it eats away at cast aluminum."

Because all GET'M Performance carburetors come with anodized billet fuel bowls, making the change from one fuel type to another may not require a complete carburetor replacement. "Often we can still utilize the same main body and fuel bowls in changing our customer's carburetors to a different fuel setup or application," Wiggins added.

"People switch back and forth," Braswell said. "They'll race at a different track, or the rules change. They'll want to take their alcohol carburetor and switch it to gas or vice versa. Usually we'll swap main bodies and metering system, or we'll just build them another carburetor, so no matter where they race, they'll have a carburetor."

"If you start with a 300-horse motor or a 500-horse motor, and you want something that makes 800 horses, you're better off to start over in most cases," Harris said. "In the race car world, carburetors are not terribly expensive, relatively speaking. Something that's custom or one-off for each engine, even at the high end, is in the $2,000 range. Two thousand bucks in a race car is still a relatively low number, especially for something that's one-off per customer, per engine, per fuel and per application." *—Drew Hardin*



The Big Flow Carburetor (or BFC) from Braswell Carburetion is a five-circuit carb designed to keep pace with today's larger, faster-spinning motors, according to a company source.

"MOST OF OUR CUSTOMERS HAVE TRIED FUEL INJECTION, BUT THEY DON'T WANT TO TUNE ALL THE TIME, THEY JUST WANT TO RACE."

a big motor is more than 900 inches, so we're trying to keep up with the ever-moving target of the application."

Engines are not only getting bigger, but they're also spinning faster, he said. "Back in the 1990s, a high-rpm motor was turning 7,500 rpm. Now, a drag race motor routinely turns over 11,000 rpm." At those speeds, "airflow through the carburetor actually drops off because the motor's volumetric efficiency decreases. But pulsations from the intake cycle also tend to make the carburetor go rich at higher rpm—the rebound wave also meters fuel in the carburetor. We had to keep changing our metering systems to keep up. Where most modular carburetors produced today have just a single air bleed on the high-speed circuit, we're using up to three high-speed bleeds. This enables us to better tailor the fuel curve at the higher rpm these engines are running."

'WE HAVE TO KEEP MAKING THEM BIGGER'

While "everyone knows us for our Twin Blade," Wiggins said, GET'M Performance released three four-barrel carburetors last year. One was a 1,050-cfm throttle-stop-style carburetor, the other two came in at 1,250 to 1,300 cfm and 1,750 cfm.

"The four-barrel is an easy transition for people to move to our stuff, especially racers who already have a four-barrel," he explained. "The four-barrel is widely accepted in the throttle-stop world and very well accepted in larger engine markets. A 632 that made 1,100 horsepower used to be a big motor. Now there are 632s that make upwards of 1,400 horsepower. We have to keep making them bigger to get in the arena of our customers who are making 1,350 to 1,400 horsepower."

The 1,750-cfm four-barrel "is more our future world," Wiggins said. "To stay ahead of the curve, we've even been testing a 1,900-plus-cfm carburetor." On the Twin Blade side of his business, Wiggins has a carburetor in development with a capacity of "around 2,100 cfm," and a Dominator-style Twin Blade that is "probably a year away" from release.

"TO STAY AHEAD OF THE CURVE, WE'VE EVEN BEEN TESTING A 1,900-PLUS-CFM CARBURETOR."

Carburetor development isn't just about big cfm numbers, Wiggins said. "We're trying to get a venturi-to-throttle-bore ratio. That's how we're able to achieve more and more cfm. The bigger bore doesn't necessarily mean the largest venturi. You're trying to get the ratio that you know is very consistent and works very well through the low, mid, and high range of engine air demand. I can build any size venturi. I can build a straight venturi. But if you can't get it to idle, or transition to wide open, it doesn't matter how big it is."

Another trend Wiggins is paying attention to is the use of "baby blowers"—250-cubic-inch Roots-style superchargers—on bracket race engines.

"A lot of people are looking for more horsepower without spending a lot of money," he explained. "They're putting these baby blowers on their bracket motors with a single carburetor on top. That makes us build a more efficient carburetor and a more efficient metering block to feed enough fuel through a baby blower." The setup, he said, "has been a large seller for us."

Beyond carburetors, GET'M Performance is branching out into ancillary components: fuel pressure gauges, fuel logs, and bypass regulators, among others. "If you call me and say the engine's not running right, I always ask what the fuel pressure is," Wiggins said. "A lot of people don't know, or they'll have to pull the Racepak up. So I decided I'm going to start supplying gauges."

'CARBS ON A DIET'

Laura Shehan of Holley Performance in Bowling Green, Kentucky, said the company last updated its racing carburetors several years ago with the introduction of the XP and Gen 3 Dominators and the associated calibrations for E85, methanol, and dual-quad setups.

"When we embarked on the 4150 XP,

"We have to keep making them bigger to get in the arena of our customers who are making 1,350 to 1,400 horsepower," noted our source at GET'M Performance, which just last year released three new four-barrel carburetors.

"WE HAVE TO COME UP WITH A BETTER PRODUCT TO IMPROVE DRIVEABILITY, TORQUE, AND HORSEPOWER AS CYLINDER HEADS AND DISPLACEMENT CHANGE."

we realized we needed to refresh the entire lineup from both an aesthetic and performance perspective, not to mention put the carbs on a diet by making the change from zinc to aluminum. We considered the typical upgrades that the modifiers were doing and implemented them in a well-tuned, out-of-the-box carburetor."

"Those older carburetors were kind of behind the times," agreed Holley's Tyson Rinehart. "We decided to give them a new look and change some of the things the modifiers were changing on the older carbs. That way they could have everything at their fingertips."

The switch from zinc to aluminum had benefits beyond shedding weight, Rinehart explained. "There's also heat soak. Zinc held in a lot of heat, while the aluminum will dissipate it. There's not as much expansion, boiling the fuel and stuff like that with the aluminum series."

"On the XP and Gen 3 lineup, we implemented billet metering blocks and throttle bodies," Shehan said. "Each of the metering blocks went through exhaustive testing and was designed specifically taking into account carburetor size, fuel, and application. Regarding the fuel bowls, we added 20% fuel capacity, anti-slosh baffling, and a drain plug feature. The main bodies of the 4150 XP and Gen 3 Dominator have the idle bypass system that works to allow the idle air to be set without losing the functionality of the transfer slot for off-idle fuel."

Engineers at Holley have updated some of the company's best-known carburetor lines, including the XP, by "[giving] them a new look and [changing] some of the things the modifiers were changing on the older carbs," a source told us. "That way they could have everything at their fingertips."

Holley's 2300 XP two-barrel also went through an update. "We eliminated the choke tower to transition the carburetor into a full-out race carburetor," Shehan said. "Like the 4150 XP and Gen 3 Dominator, the 2300 XP also has a billet metering block and throttle body, as well as a high capacity fuel bowl. We integrated an anti-siphon system into the accelerator pump channel in the main body to reduce the draw of fuel from the accelerator pump."

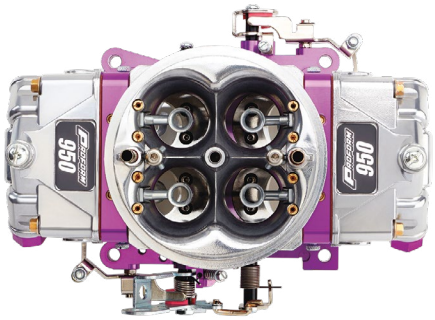
As a volume carburetor manufacturer, Holley faces a unique challenge, Shehan said. It needs to "provide a calibration that will perform upon installation, provided the carb is appropriately sized, and yet have the flexibility and range to be tuned specifically for that application by the end user," she added.

'18 NEW CARBURETOR PART NUMBERS'

PROFORM Parts of Warren, Michigan, has made what it calls "major design enhancements" to its Race Series carburetors. "Our tooling needed to be readjusted, so we had the opportunity to do a redesign and add features to our existing line," said Ryan Salata. The company also added three new lines to the Race Series inventory, "18 new carburetor part numbers," Salata said, for supercharger, circle track and alcohol, and E85 applications.

Improvements have been made throughout the carburetors. Among the most significant, according to PROFORM's Dennis Grzebyk, are new lower fuel ramps in the bowls. "The fuel chute is a big deal. It stops the aeration of fuel into the fuel bowls from the needles. It creates a downslope, so the fuel goes down and under rather than splashing directly down." Another facet of the new bowl design is increased internal baffling to control fuel slosh during high-G-force situations like rapid acceleration and cornering.

The aluminum main bodies have been redesigned, with a contoured leading edge to the venturis to smooth the air coming into the main body. "The way the main body is knifed, you see nice cuts on the casting," Grzebyk said. "The air bleeds are recessed a little further back into the body for airflow into the venturi." The main bodies also have new, double-step annular boosters that improve fuel atomization and throttle response.



Among recent "major design enhancements" to PROFORM's Race Series carburetors are new lower fuel ramps in the bowls, noted a company source, along with redesigned aluminum main bodies.

The billet throttle base plates are now built with slabbed throttle shafts with low-profile screws, which improves combustion efficiency by decreasing the air resistance into the venturis. PROFORM has also engineered more surface area in the base plates, which provides more contact between the main body and blocks to make that assembly stronger and more rigid. And within the metering blocks are eight pre-drilled emulsion channels that are tunable to allow precise control of the air/fuel mix.

In sum, the changes result in "improved performance, better fuel retention, and reduced slog," Salata said. "We expanded our carburetor's capabilities to fine tune and drill down." PRI

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INFORMED PERFOR

MANCE

Data acquisition systems are no longer considered high-end luxury items. In fact, they are now commonplace at all levels and nearly all forms of racing, including karts and UTVs. Photo courtesy of Holley Performance Products.

With such a wide range of price points and feature sets currently available, determining which data acquisition system best suits a particular racer's requirements can be difficult. Industry experts cut through the noise to figure out what a given driver needs—and what they don't.

By Bradley Iger

From the top tiers of motorsports to the grassroots, data acquisition has become nearly ubiquitous in recent years. There's a very good reason for that.

"When it comes to racing, knowledge is power," said Evan Perkins of Holley Performance Products, Bowling Green, Kentucky. "So it's no surprise that data logging has been commonplace in drag racing and road racing disciplines for a long time. What's interesting is that we're starting to see a lot of growth in the side-by-side and UTV market. As more series pop up for these racers to run in and it gets more competitive, they're looking to find an edge over the rest of the pack. Data logging is a really effective way to do that."

But it's certainly not a "one size fits all" proposition, and with so many variables in the mix, it can be tough to nail down what type of data logging system makes the most sense for a specific application. As our experts attest, simply choosing the most elaborate solution that a budget will allow may not be the most ideal approach.

EMERGING TRENDS

Since its inception, data logging has been closely tied to technological progress at large. As with mobile phones and other consumer devices, as cutting-edge technology from prior years becomes more mainstream, it allows for the integration of more advanced features at price points that make these devices accessible to a greater portion of the market.

"Camera systems have really taken off for us," said Cameron Bennett of AiM Sports, with offices in Lake Elsinore, California, and Roanoke, Virginia. "Once we got into high-definition, CAN-based cameras, it really created this powerful tool for data logging. Things like rpm, throttle and brake position—any channel

Today's CAN-based cameras allow data to be overlaid onto video in real time, allowing racers and teams to pinpoint issues with greater precision. Photo courtesy of AiM Sports.

that you might want to bring over—can be overlaid onto the video in real time. There's no post-processing needed to combine the video with the data. It's something where a driver can say, 'I wonder why I was off-pace going through turn two on lap three' and go back to that point in the video to see what their hands were doing, what their feet were doing, and what the car was doing in order to figure out where the issue was. It's something we initially saw in top-tier road racing series, but it's all over the board now, from karting to IndyCar."

Perkins said that as UTV racing has grown in popularity, data loggers have been adapted to capture information that's specific to the unique characteristics of those vehicles. "It opens up a whole new world of data points. For instance, a lot of side-by-side racers use data loggers to monitor CVT belt temperatures to make sure the belt doesn't overheat. It's critical for them because if that belt fails, they are stranded until it is replaced."

Marc Erickson of AutoMeter Products in Sycamore, Illinois, said that as younger, more technically savvy generations of drivers get on the grid, he has noticed a more educated approach to data logging. "They have a better understanding of what they need from a system based on the car they're running. So we're seeing somewhat of a shift away from all-purpose data logging systems that can do, say, a hundred channels to ones that offer fewer channels and are more affordable, but have the specific functionality that those racers need. In that respect, another big change we've seen recently is in memory. For a long time, memory chips were really expensive, but they've become so inexpensive that the same components can be built with much less money now, which in turn costs the customer less money."

KEEPING IT SIMPLE

Entry-level systems typically range from about $400 to $1,000 and can provide information that's critical to a driver's success.

"It's one of those things that when the car is running great, it might feel unnecessary," Erickson pointed out. "But when the car does that one weird thing that's hard to explain, that's where data logging pays for itself."

Dennis Lawler of Exhaust Gas Technologies in Chino, California, said that systems in this price range typically collect data that is useful mainly from a diagnostic standpoint. "Things like rpm's, exhaust temperatures and pressures," he cited, "information downloaded after the run mainly for tuning and troubleshooting purposes. Exhaust temperatures, for

"WE'RE SEEING SOMEWHAT OF A SHIFT AWAY FROM ALL-PURPOSE DATA LOGGING SYSTEMS THAT CAN DO, SAY, A HUNDRED CHANNELS TO ONES THAT OFFER FEWER CHANNELS AND ARE MORE AFFORDABLE, BUT HAVE THE SPECIFIC FUNCTIONALITY THAT THOSE RACERS NEED."

Pricier data systems can typically monitor more functions, but the car needs to be set up with the necessary sensors to provide that data. Photo courtesy of Holley Performance Products.

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From the driver's perspective, the heart of a data acquisition system is the dashlogger, which can display data from an ECU, GPS, accelerometer, and a variety of other inputs. Photo courtesy of AiM Sports.

example, can tell whether the engine is running too lean or too rich. That can be dialed in between rounds."

Bennett said that even these budget-minded systems can offer a wide range of information. "A system like the Solo 2 DL taps into the vehicle's ECU to get quite a bit of data—rpm, throttle, some kind of MAF or MAP sensor information, and sometimes brake data as well. That usually covers the basic necessities. But what's available ultimately varies from manufacturer to manufacturer. With a platform like the BMW F-series, we can gather 41 different channels from the ECU, everything from wheel speeds at each corner of the car and steering angle to water and oil temperatures."

Perkins said when moving up the hierarchy of systems toward the top of this price range, the core differences are often the number of channels of data that can be captured simultaneously. But more sophisticated data logging systems also require more sophisticated vehicle setups in order to utilize the additional capability.

"The Racepak Sportsman, for example, is a totally standalone system that can capture data from an EFI car or a carbureted car, and it has 25 dedicated channels for

"THIS KIND OF INFORMATION WILL NOT ONLY ALLOW TEAMS TO TUNE THE CAR TO GO FASTER, THEY CAN ALSO BE A GREAT EARLY WARNING SYSTEM IF THE CAR IS LOSING OIL PRESSURE SOMEWHERE, OR SOMETHING ALONG THOSE LINES."

"WHEN THE CAR DOES THAT ONE WEIRD THING THAT'S HARD TO EXPLAIN, THAT'S WHERE DATA LOGGING PAYS FOR ITSELF."

monitoring," he explained. "For a drag racer, that could be things like driveshaft rpm, so a racer can compare that with engine rpm to detect slip in the drivetrain and how well the car is hooking up. Shock travel can also be monitored to see how the suspension is behaving during launch. But it's important to remember that sensors are needed to support these functions. The vehicle itself needs to be set up to provide that data to the system."

GOING HARDCORE

High-end data loggers generally range from $1,500 to $3,000, but for teams competing at the highest levels of racing, the investment can venture well into five-digit territory. "A Top Fuel team might spend $30,000 or more," Lawler said. "These systems are going to have many, many more inputs, because the more you know, the faster you go. It's a situation where a crew chief needs to see all of this data at the same time in order to program the car properly for a specific run."

Erickson noted that systems like these benefit racers in ways that go beyond sheer performance. "This kind of information will not only allow teams to tune the car to go faster, but they can also be a great early warning system if the car is losing oil pressure somewhere, or something along those lines."

Beyond the number of different channels of data that can be recorded at a given moment, advanced data logging systems are also outfitted with greater processing power to capture information at a higher refresh rate. Refresh rate can be incredibly important when troubleshooting an issue that happens for a fraction of a second and only under certain circumstances, as it could end up being the difference between seeing all of the data needed to correct the problem or missing it entirely.

"THERE ARE FOLKS AT THE GRASSROOTS LEVEL WHO WILL SPEND MORE ON THE DATA SYSTEM THAN THEY DID ON THE CAR."

"At the professional level, the refresh or sampling rate becomes a much bigger priority," Bennett said. "Something like the MXG 1.2 can sample an analog sensor at up to 1,000 Hz, or 1,000 times per second. Sometimes that level of precision is necessary in order to get the information needed."

COMMUNICATION IS KEY

Because of the specificity of certain applications and the potential complexity of the vehicle setup required to capture some types of data, Erickson said that figuring out which system is the best fit for a particular racer usually comes down to a conversation with them about their specific goals with the system.

"I ask them what type of vehicle they have, what they're doing with it—is it naturally aspirated, or a blower car, or turbocharged, or are they running nitrous—and what type of class they're running," Erickson explained. "From there I usually ask them what they want to monitor. Some folks know and some don't. If they're not sure, we'll look at the car and the class they're running in, and I'll explain what the norm usually is. These days a lot of folks are really well versed on the subject, so they already know exactly what they want out of the system. Having the specifics about what they want to do and what type of budget they're working with makes it a lot easier to zero in on what's going to work best for them."

Perkins said that for the entry-level buyer, it's about data logging the parameters that will keep the car out of trouble. "Oil pressure and temperature, engine temperature, things like that are a good place to start in order to create a safety net for a race program," he advised. "From there, start looking at sensors to monitor vehicle performance in terms of traction, acceleration, lateral G's and so on. If you

The enormous breadth of data-acquisition components available today allows these systems to be fitted to almost any vehicle imaginable—including older machines built long before the digital age.

make a change to the shocks and want to see if it actually increased grip, data logging is a great way to substantiate whether or not the change is in the right direction."

Bennett agreed that the best way to really determine which data logger best fits an application is to start by gathering some data from the driver. "There are folks at the grassroots level who will spend more on the data system than they did on the car. They're just really into the data and love using it to get a better understanding of the vehicle's performance as well as their own. Then there are some really seasoned drivers who have cars that are really well taken care of, and they don't necessarily need all the data. It comes down to a 20-minute conversation to figure out what their goals are with the system and what they want to see. If they want specific features, we can narrow the field down through a process of elimination to get to the right system."

Lawler suggested a similar tactic as well. "Ask them what they're seeing now and what they wish they could see. That helps develop a picture of what their program looks like, and which piece of equipment is going to get them what they want."

He's also quick to point out that the data logger is one piece of a larger data acquisition puzzle. "Some car owners will be kind of brave and say, 'Just give me everything,' but the team might not have the capability or experience to use that information properly. That's going to end up being a waste unless the crew chief is taught about the data they're going to see and how they're going to interpret it. So training can become part of the process as well." PRI

SOURCES

AiM Sports
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MEMBER CHECK-IN

ANTRON BROWN

Transitioning from hired gun at NHRA powerhouse Don Schumacher Racing (DSR) to owner-driver of his own eponymous team, PRI Member Antron Brown reveals the crew members set to join him in his new venture, the alliances he'll retain, the nature of his new relationship with DSR, and the long-term goals that remain for one of drag racing's busiest and most successful competitors.

By Jim Donnelly

When he first started seriously contemplating what it would take to establish and run his own Top Fuel operation, Antron Brown wasn't yet running nitro cars in pro-level drag racing. In fact, he wasn't running cars at all. Brown was earning his chops in Pro Stock Motorcycle, first riding for former NFL cornerback Troy Vincent, when he started actively thinking about not just driving four nitro-fueled wheels but also paying the bills to turn them.

It took Brown the better part of 15 years before his ideas gradually became reality. The culmination will happen during 2022, when Brown transitions from hired gun at the NHRA's megateam, Don Schumacher Racing (DSR), to become owner-driver at Antron Brown Motorsports, which will field a Top Fuel car in search of Brown's fourth NHRA Top Fuel championship. Antron Brown Motorsports (ABM) is most decidedly an independently owned and freestanding entity, but its alliances and resource-sharing with DSR will be both comprehensive and deep. Brown's move comes as DSR disclosed that eight-time champion Tony Schumacher, the winningest Top Fuel driver in NHRA history, has returned to competition to chase the 2022 title.

"We're having our race car chassis built at DSR's in-house fabrication shop," Brown explained. "We're going to lease space from them, and we will be buying parts and pieces from them, so we will be a customer of DSR. We're still on our own, but we're going to do whatever we need to do to make us successful on the race track. We'll be buying parts that DSR manufactures, such as blocks, cylinder heads, rods and different components that they make at the DSR shop in Brownsburg, Indiana."

Brown is a dual-category NHRA star, owning 52 national-event victories in Top Fuel, plus another 16 in Pro Stock Motorcycle. His lone 2021 win for DSR came at Atlanta Dragway. A third-generation drag racer, Brown spent a decade on two wheels before transitioning to Top Fuel in 2008 and winning No. 1 qualifier at his very first race. Brown won his first Top Fuel trophy in his fourth start, becoming the first to win national events in both that category and Pro Stock Motorcycle. Signing with DSR, Brown became the first African-American to win a major motorsports championship when he took the Top Fuel crown for DSR in 2012. He was honored that year by the African-American Chamber of Commerce in his native New Jersey with the Circle of Achievement award and was on NBC's 2013 edition of "theGrio's 100" list that features Black industry, sports and community leaders.

Brown's Top Fuel titles have all been managed by crew chief Mark Oswald, who completed a remarkable feat in his own right as a driver by earning NHRA, IHRA and AHRA Funny Car championship titles in the 1984 season. He has been with Brown since DSR bought the team from Mike Ashley in 2009. Oswald now shares Brown's tuning and co-chief duties with Brian Corradi. Both will make the jump from DSR to ABM, along with Brad Mason, who's helping Brown with much of the new team's groundwork. Brown expects to have 12 team members when 2022 starts.

"I have a couple of business manager options that I'm working on, but I don't have anything to announce yet," he said. "You also have to do your due diligence with things like insurance, payroll, all that stuff on the administration side, getting all that stuff in line, so that when we actually make the changeover, we're ready, we're prepared for it, and it can become as seamless or as effortless as possible."

Matco Tools and Toyota will be back as sponsors, along with Hangsterfer's, a producer of specialty cutting oils and lubricants for machine tools that, like Brown, hails from southern New Jersey.

This year, Antron Brown charts a new path as owner-driver at Antron Brown Motorsports, which will field a Top Fuel car in search of Brown's fourth NHRA Top Fuel championship.

More backers are expected, and Brown says his long-term goals are to help them, and other teams' sponsors, maximize their investment.

"My dream, my next goal, is to have another team, so one Top Fuel and one Funny Car," he said. "It would be enough to handle, it would be the right number of people, and we could then have a marketing program at ABM that would allow us to cater to other teams, too. We'd find sponsorship deals for other teams, and more importantly, show them the skills that they're going to need to keep those sponsors."

Part of the new equation of race team management involves coping with COVID-related issues. "It's across the board with everything," Brown explained. "I was lucky enough to have started out early this year [2021] in terms of ordering our new vehicles. Our trailers would have normally been done a lot sooner, but instead we're getting them in October. Ordinarily, we probably would have had them in early August. They were having issues with the A/C units, or with the cabinets, because they couldn't get the extruded trim that they needed. Waiting times now are four times longer than they usually are.

"But I've been planning for most of the last 10 years for this," Brown continued. "I ran my own Pro Stock Motorcycle team for three years, and then when I went to drive for Don Schumacher, I was really running the race team. I did all the budgeting, all the parts ordering, figured how much it cost to travel and fly, everything. I'd advise anyone that if this is something you really want to do, you need to do your homework." PRI

HOW TO SOLVE 10 COMMON TIG WELDING PROBLEMS

Helpful tips to prevent contamination, oxidation, and other potential setbacks.

By Miller Electric Mfg. LLC

Gas tungsten arc welding (GTAW), or TIG, is often specified to meet strict aesthetic, structural, or standard requirements. The TIG process is complex, and it is undisputedly challenging to learn. Here, we uncover common TIG mistakes and how to prevent these oftentimes detrimental errors from happening.

1. CONTAMINATION DUE TO POOR GAS COVERAGE

Welds can be contaminated by lack of shielding gas. To troubleshoot, be sure to use the proper type of gas. For TIG welding, this is typically 100% argon. For thick aluminum, use an argon/helium blend. Attempting to TIG weld with an incorrect blend, such as argon/carbon dioxide commonly used for MIG welding, will cause contamination.

Also check recommended gas flow rates, which should generally be 15–20 cubic feet per hour (cfh). Welders commonly—and incorrectly—assume that a higher gas flow pressure provides greater protection. Instead, it may cause turbulence and pull in airborne contaminants, leading to arc wandering. Generally, err on the lower side of recommended shielding gas rates as the project begins.

A breach in the fittings and hoses can cause gas leaks, which are big money wasters. Rub soapy water over the hose and fittings. Replace the defective components if bubbles form.

If none of the solutions solve poor gas coverage, consider that the tank may be contaminated with moisture. Check with your gas supplier to resolve this issue.

2. CONTAMINATED BEADS OR DISCOLORATION IN WELD PUDDLE

TIG welds created with the machine's polarity set on direct current electrode negative (DCEN) may not break down the aluminum oxide layer. This can result in filler metal mixed in with the partially melted oxide to create a contaminated bead. To defeat this, always TIG weld aluminum with the polarity set to alternating current (AC).

If there is brownish oxidation or black flakes in the weld puddle, decrease the balance setting. This will increase the time in EP, or the time spent in the "cleaning action." Excessive EP, meanwhile, may cause the tungsten to ball excessively.

> *"FILLER METAL PROBLEMS TYPICALLY CAUSE A GRAINY APPEARANCE."*

3. WELD GRAININESS

Filler metal problems typically cause a grainy appearance. Before welding, always check the proper filler metal type and remove all grease, oil and moisture from the surface to prevent contamination.

4. LACK OF FUSION AT THE ROOT

Lack of fusion at the root of a T-joint or a fillet weld is more often seen with a transformer-based machine, as the arc tends to wander between the two sides of the joint. In this case, obtain better directional control and increase penetration by reducing arc length. Also, be sure not to weld too quickly or underfill the joint.

Inverter-based machines (especially those with advanced output controls such as adjustable frequency and pulsing controls) offer more control over the arc.

5. CRATERS

Typically occurring at the end of the weld, craters often lead to cracking. They can be caused by reducing power too quickly, which makes the puddle cool too soon. Removing the filler rod too quickly can also cause craters.

To prevent craters, continue to feed the filler rod while gradually reducing the

current at the end of the weld. Some TIG welders have a crater control function, which automatically reduces the current.

> *"ALWAYS TIG WELD ALUMINUM WITH THE POLARITY SET TO ALTERNATING CURRENT (AC)."*

6. DIRTY BASE OR FILLER METAL

Base and filler metals—susceptible to contaminants like mill scale, oxide on aluminum, and dirt or grease—must be cleaned. Be sure to remove pollutants by grinding, brushing and wiping.

To properly clean aluminum surfaces, dedicate a stainless steel brush for the task to prevent cross-contamination.

7. POOR COLOR ON STAINLESS STEEL

Stainless steel welds may experience discoloration due to overheating, which degrades their corrosion resistance and mechanical properties. Unfortunately, once this error is made, there is nothing that can be done.

To prevent overheating, try to reduce amperage, marginally increase travel speed or shorten the arc length, which is the distance between the electrode and the base metal. In addition, if the welding equipment features pulsed welding capabilities, use them. Pulsing, which reduces heat input, allows for better control of the weld puddle.

8. SUGARING/OXIDATION

Sugaring, or oxidation, may occur in stainless steel welds exposed to oxygen. To prevent sugaring, back purge the weld with argon shielding gas or reduce welding amperage.

9. WIDE BEAD PROFILES

When the amperage is set too high on aluminum, it may create a wider profile or an ill-defined bead. This can potentially lead to burn-through. To solve this, reduce amperage or increase travel speed, or both.

10. IMPROPER ARC LENGTH CONTROL

The color change in the middle of an aluminum weld bead can result from an increase in arc length. Arc length determines TIG welding voltage. Holding too long of an arc increases overall heat input and the potential for distortion. It also widens the weld bead while decreasing penetration and affecting weld bead appearance. Practice holding a consistent arc length to improve heat input control and improve weld bead quality. PRI

ADVOCACY CORNER

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

Edited By Laura Pitts

PRI's Washington, D.C.-based advocacy team works around the clock to protect race tracks and motorsports businesses. We are currently engaged in a number of federal and state initiatives, including a new campaign to raise awareness and pass the RPM Act, along with an update on international tariffs for U.S. businesses and a note about how PRI is supporting race tracks.

CALL CONGRESS, TELL YOUR LAWMAKERS TO PASS THE RPM ACT

Support for the bipartisan Recognizing the Protection of Motorsports Act (RPM Act), H.R. 3281 and S. 2736, is more critical in 2022 than ever before. The bipartisan bill, designed to protect Americans' right to convert street vehicles into dedicated race cars, has garnered healthy backing by lawmakers. As of press time, the RPM Act had 113 members of the House and 22 Senators co-sponsoring the initiative, thanks in large part to the Save Our Race Cars letter-writing campaign, which saw over 1.5 million letters sent to Congress. The industry's efforts have garnered the attention of lawmakers, but we can't let up until the bill becomes law.

PRI thanks the racers, businesses, enthusiasts, and fans that have already sent a letter to elected officials, and we encourage you to follow up by making a quick call to voice support for the bill. Talking points and the phone numbers of your local elected officials can be found at votervoice.net/SEMA/campaigns/88605/respond.

"Lawmakers are more likely to address the issues they hear the most about. If an office hasn't heard from their constituents in significant numbers over a period of time, they assume the issue isn't very important or has been addressed. We can't let them think that the hard work has been completed on the RPM Act," said Daniel Ingber, PRI's Vice President of Government and Legal Affairs. "Now is the time to step on the gas and apply pressure. We need our co-sponsors to make passing the RPM Act a top priority, so go online to find out how to call your lawmakers and ask that they save racing from government threat."

Beyond phone calls, below is a list of actions industry members can take to help to pass the RPM Act:

- For those that have not sent a letter, visit saveourracecars.com. A letter has already been drafted, and it takes less than a minute.
- Sign and send a letter to your lawmakers on company letterhead. Email erics@sema.org for a template and more information.
- Post about the RPM Act on your company's social media accounts using the toolkit of digital assets found at performanceracing.com/rpm-assets.
- Become a member of PRI and learn more about PRI's Political Action Committee (PAC). The Performance Racing PAC allows PRI members to support the lawmakers that stand up for racing in Washington. Visit performanceracing.com/membership for more information.

For details about the RPM Act and more information about working with your lawmakers, contact Eric Snyder at erics@sema.org.

NEW RPM ACT SUPPORTERS (AS OF LATE NOVEMBER 2021)

U.S. SENATORS:

TAMMY BALDWIN (D-WI)
MARSHA BLACKBURN (R-TN)
DEB FISCHER (R-NE)
MIKE BRAUN (R-IN)
JOHN KENNEDY (R-LA)
JOHN HOEVEN (R-ND)
BOB CASEY (D-PA)

U.S. REPRESENTATIVES:

CLAY HIGGINS (R-LA)
GUS M. BILIRAKIS (R-FL)
DAVID P. JOYCE (R-OH)
CYNTHIA AXNE (D-IA)
ANGIE CRAIG (D-MN)
DARREN SOTO (D-FL)
JOHN R. CARTER (R-TX)

> "NOW IS THE TIME TO STEP ON THE GAS AND APPLY PRESSURE. WE NEED OUR CO-SPONSORS TO MAKE PASSING THE RPM ACT A TOP PRIORITY."

PRI SOCIAL MEDIA CAMPAIGN BRINGS AWARENESS TO RPM ACT

In conjunction with ongoing efforts, PRI's advocacy team has begun a social media campaign encouraging the racing community

"THE [MOTORSPORTS FAIRNESS AND PERMANENCY ACT OF 2021] WILL HELP TO SPEED UP THE DEPRECIATION SCHEDULE FOR INVESTMENTS MADE IN RACING FACILITIES."

to call and write their members of Congress and ask them to support the RPM Act.

"The men and women who work in the motorsports industry, racers, and their fans are on the front lines in the fight to pass the RPM Act," said Eric Snyder, PRI's Director of Congressional Affairs. "We have commenced a social media campaign that is focused on getting everyone who is a part of the racing community to write their members of Congress in support of the bill. For those who have already written their lawmakers and want to do more, this campaign is for you. We're asking that you take the next step and call your lawmakers and ask them to pass the RPM Act."

The phone campaign is off to a fast start, with over 500 calls to Congress in just its first few weeks. PRI appreciates the efforts of everyone who has helped so far and is enthusiastic about the campaign's impact as it continues to evolve.

U.S., E.U. AGREE TO END STEEL AND ALUMINUM TARIFFS, U.S. NOW IN TALKS WITH JAPAN

The United States and the European Union have agreed to end a three-year dispute over steel and aluminum tariffs. As a result, effective January 1, 2022, the U.S. will no longer impose 25% tariffs on steel (sheets, bars, tubes, etc.) and 10% on aluminum, and will instead use a quota system. The agreement will also apply to derivative products made in the E.U. and subject to tariffs such as steel bumper stampings (HTSUS 8708.10.30).

"For motorsports manufacturers who have been subject to tariffs—those who import raw steel or aluminum, or certain finished products like steel bumper stampings from the E.U.—it means they are no longer subject to the 25% tariffs on steel or 10% tariffs on aluminum unless the value of the U.S. imports exceeds the E.U.'s allotted quota. This should save these companies money and will take effect this year," said Stuart Gosswein, PRI's Senior Director, Federal Government Affairs.

Related, the U.S. and Japan are now pursuing a new commercial and industrial partnership to bolster economic ties, including strengthening supply chains, export controls, and innovations such as digital technologies. As part of the discussions, the two countries have agreed to pursue a quota approach to remove the metal tariffs.

"If the discussions between the U.S. and Japan are successful, it would mean that motorsports manufacturers who import steel or aluminum from Japan would no longer have to pay the 25% and 10% tariffs and instead would be able to take advantage of a quota system for metal imports," Gosswein said.

The Trump administration first imposed the metal tariffs in 2018 under Section 232 of U.S. trade law, citing that dependence on foreign sources posed a national security threat. Based on quotas, Argentina, Australia, Brazil, and South Korea were excluded, and Canada and Mexico were eventually excluded based on the USMCA trade agreement. Although the tariffs have been imposed worldwide, a primary issue to be addressed is the global overproduction of metals, especially by China.

For more information, contact Stuart Gosswein at stuartg@sema.org.

"[THE NEW AGREEMENT] SHOULD SAVE THESE [MOTORSPORTS] COMPANIES MONEY AND WILL TAKE EFFECT THIS YEAR."

PRI SUPPORTS RACE TRACKS WITH MOTORSPORTS FAIRNESS AND PERMANENCY ACT OF 2021

The Motorsports Fairness and Permanency Act of 2021 (H.R. 4674 and S.2940) has been introduced in the U.S. Senate by Senators Debbie Stabenow (D-MI) and Richard Burr (R-NC). The PRI-supported bill would amend the Federal Tax Code to make the seven-year recovery period for race venue investments permanent, ensuring race track owners and investors can claim an important tax incentive for their facilities for years to come (more on that below).

"The bill will help to speed up the depreciation schedule for investments made in race facilities. If passed, this law would provide an incentive to invest in racing facilities," said Eric Snyder, PRI's Director of Congressional Affairs.

The Act also has bipartisan support in the U.S. Congress, having been introduced by U.S. Representative Mike Thompson (D-CA), and with eight co-sponsors as of press time, including PRI allies Rep. Richard Hudson (R-NC) and Bill Posey (R-FL), along with Terri Sewell (D-AL), Stephanie Murphy (D-FL), Tom Reed (R-NY), Jackie Walorski (R-IN), Drew Ferguson IV (R-GA), and Michael Waltz (R-FL).

Currently, accelerated depreciation of race tracks is authorized through December 31, 2025. Accelerated depreciation of race track investments applies to capital expenditures in a facility's ticket booths, track surfaces, suites and hospitality facilities, grandstands and viewing structures, props, walls, special-purpose structures, facades, shop interiors, and buildings. In addition, support buildings such as food and beverage retailing, souvenir vending, and other non-lodging accommodations, parking lots, sidewalks, bridges, fences, and landscaping are also eligible.

The tax incentive does not apply to transportation equipment, administrative services assets, warehouses, administrative buildings, hotels, or motels.

For more information and to see if your race complex is eligible, contact Eric Snyder at erics@sema.org. PRI

INDUSTRY NEWS

SPEEDWAY MOTORSPORTS TO ACQUIRE DOVER MOTORSPORTS

Speedway Motorsports in Concord, North Carolina, has entered into an agreement to acquire Dover Motorsports for an approximate total equity value of $131.5 million. Dover Motorsports owns and operates Dover International Speedway (Dover, Delaware) and Nashville Superspeedway (Lebanon, Tennessee).

"We've been committed to working for the fans and growing the sport of NASCAR for more than 60 years," said Speedway Motorsports President and CEO Marcus Smith. "This is a tremendous opportunity for us to continue growing our investment in motorsports."

RWB ACQUIRED BY MIDDLEGROUND CAPITAL

Race Winning Brands has been acquired by private equity firm MiddleGround Capital.

Race Winning Brands consists of a 12-brand portfolio of high-performance aftermarket product categories, including JE Pistons, Wiseco Performance Products, K1 Technologies, Diamond Pistons, Trend Performance, Rekluse Motor Sports, MGP Connecting Rods, ProX Racing Parts, Dart Machinery, CV4, Manley Performance, and Victory 1 Performance.

"We are thrilled to be partnering with MiddleGround," Race Winning Brands CEO Bob Bruegging said.

MOTORSPORT PARK HASTINGS HIRES NEW GENERAL MANAGER

Jeff Lacina has been named the new general manager of Motorsport Park Hastings in Hastings, Nebraska. In his new role, Lacina will oversee all daily track operations as well as all promotions, marketing, and event management functions, including group, corporate, and private event rentals.

HOLLEY ANNOUNCES PLANS FOR MOORESVILLE MANUFACTURING FACILITY

Holley Performance Products, the automotive performance company based in Bowling Green, Kentucky, has announced plans to establish a 111,000-square-foot manufacturing facility in Mooresville, North Carolina.

The company will receive local tax incentives for the $12.3 million expansion, which will bring 80 existing employees to the operation and also add 40 new jobs.

Holley offers nearly 70 brands including Detroit Speed, GearFX Driveline, Flowmaster, MSD Ignition, Holley EFI, Hurst Shifters, NOS, Simpson Racing, Stilo, and more.

VP RACING FUELS EXPANDS OPERATIONS IN TENNESSEE

VP Racing Fuels has announced an expansion of its operations in Tennessee, including a second new facility in Carroll County.

VP will expand its Huntingdon hub and acquire a second facility in McKenzie near the Carroll County Airport, increasing its total Tennessee investment to $14.2 million. The project is expected to create 150 new jobs and comes less than three years after the company invested more than $4 million to establish its Huntingdon operations.

NEXEN TIRE AMERICA RELOCATES US HQ

Nexen Tire America has announced the relocation of its US-based headquarters to Richfield, Ohio.

The new facility joins its North American technical center located in the same city. The $5.2 million, 35,000-square-foot facility opened in 2019, and is one of three technical centers Nexen Tire operates worldwide. Nexen Tire will continue to utilize its three US distribution facilities located in California, Georgia, and Ohio, as well.

MATTOX-GORBY PROMOTIONS PURCHASES URSS

Terry Mattox and Kerry Gorby of Mattox-Gorby Promotions have purchased the United Rebel Sprint Series (URSS) 305ci winged sprint car racing series, with events in Kansas and Missouri.

The pair plan to cross-promote races with the Oil Capital Racing Series, also owned by Mattox-Gorby Promotions. Rick Salem had previously operated URSS since founding the series in 2006.

BRAD HAYES RACING AQUIRES USSA, MEL KENYON MIDGETS

The United States Speed Association (USSA) and the Mel Kenyon Midget Series have been purchased by Brad Hayes Racing. USSA was incorporated in late 2009, and has since sanctioned 250 races.

"Even though the operation of USSA has changed hands, Mel and I will still be available in whatever capacity we are needed," said Don Kenyon, who has served as president of USSA since its inception and is Mel Kenyon's brother.

PIRELLI TIRE NORTH AMERICA NAMES NEW CEO

Pirelli Tire North America has announced Claudio Zanardo as its new CEO. He replaces Pietro Berardi.

Zanardo will join the North American team from Pirelli's Milan headquarters.

PACIFIC RACEWAYS ANNOUNCES NEW INNOVATION CENTER

Pacific Raceways, the multi-purpose motorsports facility in Kent, Washington, has broken ground on the new Pacific Innovation Center and Pacific Motorsports Park, part of a $200 million expansion.

"This transition redefines the infrastructure to include a testbed for transportation industry

innovation, and that solidifies the sustainability of racing in our region," Pacific Raceways President Jason Fiorito said.

MAHLE GROUP NAMES MATTHIAS ARLETH NEW CEO, CHAIRMAN

Matthias Arleth has been named CEO and Chairman of the Management Board of the MAHLE Group, effective January 1, 2022. He succeeds Dr. Jörg Stratmann, who left the Group on March 31, 2021.

BRIAN REESE NAMED CEO OF T SPORTLINE

T Sportline, the Los Angeles, California-based manufacturer of parts and accessories for Tesla vehicles owned by Kian Capital, has announced Brian Reese as its new CEO.

Reese, a member of SEMA's Board of Directors, was previously president and CEO of Driven Lighting Group. Prior to that, he served as president and CEO of Race Winning Brands, as well as vice president at COMP Performance Group, vice president at Craftsman and Diehard, and director at SLP Performance.

TERRY MATTOX TAKES OVER AS ASCS OWNER

Officials from the Lucas Oil American Sprint Car Series (ASCS) have announced new ownership, with Terry Mattox taking over as head of the Oklahoma-based series. Mattox will also serve as national competition director.

Founded by Emmett Hahn in 1992, ASCS hosts nearly 200 events each year across its regional and national tours. Hahn will work with Mattox during a transition period.

LSI ANNOUNCES JAMES PALASOTA AS COO

Lubrication Specialties Inc. (LSI) in Mt. Gilead, Ohio, has announced the addition of James Palasota as the company's chief operating officer (COO). Palasota previously was vice president of sales and marketing for e-cigarette manufacturer Sottera.

In his new position, Palasota will report directly to LSI CEO Chris Gabrelcik.

WILWOOD ENGINEERING ADDS MARK CORNWELL

Wilwood Engineering of Camarillo, California, has announced Mark Cornwell has been appointed vice president of New Business Development and Specialty Markets.

Cornwell comes to Wilwood after 14 years at StopTech High-Performance Brake Systems, a division of Centric-Parts.

NMRA/NMCA NAMES AUGUSTINE HERRERA NATIONAL TECH DIRECTOR

ProMedia Events and Publishing in Santa Ana, California, has announced Augustine Herrera as the new NMRA/NMCA National Tech Director. His duties include overseeing fair competition in both drag racing series and leading the on-site tech staff at all national events.

"Augustine joined our team in 2019 and quickly learned the ins and outs of our categories and our competitor base," said Rollie Miller, National Event Director and General Manager for NMRA/NMCA.

RANDY WILLIAMSON NAMED GENERAL SALES MANAGER AT CSI

Competition Specialties Inc. (CSI) of Rancho Cucamonga, California, has announced the promotion of Randy Williamson to general sales manager. Williamson will oversee all of CSI's sales efforts in this new position.

Williamson joined CSI in 2013 as a phone salesman before being promoted to phone sales manager in April 2019.

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

IN MEMORIAM

BOB BONDURANT, 88, DRIVING SCHOOL FOUNDER AND RACING LEGEND

Legendary American race car driver Bob Bondurant has passed away at age 88. An avid racer in the past, Bondurant opened the Bob Bondurant School of High Performance Driving in 1968. The school teaches the copyrighted "Bondurant Method" with its lineup of instructors. Over 500,000 students have graduated from the school, overseen by the company president and CEO, and Bondurant's wife, Pat Bondurant.

RICHARD MASKIN, 74, FOUNDER OF DART MACHINERY

Dart Machinery announced late last year that founder Richard Maskin had passed away at the age of 74.

"He was an innovator in motorsports, a fierce competitor, a good friend, a loved family man, a generous and respected employer, and we all will miss him immensely," read a company statement.

DOUG AULD, 59, SPRINT CAR & MIDGET FOUNDER

Doug Auld, the Hall of Fame journalist and founder of Sprint Car & Midget Magazine, has passed away following a brief illness. He was 59.

"A giant has left us," longtime Sprint Car & Midget Magazine writer and columnist Dave Argabright said. "Doug was intensely passionate about motorsports, and his effort and determination provided a great magazine to tens of thousands of readers over the past 20-plus years."

RACE SHOP

APEXTURBO

apexturbo.com

ApexTurbo and the ApexWheel Technology is engineered in the USA for maximum airflow and maximum horsepower. The unique, patented, fastener-free wheel delivers an advanced aerodynamic turbocharger design.

Contact: 734-777-1380

DMC

dmctools.com

The DMC2204 Autosport Wiring System Service Kit includes the tools, accessories, tools to connector/contact/terminal cross-reference information, and illustrated operating instructions needed to repair and enhance an autosport wire harness. This turnkey solution eliminates costly and time-consuming research while providing precision tooling to meet the demands of high-reliability electrical systems.

Contact: 407-855-6161

HOT SHOT'S SECRET

hotshotsecret.com

Hot Shot's Secret has expanded its Blue Diamond PAO diesel engine oil line with a new 10W-30 offering for heavy-duty use in diesel powered vehicles. With improved oxidation, shearing, and thermal stability, Blue Diamond 10W-30 is more fortified and resists breakdown allowing for longer drain intervals and reducing engine wear. It uses 100% synthetic Group IV and Group V base oils, a robust CK-4 additive package, and an infusion of patented FR3 nano lubricant technology for longevity and high performance.

Contact: 800-341-6516

INDY 500 MEMORIES

indy500memories.com

In "The Indianapolis 500 – Memories of a Fan," readers will learn the stories accumulated by a most dedicated Indy 500 fan. Ride along with Butch Welsch on his journey through 73 consecutive Indy 500s. There are also more than 500 never-before-published photographs from the events.

Contact: 314-393-2295

K1 RACE GEAR

k1racegear.com

The new K1 Pilot 2 Karting shoe is constructed of genuine luxury leather for durability. It features a breathable perforated tongue, molded soles for maximum grip and pedal feel, internal comfort shoelace system, flexible Achilles for maximum throttle control, and more. This shoe has been specially developed to offer kart racers of all ages a budget-friendly shoe option while maintaining structural integrity for extreme durability and comfort.

Contact: 760-268-0710

MAHLE MOTORSPORT

mahlemotorsports.com

Engine builders are now able to order MAHLE's PowerPak high-performance piston kit for a Top Alcohol Hemi that will come with a 1/16-inch, 1/16-inch, 3/16-inch performance ring set, and pistons forged in 2618 alloy.

Contact: 888-255-1942

MOROSO PERFORMANCE PRODUCTS

moroso.com

This BBC Mark IV Offshore Marine 10-inch deep, 12-quart oil pan is fully fabricated from heavy-duty 14-gauge steel, billet end seals and a clear zinc finish. It accepts up to a 4.75-inch stroke with aluminum rods, and the marine baffling also works well for tractor pulling and mud drag trucks.

Contact: 203-453-6571

SNOW PERFORMANCE

nitrousexpress.com

Snow Performance fuel rails are designed and built in the US from high-quality components. They are CNC machined for an ideal fit and are anodized in black for looks and corrosion resistance. These fuel rails utilize high-strength stainless steel mounting brackets to ensure the rails stay in place and don't leak in high-performance conditions. They are made for use with 8AN ORB fittings in the inlets/outlets of the rails and also incorporate two 1/8-NPT ports in each rail for gauges, sensors, or fuel fittings to feed a nitrous system.

Contact: 940-767-7694

VP RACING FUELS

vpracingfuels.com

VP Power T.A.R. deeply penetrates to remove rubber or tar without damaging the vehicle's surface, vinyl wraps, graphics, decals, and Lexan windshields. This product is specifically designed for oil-based contaminants whether from the track or the road.

Contact: 210-635-7744

WILWOOD ENGINEERING

wilwood.com

Wilwood has combined the capabilities of Grand National four piston calipers with lug-drive dynamic-mount rotors in a new road race package for 2005–2014 Ford Mustangs. The kit is in full compliance with all current SCCA specifications for American Sedan and is also well-suited to NASA classes and other sanctioning bodies requiring four piston calipers and OE production S197 spindles. It includes GN4R/ST Thermlock piston race calipers, Spec37 iron alloy GT-48 directional vane rotors and lug-drive hat assemblies.

Contact: 805-388-1188

PERFORMANCE INDUSTRY REPS

PERFORMANCE INDUSTRY REPS

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AD INDEX

SOCIAL STATUS

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

YouTube is the world's second most visited website—attracting more than 20 billion monthly visitors—and one of the top social media platforms in terms of users. What this means is that maintaining a presence on YouTube can be very beneficial for your motorsports business.

"Having a YouTube channel can financially help your business in that once you have 1,000 subscribers and 4,000 watch hours, you can then start earning money through Adsense," noted Brent Leivestad of PFI Speed, Fort Lupton, Colorado. "So, having a channel really is beneficial in that you are engaging directly with your clients and can pick up revenue for your efforts."

Leivestad launched his company's YouTube channel three years ago, and it has amassed more than 345,000 followers to date. "I genuinely love what I do every day, and I believe that goes a long way to start a following," he explained.

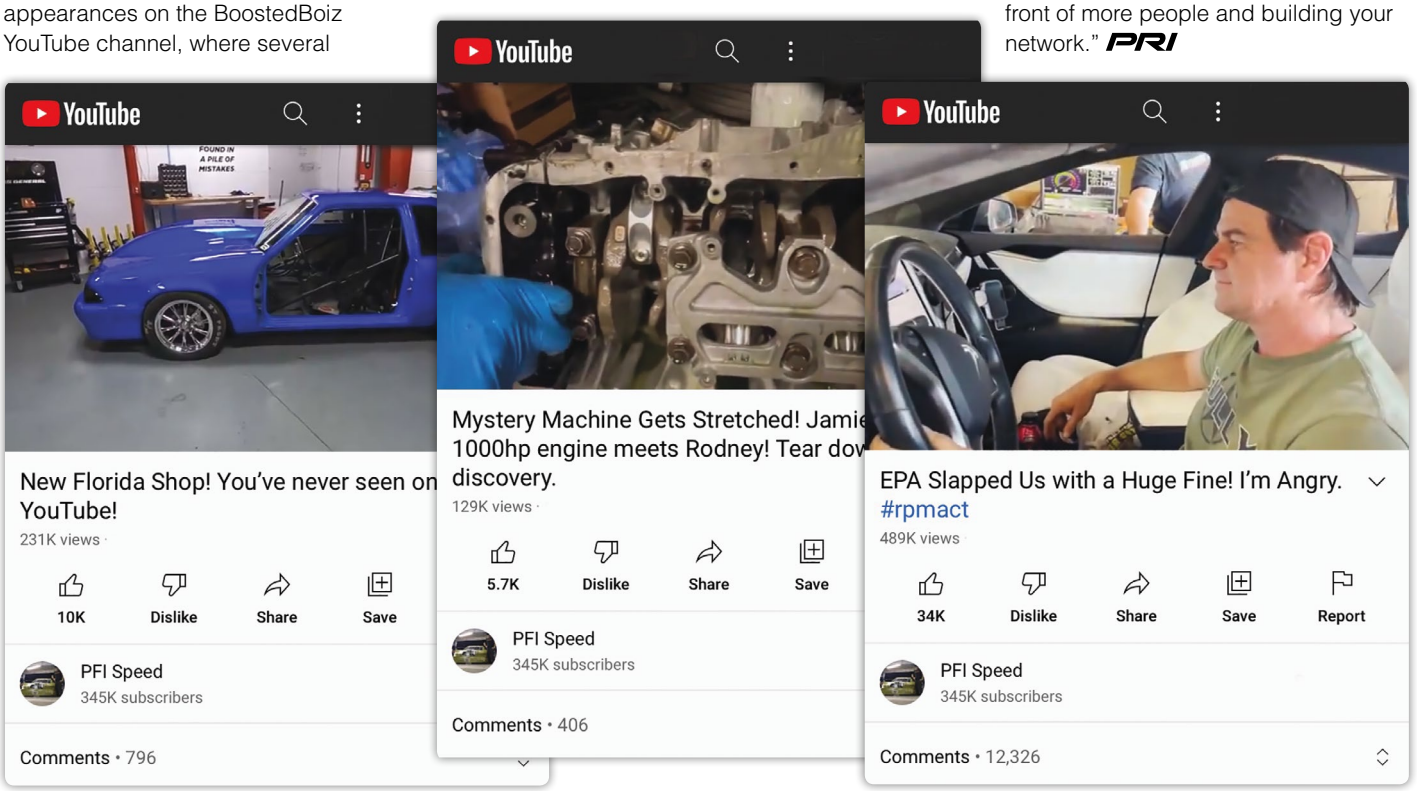
Additionally, Leivestad made appearances on the BoostedBoiz YouTube channel, where several comments were made that he should start his own channel. Developing that initial connection helped to build his following quickly.

But it was initially Leivestad's friend Josh, who runs the Gunmetal Civic YouTube channel, that helped him learn the ropes and taught him how it all worked. In that first year, Leivestad would create daily videos for his channel; now, he tries to produce four to five videos per week. "The content I do is simply a day in my life, whether I'm working or racing or with family. I share my world and make videos of what happened in my day," Leivestad explained. "Videos can take anywhere from an hour to 10 hours to edit, depending on how many cameras and what the content is. So, it's like a second job, and I probably burn the candle at both ends, but again, I enjoy it."

The most popular videos on the PFI Speed channel are typically the ones that solve problems on some of their wilder projects. "I show what's real, and how and why it works. I give knowledge freely without a tax because I believe passing it on is what makes the world a better place. So, I believe people who are interested gravitate to all of that."

After the filming and editing process, it's time to post the video to PFI's channel. "I think one of the biggest things you can do with YouTube (and I'm still not the best at this) are the thumbnail and title. Those two things are so important," advised Leivestad. "If you make it clickbait and the video doesn't go with it, that drives folks away. But when the thumbnail and title work, it'll drive your video to another level.

"However, not every video needs to be viral. Remember to just enjoy it and share your memories. It truly is an amazing way to connect and build a community," Leivestad added. "It also opens up opportunities that may not have been there, whether through marketing products in your videos or collaborating with other channels, bringing communities together and putting you in front of more people and building your network." PRI



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