

VOLUME 36, NUMBER 6 JUNE 2021

PRI

PERFORMANCE RACING INDUSTRY MAGAZINE

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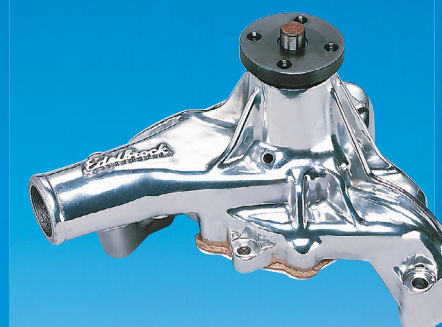
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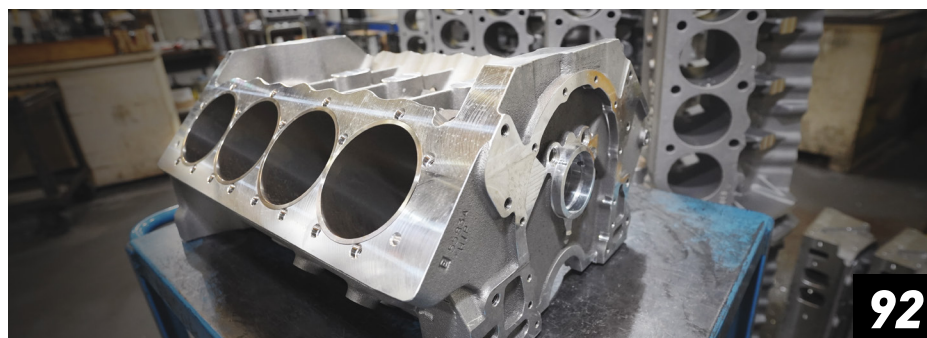
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FROM THE PRESIDENT

Welcome to another great issue of *PRI Magazine*, and thank you for joining us. Just like your business, there is a lot happening at PRI. Our social media channels have never been busier, the PRI Membership program has launched with great success, and we are seeing very, very positive signs from early PRI Trade Show registration. So, yes, tell your friends to make plans for PRI 2021—December 9–11, in Indianapolis.

By the time we arrive it will have been two full years since the racing industry was all together in one place. Thankfully, we continue to see more and more positive signs as big racing events are being held, face-to-face trade shows are coming back, and life is starting to return to a version of normal.

All of this is great news for the racing industry, and it's only adding to our enthusiasm as we continue preparations for our long-awaited return to Indy. In future issues of *PRI Magazine*, we'll be rolling out all the new innovations, exhibits, and parts manufacturers you can expect to see in December. As always, PRI will help bring you the latest from the racing industry—and beyond—so your business can take advantage of the opportunities to succeed and win.

As all of this is taking place at PRI headquarters, it got me thinking about all the great memories I have of past PRI Shows. My own relationship with PRI started in 1998. I was a full-time scientist, but I was quickly leaning toward a major career change that would take my freelance writing, race promotions, marketing strategy, and drag race announcing to the forefront of my life. Those early days were simply amazing for me. I had helped James Lawrence (currently SEMA/PRI Chairman of the Board) and Steve Wolcott (still the principal at ProMedia) form the initial elements of the National Mustang Racers Association (NMRA), and I was proud to help them host their annual awards banquet each year at PRI. What an honor it was for me to help celebrate this young, sometimes reckless group of racers. I still have deep friendships with most of you that attended those shows.

New rule sets were always released at PRI, and I remember that news running through the Indiana Convention Center like wildfire as racers worked our combinations and hustled for parts hook-ups right there on the trade show floor. Manufacturers who had helped orchestrate those rule changes enjoyed strong sales. And new racers, inspired by a fresh new race or class, would pull together combinations with engine builders and chassis gurus. Fun stuff!

One of the biggest parts launches for me while I was at Chevrolet Performance was the Camaro Body-In-White (BIW) and the COPO Camaro. Years before we ever got approval to move on these projects, I looked at what archrival Jesse Kershaw was doing at Ford Performance. Backed by Brian Wolf, Jesse was changing the very fabric of sportsman drag racing with the Ford Cobra Jet program. It was wild, obnoxious, and obvious—if you worked outside of Detroit. Yes, a factory-backed NHRA Stocker program hadn't been seriously done for 50 years. But Kershaw had forced Detroit's hand, and Chevrolet (and Dodge) finally got around to supporting the effort maybe five years after. But during that time, I had loyal, crazed Chevy fans all over us at PRI helping with the combinations and dreaming of national championships.

The COPO came after the BIW, and the story that no one knows is that I had told my Program Manager Micah Kern that we were launching the Camaro BIW at PRI before he had ever figured out how to get it out of the plant, on a pallet, and ready to ship to the dealers. He had maybe four months to pull it off. That sounds like no big deal for you independent operators, but it was a mad scramble to get the thing ready. Micah delivered the goods, and the BIW sales (fueled by sportsman racers around the country) helped push Chevy into releasing the COPO a few years later.

I remember my first few years at PRI fondly as a complete spectacle of horsepower, creativity, and imagination. Parts I had only seen pictures of were right there to be touched, and super-intelligent representatives gave me insights that I would



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share with my many readers and network of racers. It was before the Internet-on-your-phone, so I can remember calling my friends from the hotel room to share with them what I had seen during the day. I have countless PRI stories of new parts, killer race cars, bench racing sessions that ran late into the night, and maybe a story about a rental car that was rumored to be going too fast on the way back to the hotel. But, like most stories, they tend to get a little exaggerated over time.

We want the PRI Show to always feel special for you—whether it's your first one or your 33rd. It's where the industry brings its A-game: the best parts, the best cars, and the best people.

Got a great PRI memory that you'd like to share with me? Or how about a suggestion on what you'd like to see at the PRI Show this year? Please, feel free to send me a note: president@performanceracing.com.

Until next time, stay safe...and stay in the winner's circle. **PRI**

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FROM THE EDITOR

Three things I think while admiring the accomplishments of the great Bobby Unser, 87, who sadly passed away as this issue was going to press. The industry, indeed, has lost one of its fiercest competitors:

1) I THINK SOME OF THE REVELATIONS in our behind-the-scenes report on PRI's groundbreaking Road Tour surprised even me. Rewind to last fall, when PRI made the difficult decision to shelve our illustrious Trade Show for the first time in 32 years. Not much of a decision, really, as our hand was all but forced by powers beyond our control. Unfortunately, it also left us with few viable options to fill the void and, most importantly, serve our industry. But out of misfortune came opportunity, and the team here quickly rallied behind a concept that essentially flipped the script on our annual gathering in Indianapolis: "If we can't bring the industry to PRI, why not bring PRI to the industry?" And just like that the PRI Road Tour was born. In a nutshell, we proceeded to take some of the world's top content creators, load them into a van, and send them to nearly 100 motorsports parts manufacturers, speed shops, engine builders, car builders, tuners, WDs, race tracks, museums and more over two-and-a-half months to capture the images, tell the stories, and uncover the treasures from our innovation- and heritage-rich motorsports community. Taking this program from idea to reality was a journey in itself, and you'll no doubt enjoy discovering how it all came together, straight from those who made it happen, beginning on page 50.

2) I THINK AFTER READING THIS MONTH'S *Industry Insights* column featuring Pikes Peak International Hill Climb Executive Director Megan Leatham, my bucket list just grew by one. Leatham, who took the position with no motorsports experience to speak of, has leaned instead on her natural leadership and organizational skills to shepherd the iconic event through a decade of growth and good financial stewardship. Her resume is even more impressive when you consider the logistics involved in hosting a one-day race that's twelve-and-a-half miles up the side of a



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mountain. It starts with a unique partnership between the Hill Climb, the city of Colorado Springs, Colorado, and Peak National Forest to maintain the venue. "It's not meant to be a race course," Leatham told us, "and that is what makes it so exciting. For one fantastic day each year, everything goes away and the road turns into a race course." As for the people, a crew of about 15 full-time staff and contract workers balloons to a few hundred race officials, volunteers and seasonal employees each June. For more on the event's racer selection process, why EVs are so effective at altitude, and what makes the Peak such a draw, see our coverage beginning on page 38.

3) I THINK WHAT MANUFACTURERS like Eagle Specialty Products, Anderson Composites and others are experiencing, as highlighted in our piece titled "Still Spiking," is not unusual among motorsports parts suppliers. After a month or so of uncertainty last spring, a number of companies saw sales take off around summer. Well, here we are a year later and demand hasn't let up. This scenario no doubt falls into the "good problem" category. But it's nonetheless created challenges—order fulfillment, labor shortages, shipping delays, etc.—that require smart solutions. Get the inside story on how some of the industry's brightest operators are adjusting to this unprecedented (and unpredictable) reality in our story beginning on page 112. **PRI**

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ACCOUNTING PAYABLES
Lily Huang

Performance Racing Industry (ISSN 1045-3024) is published monthly in the interest of the growth and development of the racing market, consisting of manufacturers, retailers and racing participants. *Performance Racing Industry* can be contacted at 27081 Aliso Creek Rd, Suite 150, Aliso Viejo, California 92656, 949/499-5413, Fax 949/499-0410. Periodicals Postage paid at Laguna Niguel, CA 92677, and additional mailing offices. **Postmaster:** Send address change to *Performance Racing Industry*, 27081 Aliso Creek Rd, Suite 150, Aliso Viejo, California 92656. No part of this magazine may be reproduced without written consent of the publisher who is not responsible for the unsolicited material. *Performance Racing Industry* is sent to the retailers, distributors, manufacturers and racing participants within the United States. Subscriptions are complimentary to qualified members of the racing industry. "Performance Racing Industry" is a trademark owned exclusively by SEMA © 2021 Performance Racing Industry. All rights reserved. **Printed in U.S.A.** PM # 40702022. Return Undeliverable Canadian Addresses to: Station A, PO Box 54, Windsor, ON N9A 6J5. Email: cprereturns@wdsmail.com



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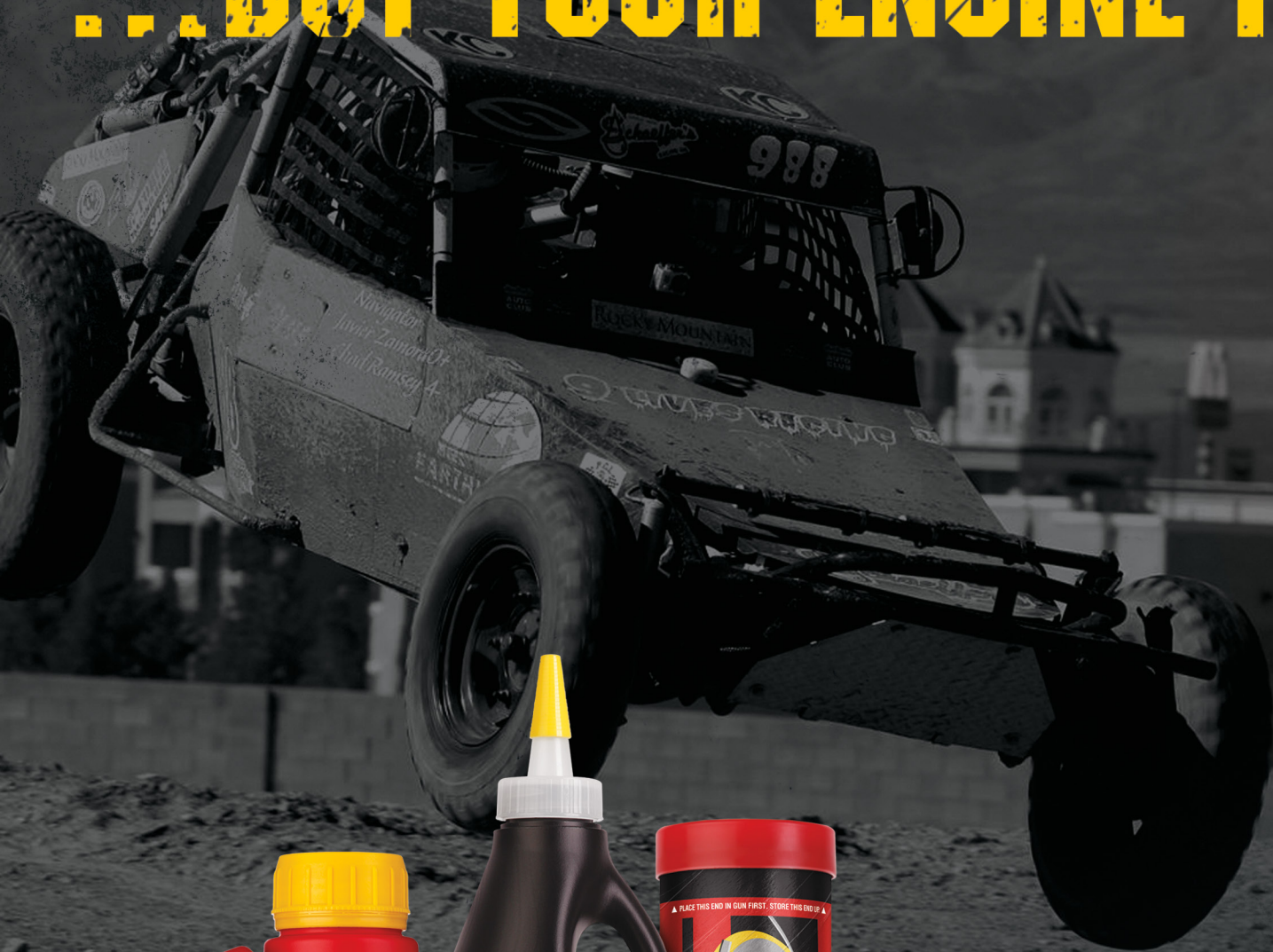
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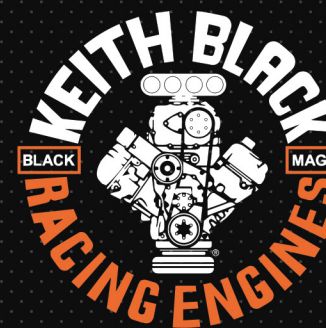


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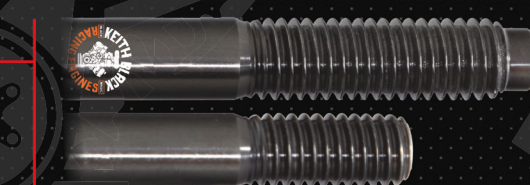
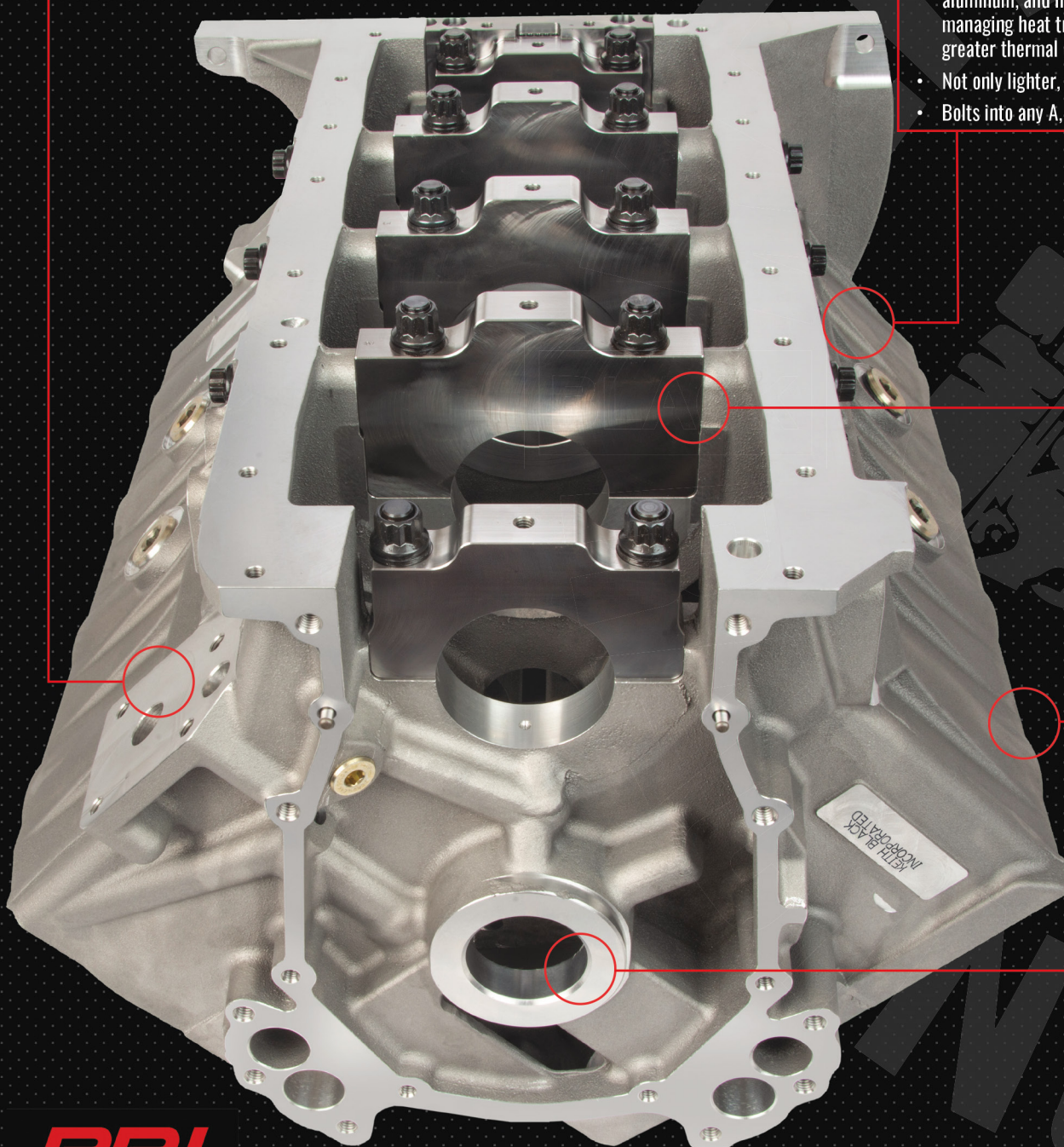
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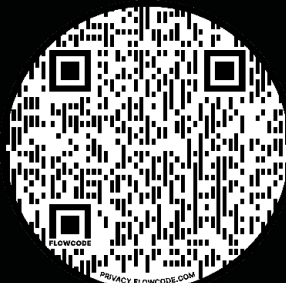
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LEAD POSITION

Meet Wall-E! This Mars Rover-like contraption was an invaluable contributor to the inaugural PRI Road Tour, according to handler Justin Cesler of Driveline Studios, whose content creators spent two-plus months gathering exclusive, behind-the-scenes images, video, news, and interviews for our groundbreaking program that launched in fall 2020. In fact, Wall-E became something of a breakout star during the Tour's cross-country journey that took us to the doorsteps of nearly 100 motorsports manufacturers, engine builders, fabricators, distributors, race teams, and more. So what is Wall-E made of? Glad you asked. According to Cesler, it's—sorry, *he's*—a custom-built RC camera platform built by Bryant Lambert Inc. that utilizes a custom RC chassis, a gimbal stabilizer system, and a RED camera. The whole package weighs about 60 pounds, give or take, and can reach speeds of up to 45 mph; he's also capable of crawling for more technical, low-speed applications. Cesler told us, too, that Wall-E powered most of the interior and exterior low-angle moving shots captured on the PRI Road Tour, adding, "Wall-E allows our team to create content that couldn't be done without him. Wall-E is perfect for showcasing the amazing facilities that make up our industry. Whether Wall-E was running through a factory full of CNC machines or chasing race cars around the track, we can count on Wall-E to help us create the shots we need." For much more on the inspiration, development, talent, and operations behind PRI's revolutionary Road Tour, see our coverage beginning on page 50. Plus, scan the QR code at right for access to our YouTube page and PRI's growing playlist of incredible Tour content.



PRI MEMBERSHIP: FRONT-RUNNERS

As the motorsports industry continues to face mounting threats to its existence, these Founding Members share the reasons why they pledge their full support to our right to race with a PRI Membership.

By PRI Staff

Flip or scroll through the sports news, and the headlines covering racing are always about the winners. The individuals. The exceptional talents.

But the stories behind the headlines reveal the accomplishments of the crews, shops, supporting teams, and organizations that enable the winners...to win.

Without a doubt, PRI is racing's critical enabler. We are the organization that builds, promotes, and protects the racing community to ensure that race/win headlines remain a part of our industry's future.

Given the current regulatory environment, however, that future is by no means guaranteed. (Have you tried shopping for long-tube headers lately?) And that is why we have taken our place as the chief guardian against threats to the motorsports community. What this means for the industry as a whole, and its many tributaries that extend into regional and local markets, is that we are focused squarely on you, and your business, whether your annual revenues number \$100,000 or \$1 billion.

This vision and inspiration to meet our industry's call is why we started developing a membership program two years ago. The official membership drive launched in March, and the roster is growing.

We are strongest when we're all united as an industry. Plus, our collective political voice and economic power is more influential. A decision to join PRI is a clear message that you stand with industry members and fans to protect and grow the lifestyle that we all love. Coming together to unify the racing industry is our best chance to navigate the challenges we face today and tomorrow, and to get results.

Beyond economic, legislative, and important educational initiatives, your PRI membership affords your company discounts on PRI booth space, PRI advertising, and additional benefits as the program grows.

On the following pages you'll hear from some of the first to join PRI's mission—the early adopters who came on board as Founding Members—in recognition of the benefits to the industry, as well as to their own companies.

These Founding Members also identified something unique that came with their level of involvement, namely an organized ability to network with other industry leaders. The first official Founding Members' event will be held at this year's PRI Trade Show in Indianapolis.

While this special reception will mark the return of our in-person Show, it will also include an exclusive, state-of-the-industry presentation covering the latest economic and government affairs developments. Just as important, there will be face-to-face networking as well as opportunities to interact with key representatives from governmental business development teams, the banking world, and venture capital firms.

Business leaders know the value of making connections and gaining exposure to critical insights that steer markets and decision-making. And so does the PRI team, which is why we're making PRI Founding Member status available, for a limited time, for \$25,000 (with a payment option of \$2,500 per year over 10 years). In other words, for the cost of a small Facebook advertising campaign, your company could position itself at the forefront of our industry.

That's the value Moser Engineering, CP-Carrillo, Racing Optics, and Motor State Distributing realized. These companies were among the first out of the gate and onto PRI's Founding Member roster.

As you read more about these industry leaders, consider the practical and affordable membership options our team has for your company, or for you as an individual. With your involvement, we will continue to build, promote, and protect your livelihood, as well as the prosperity of the entire racing and aftermarket community.



If you build race cars, Moser Engineering likely needs no introduction because the company is so widely known for its American-made driveline components. And when Moser displays "made in the US," that includes the steel and its own custom alloys used to create axle forgings and axle housings. Founded by Greg Moser in 1986, and now operating out of a 100,000-square-foot production facility in Portland, Indiana, the company is also known as a rapid-turn, low-volume manufacturer, and for being a quality distributor of aftermarket driveline and performance parts.

Marketing Director Jeff Anderson clearly articulated why his company became PRI's first Founding Member: "We see many challenges ahead for the industry, both here in the US and abroad. The challenges range from the threat of overseas competition from an uneven playing field, to economic trade policies including managing the balance between free markets and industrial policies

"WITHOUT THE HELP OF ORGANIZATIONS LIKE PRI, OUR VOICES WOULD LIKELY NEVER BE HEARD."

—JEFF ANDERSON, MARKETING DIRECTOR, MOSER ENGINEERING



From its inception, CP-Carrillo has dedicated its efforts to the motorsports industry, so the choice to become a PRI Founding Member was easy. Peter "Snake" Calvert, president and CEO, stated the company's position simply: "Our valued successes are attributed to decades of hard work in racing, good employees, quality products, and great service—and the PRI platform shares that vision!"

To understand the long-term success CP-Carrillo has earned is to understand that to win races, everything in an engine needs to work together to produce reliable power. This applies doubly to reciprocating

"SINCE THE BEGINNING, CP-CARRILLO HAS BEEN A PART OF PRI. GOVERNMENT REGULATIONS ARE ALWAYS A CONCERN, AND PRI HAS ALWAYS BEEN AT THE FOREFRONT TO HELP THE INDUSTRY REACT."

—PETER "SNAKE" CALVERT, PRESIDENT & CEO, CP-CARRILLO



that can sometimes be detrimental to certain segments of our economy. We need to be thinking about these policies, as it will affect our industry in the future."

Like so many in the industry, Moser Engineering has faced its share of business challenges over the decades, including inferior, cheap, and counterfeit parts. With its Founding Member status, the company recognized that PRI would amplify its voice to a level that policymakers couldn't ignore.



assemblies of pistons, rods, pins, rails, rings, and more. Working out of their expansive facility in Irvine, California, the CP-Carrillo team—members of Pankl Racing Systems—brings cutting-edge technology together with traditional hand craftsmanship to produce some of the industry's highest performing rods and pistons that work together from the outset. The pairing of pistons with rods is a unique CP-Carrillo product advantage. Its approach has earned CP-Carrillo records and wins to rival (or surpass) any other piston or rod manufacturer.

The company's foundation was laid in 1963 when Fred Carrillo took a no-compromise approach to manufacturing connecting rods. The Calvert brothers formed CP Pistons in 1998, and the two companies joined forces in 2008 to continue improving and innovating for their customers across the racing spectrum, from Formula 3 to drag racing, and from Supercross to vintage.

Beyond its products, CP-Carrillo is dedicated to the racing industry at all levels. The company works closely with local high schools and colleges via internships, employment, and sponsorships. At the legislative level, the company fully supports the RPM Act, as well as PRI's lobbying efforts at large.



racing optics

If you can't see your goal, you'll never reach it. Born out of practicality, Racing Optics' multi-layer laminated tear-offs have become a fixture in professional and amateur racing. Racing Optics helps racers keep their goals in clear view, and in that, sees its role as one that's parallel and aligned to PRI's.

Quality optics that perform in racing require ultra-precision laminating, coating, die-cutting, and laser technologies, and Racing Optics excels at providing a broad line of products with the performance and reliability customers demand. The products are used widely in the racing industry, and by partners including the

"WE DEPEND ON PRI TO HELP OUR STAFF KEEP UP WITH THE LATEST RACING TRENDS, NEW PRODUCT LINES, AND INDUSTRY STRATEGIES."

—BART WILSON, PRESIDENT, RACING OPTICS



US military, 3M, GE, Oakley, Rawlings, Scott, Smith, Spy, Bell, Shoei, Schuberth, and Arai as OEM customers for diverse applications from visor shields to windshields.

As the company's expertise has evolved, it applied the same technology to other industries, improving safety and performance wherever visibility is critical. For example, in response to the pandemic, the RealShield PPE line was introduced.

Founded in 1999 in Orange County, California, Racing Optics, Inc. is now located in Las Vegas, Nevada. The company has continued to expand into other markets, building on the legacy of the Wilson family in racing. The Wilsons have deep motorsports roots, going back to the 1940s when Dempsey Wilson began building and racing roadsters. The senior Wilson was a founding member of SEMA, and his sons Bart and Steve chose to honor their father's vision (and ensure their business' success) by becoming a PRI Founding Member.



If you were an exhibitor at the very first PRI Show in 1988, chances are Motor State Distributing founder George Lane walked past your booth. Back then Lane would have been shopping for his company, Lane Automotive, a part-time speed shop he ran out of his garage.

Today, Lane's efforts are represented by Motor State Distributing, a leading worldwide warehouse distributor of racing and high-performance automotive parts. From its Southwest Michigan headquarters in Watervliet, Motor State now services thousands of

"AS A FOUNDING MEMBER, WE RECOGNIZE THE ROLE THAT PRI CAN PLAY IN CREATING A VOICE FOR THE INDUSTRY AS WELL AS A FORUM TO ALLOW MEMBERS TO WORK TOGETHER TO FIND SOLUTIONS FOR THE ISSUES WE ALL FACE."

—SCOTT WAHLSTROM, DIRECTOR OF MARKETING, MOTOR STATE DISTRIBUTING



customers throughout the United States, Canada, and more than 35 countries. Stocking more than 100,000 part numbers from more than 650 brands, the company serves a variety of performance and racing markets, including circle track, drag racing, engine building, open wheel, hot rod, early muscle, modern muscle, truck, and off-road. Motor State has successfully adjusted to the shifting demographics of the market as the American car culture adapts to new technologies.

Like most in the performance industry, Motor State Distributing has experienced firsthand the impact of constantly changing environmental and regulatory requirements, including EPA guidelines to Prop 65. These constraints have prompted the closure of tracks, restricted access to performance parts, and led to increased costs for many manufacturers. The company recognizes the power of PRI's commitment to pursue reasonable exceptions for race and performance enthusiasts.

As it always has, Motor State sees a bright future for motorsports, especially if the industry bands together as distributors, manufacturers, and racers. **PRI**

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FACTORY BMW DRIVER—CONNOR DE PHILLIPPI

CHARLOTTE, NORTH CAROLINA

Adaptability is key for this American sports car racer as he improves his technical knowledge, embraces a new language, and expands his sim racing skills.

I race in the IMSA WeatherTech SportsCar Championship, and the last three seasons we've been doing a full program, which is 11 events. But in 2021 we have a reduced program due to the fact that our class is getting phased out this year. We're doing just the four main endurance races in the US, which are the Rolex 24 at Daytona, Mobil 1 Twelve Hours of Sebring presented by Advance Auto Parts—both of which have already taken place—and Sahlen's Six Hours of the Glen at the end of June and Motul Petit Le Mans at Michelin Raceway Road Atlanta, which is typically in October but was moved back to November this year.

So, BMW has restructured and is planning for the future, which includes a new class next year. We scaled back a little bit this year and moved some of those resources into developing the car for next year.

With the car, we've been looking to find a way to make the drivability window bigger. In previous years, the car has been pretty tricky to drive at its limit for an entire hour, so there were always mistakes that we would make over the course of the one-hour stint. It was very difficult to drive, especially as tire degradation began to kick in.

One of the biggest things that me and my engineer spoke about was how to make the car a little more forgiving and allow us to have that bigger window of drivability to reduce mistakes as tires degrade, or have the tires degrade at a slower rate.

As far as physical work on the car, I don't get involved. I definitely accept that the mechanics know a lot more than I do, so I let them do their job. However, I'm very involved in the engineering side, the technical

understanding side, and the development side. I'm very intrigued with the technical side of motorsports, so I have quite a few calls throughout the month with my engineer to brainstorm ideas and discuss areas that we can improve on or are overlooking. We look at reports from different events and try to understand what we could've done better.

My main focus this season is on the four big IMSA races, but I also have a contract with BMW in Munich, Germany, to do four races for them at Nürburgring. The main show is the ADAC TOTAL 24 Hours of Nürburgring (a race I won in 2017) this month, and I had three preparation races at Nürburgring leading up to the big show.

In between races I have a simulator at my house, and BMW has us very involved with sim racing. It's something pretty new, but something they are taking very seriously because they see value in it. They see the future in it. Racing is more and more expensive as years go by, so sim racing is a way for BMW to interact with motorsports fans at a different level and interact with their own drivers in a different style than just being at the race track. They've been pushing us quite heavily in the sim world.

During April, we had several sim races that IMSA organized and live streamed. There were about 35 of us, pro IMSA drivers, racing against each other in the simulator championship. That's something new and exciting, interesting for fans to watch, and something maybe they can relate more directly to since more people have simulators than race cars. Sim is something that takes up a lot of our time in between events, as well as fitness training like cycling



and running.

Something I'm proud of, that has also proven beneficial, is that I'm fluent in German. My third year in Europe I lived in Austria for six months and drove with an Austrian team, and many of them didn't speak a ton of English, so I started to learn some German there. And in my fourth year I drove with a fully German team, and they spoke zero English, so I had to know how to communicate with them, and that's when I started learning at a quicker rate.

It definitely has helped me when driving for German teams and German brands. I think it goes a long way and makes me more marketable for them. I can do press events in Germany when I'm there, and I get to mingle with different groups that maybe I wouldn't get a chance to if I wasn't German speaking. It certainly has its benefits.

As for my future in racing, I'm very content where I'm at now. My short-term goal is to get to the top level of sports car racing, which would be the prototype category. With the future of the rules and the way that they're restructuring classes now, it's going to be called the LMDh. I hope I get a chance to move up to that category. **PRI**

"IN BETWEEN RACES I HAVE A SIMULATOR AT MY HOUSE, AND BMW HAS US VERY INVOLVED WITH SIM RACING."

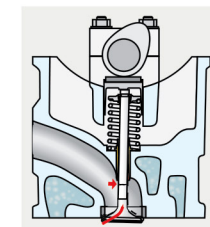
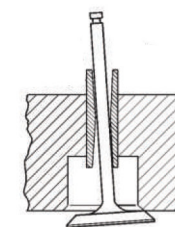
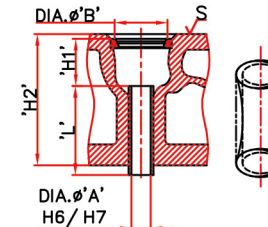
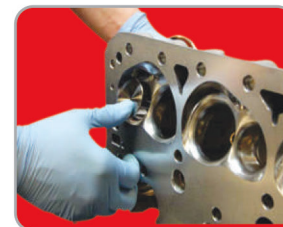
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5 - 7mm	10 - 40 µm	25 - 55 µm
>7 - 9mm	20 - 50 µm	35 - 65 µm
>9 - 12mm	40 - 70 µm	55 - 85 µm

'Valve Guide Machining Tolerances'

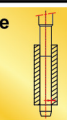
Dia. Ø 'A'	SURFACE FINISH	CIRCULARITY	CYLINDRICITY
GUIDE BORE TOLERANCE (Ø 6-10 mm) H6 Ø 'A'-0.000 +0.009 mm (0.00035") or H7 Ø 'A'-0.000 +0.015 mm (0.0006")	0.5 Ra µm • 20 Ra µm In • 0.5 CLA • 3.8 Rz ISO • 0.6 RMS	(Roundness) 0.006 mm (0.00025")	(Straightness & Roundness) 0.005 mm / 50 mm L (0.0002" / 2" L)

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ASK THE EXPERTS

MUFFLERS

Don't believe the old racers' tale of "mufflers hurt horsepower," as our sources reveal how these components may actually enhance on-track performance.

By Drew Hardin

Whether it's because of sanctioning body rules, track-area noise regulations, or a combination of the two, some sort of sound attenuation equipment is a requirement on most race cars. Conventional wisdom used to be that a muffler would always hurt engine performance, yet many of today's racing mufflers cause little or no power loss. That's not always the case, though, so racers still need a strategy for choosing the proper muffler and then minimizing any resulting changes in power. For insight on this topic, we spoke to three experts in the muffler field: David Borla of Borla Performance Industries, Johnson City, Tennessee; Vince Roman of Burns Stainless, Costa Mesa, California; and Mark Emerson of Flowmaster, Bowling Green, Kentucky.

How do I choose a muffler with the least impact on my engine's performance?

"You need to understand the rules and regulations that require the use of mufflers in the first place," said Borla. "Different tracks and sanctioning bodies have different rules. Is there a specific decibel limit and test standard to meet? If so, what's the testing procedure? Is it a stationary test? Drive by at a certain rpm? Where are the measuring devices located on the track? The more you understand about the requirements, the better decisions

you can make regarding which mufflers to use."

"Some places just require that you have a 'muffler,' and that's it," said Emerson. "That's a lot different than having to meet a specific decibel limit using a sound meter."

Complicating the issue is the fact that decibel limits can be a moving target, said Roman. At Laguna Seca, for example, "on weekends when there's a big series in there like IndyCar or IMSA, it's basically unrestricted, even for the lesser classes. Other weekends they'll have a 95-decibel limit, but some days

Different tracks and sanctioning bodies have different muffler requirements, which means racers must keep in mind factors like whether there's a specific decibel limit and test standard to meet, and what that testing procedure may entail. Photo courtesy of Flowmaster.



the limit is 92. You have to look at the schedule to see what the limit is on the days you run."

Mufflers with the least effect on performance are the flow-through, open-core, absorption mufflers, according to Roman. "It flows like an open pipe. As long as the system length remains the same and you use a muffler like ours, you're not going to lose any power," he said.

Flowmaster offers a muffler, the Outlaw, that was designed to not restrict power. "Those are great for a series that doesn't mandate a particular decibel limit," Emerson said. "They just take away some of the harshness of the exhaust sound." Inside the Outlaw muffler are "angled rings in the expanded part of the muffler case that help with sound attenuation and create a scavenging effect. As the exhaust pulse goes by, it creates a little low-pressure area on the back side of the rings to help pull the next pulse through."

Emerson said Flowmaster "always recommends" exhaust turn-downs after the muffler, "because you can point them to help meet sound requirements. Depending

on the application and where the sound meters are, they can be pointed down at the ground or angled back away from the sound meters. On a dual-exhaust system, if you point the turn-downs toward each other at about a 45-degree angle, that will add additional sound control because the exhaust pulses coming out of them will be pointing toward each other in the same fashion as the sound inside the muffler is controlled when we direct those sound frequencies into each other."

How can an engine be tuned to minimize power loss with mufflers?

"It depends on the application," Emerson said. "They're all going to vary depending on whether it's a single system or dual. It might need digital tuning upstream as far as timing and jetting or mapping of the fuel system if it's injected. The muffler is the last thing connected to the engine, but it's still part of it. You typically can't just throw them on and

go. They need to be tuned as a package."

"From our experience it's not very difficult to tune around the muffler, as long as you're keeping the length of the system—from header to tailpipe—similar or constant," Roman said. "With the straight-through muffler it has more to do with the tuning waves occurring in the exhaust. Adding a muffler in there will affect those waves. You might have to tweak the fuel curve in a few different areas because of those frequency changes. But they're not usually huge changes."

With a more restrictive muffler, though, "you're basically pushing less air and fuel through the motor," he added, "so you're going to have to tune by taking fuel out of it."

Can my engine builder or local retailer be a good source of help with mufflers?

"Yes, experience matters a great deal," said Borla. "Gather all the advice you can from the most reputable sources you can

find and use that to narrow down your choices. You can't test a thousand mufflers. You need to start somewhere."

But, added Borla, the key to getting the most performance from mufflers is "testing, testing and more testing. You can combine all the tribal knowledge in the universe with computer modeling technology and throw a palm reader or astrologer in there for good measure, and it still won't replace testing. There are no shortcuts." **PRI**

SOURCES

Borla Performance Industries
borla.com

Burns Stainless
burnsstainless.com

Flowmaster
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TECH UPDATE

DEMYSTIFYING SHOCK DYNOS

A leading manufacturer breaks down exactly how these valuable tools can be used to optimize performance for better on-track results.

By Chris Berg

The technical side of motorsports can be intimidating for new participants and seasoned veterans alike. If you have ever spent any time at the race track, particularly as a competitor, you no doubt heard the term “black art” attached to some aspect of race car tuning, often in reference to highly technical components like dampers—also known as shock absorbers.

Today, the increased complexity in suspension design has forced these components to work in a smaller envelope of optimal performance. Which is why having a good shock specialist at your disposal has never been more important. Simply put, without the help of a talented shock builder, racers across all forms and levels of competition could find themselves at a big disadvantage.

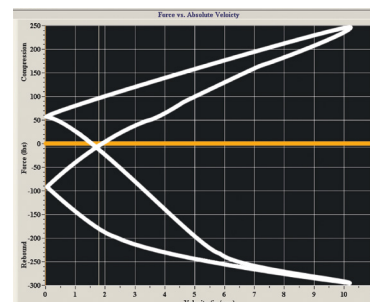
But not everyone has access to a shock or damper guru, and that's why we're here: to provide clarity on this at-times murky topic and explain how one of the most useful tools on the market—a shock dyno—can benefit your program.

So, what is a shock dyno? It is

a mechanically or pneumatically powered piece of measurement equipment that records the exact amount of force it takes to overcome resistance to the compression and extension of a shock at a given velocity and stroke length. Compression—also called bump—refers to the force needed to push a shock together, while rebound describes the force values needed to pull a shock apart.

Shocks control, or dampen, the speed at which the suspension of a race car extends or compresses, controlling how weight is transferred from side to side or front to back. The easiest way to understand the role of a damper is by picturing what happens as a driver approaches a turn. When slowing down for a corner, either lifting off the throttle or applying the brakes, weight will transfer to the front tires. As the driver adds steering input, weight transfers to the tires opposite the direction of the turn, with the outside front tire bearing the highest load. The compression characteristics of the front dampers and rebound behavior of the rear dampers control the speed of this transfer.

The Force vs. Absolute Velocity graph is one of the primary tools used by racers to get a high-level snapshot of a damper's performance. This shows how the shock will behave during compression and rebound movements at a variety of speeds.



As the race car moves through the apex, the driver will usually begin to apply throttle and unwind the steering wheel. This causes the rear suspension to compress, often referred to as squat, as weight transfers to the rear tires. The rebound rate of the front shocks, and compression values of the rear shocks, control how quickly that load transfers rearward. Whether transitioning into or out of a turn, controlling the transfer of load is extremely important. Transferring the force too quickly can overload a tire, causing a complete loss of grip; or, it can transfer too slowly, and under-utilize the full amount of potential traction.

Shocks are adjusted using different shock oil viscosities and various piston valve configurations, changing the amount of oil that flows from one side of the piston to the other when moved. Technicians use these settings to change the amount of resistance throughout a compression and rebound cycle. And that's where the shock dyno comes into play: It allows a racer, or shock builder, to understand exactly how the shock will behave in each phase of travel by several means, most commonly tables and graphs.

Carter Gerlach of Elite Shock Services uses an Intercomp 3-hp Variable Speed Dyno to test freshly rebuilt shocks (dampers) before they leave his shop. This is the final step to check seals and ensure it provides the optimal on-track performance for his customer.



The “Force vs. Absolute Value” graph is one of the most recognizable outputs from a shock dyno. It shows how the shock resists movement when actuated in low- and high-speed damping situations. The other graph most often associated with a shock dyno is “Force vs. Displacement,” which shows how a shock resists movement through a given stroke length. Basically, the first graph tells how the shock reacts when a race car first begins to change directions, while the second graph shows how a shock will respond as cornering forces continue to be applied.

For a shock to be most effective, it needs to provide the same level of performance lap after lap and from one track to the next. Over time, seal wear, loss of gas pressure, and shock fluid contamination cause performance to degrade, making load transfer unpredictable when the race car is in a state of transition. Since wearable or damaged damper components are not often visible without disassembly, performance characteristics tracked over time allow racers to know when a rebuild is needed. Most dyno software provides the ability to easily compare data from past dyno runs, helping racers to anticipate changes in a race car's performance, or providing the opportunity to make other chassis adjustments to offset the deficit.

In recent years, the advent of smaller and more powerful dynos has made it possible for these units to be installed in race trailers or other transport vehicles. This allows racers to be certain that a worn damper will not let them down in the middle of a session, and allows for more in-depth service, like a rebuild, in real time.

Racers' ability to leverage sophisticated tools like shock dynos—especially at the track—is proving to be a game-changer as teams learn more about their many advantages. Consider that we've only scratched the surface here. The possibilities now and into the future are very much wide open. **PRI**

Chris Berg is the head of marketing for Intercomp's racing division. He has been an active member of the racing community for more than 20 years, competing at various levels from regional karts to professional motorsports at some of North America's premier tracks and venues.

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PROBLEM SOLVERS

Understanding your company's objectives, clearly communicating them, and tracking your partners' progress can make all the difference for a successful sponsorship agreement.

By David Bellm

THE PROBLEM: I can't tell if my company is getting adequate ROI from sponsorships

THE SOLUTION: Define precise, measurable objectives and continually monitor them

“Most marketing directors say sponsorship ROI is like licking your finger and sticking it in the air to see which way the wind is blowing,” said sponsorship consultant Alex Striler, author of the book *Motorsports Marketing and Sponsorships: How to Raise Money to Race and Give Sponsors What They Really Want*. “Frequently, they put the cart before the horse. They haven’t thought through why they’re doing something versus other alternatives that they could do.”

We recently reached out to Striler for his expert insight on how companies can more precisely gauge the results of their sponsorships. He recommends first starting with a detailed picture of what you’re actually trying to get out of the agreement. “From my experience, most of the time sponsorship deals go wrong it’s because the company didn’t have clearly identified objectives,” Striler told us. “You have to think about the

logic of the relationship, and then you define it at the beginning. “Start by asking, ‘What’s the purpose of this sponsorship?’” he continued. “Is it to increase awareness? Is it to open distribution channels? Is it to generate sales leads? Is it to give away samples? Is it to create a hospitality environment for brands to meet each other and perhaps get business-to-business deals going? Is it to create content that can be used to promote your company on social media? If you know the objectives, then you can determine if the sponsorship is working.”

Once companies have clearly defined their goals, they need to communicate them in sponsorship agreements. Ideally, they should spell out specific activities intended to bring about these outcomes, starting with broad overall objectives. “It’s not about giving people money and then letting them go try to do whatever it is that they do with the money to represent you,”



said Striler. “It’s about telling them, for example, ‘We’re giving you this money for the following reasons: One, we want you to market into this new geographic area where you race and where we don’t have any presence. Two, while you’re there, we hope you can get our product into four local retail stores.’ Having clearly defined objectives like these at the beginning lets you gauge the performance of a sponsorship as it goes on.”

Next, companies should require teams to report their activities and results regularly. These reports are called proof-of-performance documents, and they need to be a central component of any sponsorship deal. “There are two types of proof of performance,”

Consider the purpose of sponsorship agreements in order to properly measure their effectiveness. Is it intended to increase brand awareness, or create promotional content for social media, or something else entirely?

Striler explained. “After-event proof of performance is where racers give maybe a one-page outline to sponsors of how they did, both good and bad—you don’t want to hear only the good. You also want to know what went wrong, so you can learn from it and change it. And then, at the end of the year, all of those regional and local proof of performances can be compiled into one larger document that says, ‘This is what we did all year long.’ That document will determine whether or not they fulfilled the obligations agreed on in their contract.”

But Striler cautioned that racers often tend to focus more on their race performance in these reports, rather than your marketing aims. For that reason, companies need to specify exactly what they expect to see in proof-of-performance documents. “Proof of performance isn’t about the racer, it’s about the brand. The proof-of-performance report should state something like this: ‘I got third place on the podium, which was viewed by 100,000 people through social media. Those 100,000 people were primarily males age 18 to 24, according to Facebook demographics. And we got television coverage on NBC Sports. That 30 seconds of coverage is worth X dollars, according to the network’s rate card.’”

Armed with these tools, companies can continually adjust and tune a sponsorship to achieve the right objectives. Striler said the key to doing so is to monitor the relationship throughout the season and communicate often. “If the sponsorship contract says you need 20 engagements through social media, but halfway through the season the race team hasn’t done any, now you know you’ve got to make adjustments.”

“After every event, you should know whether or not you’re one step closer to achieving your objectives,” he added. “Having clearly defined goals allows you to adjust along the way and make changes. That way, when the year is over nobody is blindsided by the fact that, ‘Oh, this didn’t work.’” **PRI**

SOURCE

Alex Striler
alexstriler.com

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EDITORS' CHOICE

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

GS1R & CF1R BEADLOCK WHEELS

FORGELINE

forgeline.com

Forgeline is leveraging technology from its road-racing efforts to develop beadlock rims for exotics and late-model muscle cars that participate in drag racing and standing-mile events. The new GS1R Beadlock and CF1R Beadlock are 10- and 5-spoke, respectively, lightweight one-piece monoblock designs that are available in four different diameters.

"Many other wheels are constructed with multiple pieces or sections welded together," explained David Schardt of the Dayton, Ohio-based company. "Our wheel is a monoblock style, like our road-racing wheel, that starts out as a 110-pound forging. We then machine it out and make the beadlock rings separately."

The two spoke patterns are the lightest in the lineup, but Schardt said that new designs will be forthcoming. The target audience includes Lamborghini, Audi R8, McLaren, and late-model Mustangs, Corvettes, and Camaros that race weekends at the strip or compete in standing-mile and 2-mile events that require beadlocks.

"We may be the only company that offers a 19-inch beadlock," added Schardt.

The GS1R and CF1R Beadlock rims are available in 15-, 17-, 18- and 19-inch diameters with a number of widths, lug patterns, and backspacing available. There are also finish options and different beadlock colors available. —Mike Magda



G-COMP UNSER EDITION FRONT SUSPENSION KITS

SPEEDWAY MOTORS

speedwaymotors.com

Tailored for high-end Pro Touring, autocross, and road racing, the G-Comp Unser Edition front suspension kits from Speedway Motors in Lincoln, Nebraska, offer increased adjustability and more performance options than the standard G-Comp lineup.

"The G-Comp was supposed to be a performance upgraded street package. Then we started working with Robbie Unser and Al Unser Jr. on a competition version," said Tom Brown. "Mainly, we wanted more adjustability in certain areas. What we ended up with was a race version of the G-Comp."

The Unser edition features additional caster and camber adjustment range and adjustable upper shock-mount location that allows for longer shocks and a larger OD coil-over spring. A redesigned upright also uses an inverted upper ball joint to allow deeper wheel back spacing. Numerous options for brake kits, shocks, and springs add to the flexibility of the kits.

"It's just a beefier front end with more adjustability," added Brown.



The G-Comp Unser Edition is available in dedicated bolt-on kits for select early Camaros, Novas, and trucks—but there is also a universal kit that can be welded to a variety of applications.

"It's available in four different track widths, so you can put it in just about any vehicle," Brown added. —Mike Magda

4L80E BILLET STREET RACER TORQUE CONVERTER

FTI PERFORMANCE

ftiperformance.com

FTI Performance in Deland, Florida, builds 9.5- and 10-inch Street Racer lockup torque converters for all the popular modern lockup transmissions, with the 4L80E being the most popular. Available in single- and triple-clutch versions, it's available in a range of stall speeds from 2,800 up through 4,000 rpm; and there's also a custom stall-speed option.

"The most popular is the triple-clutch model," said Greg Samuel. "We use the same technology in a 3,000-horsepower bolt-together torque converter as we do in the Street Racer series."

FTI makes its own parts, and all the converters are fully CNC machined. Furnace brazing and hand TIG welding are also part of the construction process, and the converters are assembled with triple Torrington bearings and billet pistons for the lockup function. The billet front covers are designed to work with all the popular bolt patterns on GM flywheels.

"The triple-clutch is designed to lock up under full throttle, which is very popular in today's turbo world," said Samuel.

FTI has about 20 different blade angle-stator combinations to accommodate every type of power combination.



"It all goes back to the stall-torque ratio," Samuel explained. "That's why we ask so many questions when you order one. We'll set that converter up for your application." —Mike Magda

MAKE THE CASE

AIR-TO-AIR VS. AIR-TO-WATER INTERCOOLERS

Proper charge temperature cooling plays a crucial role in today's high-horsepower forced induction engines. As racers seek out ways to squeeze every last ounce of performance potential from their combinations, we're taking a look at how these different intercooler designs can affect the end result, and where each one does its best work.

As told to Bradley Iger



**AIR-TO-AIR
INTERCOOLER
ADVOCATE:
ERIK RADZINS,
PROCHARGER**

*"AT THE END OF THE DAY,
IT REALLY COMES DOWN
TO BANG FOR THE BUCK,
EASE OF INSTALLATION,
AND REPEATABILITY."*

Any time you compress something, you're making it hotter, so adding boost to an engine will increase the ambient temperature of the air coming in by, say, 10 degrees per pound of boost or 20 degrees per pound of boost—it just depends on what you're doing. The high compression ratios of most modern engines results in air inside the cylinder that's hot to begin with, and you don't want a pre-ignition condition because you decided to stuff an extra 250 degrees worth of air in there. So the name of the game is to get your charge temperature back down to ambient air temperatures.

I like to keep things simple, and that's why using an air-to-air intercooler to accomplish this makes a lot of sense. There are no moving parts, there are no relays, no wires, no pumps, and no expansion tanks. With an air-to-air intercooler it's a bit of a balancing act between how much cooling it can provide and how much flow it allows for—if it's too restrictive, you see too much of a pressure drop. So there has to be adequate airflow for the intercooler, and you have to have enough space to fit it. Thankfully, the engines in most modern cars make a lot of power right out of the box, so the OEMs usually provide you with both of those.

By contrast, with an air-to-water system you've got an intercooler mounted somewhere, an expansion tank full of water, and that water goes through that intercooler core into a heat exchanger. These systems

work well if they're sized correctly, but a very effective air-to-water setup is an expensive proposition, and the installation is far more complex. You've got to cut all the lines, do the wiring, bleed the system, and so on. And when it comes to the parts involved, the relays, pumps, and electrical items are all wear items. Eventually they're going to fail, and you just have to hope your foot isn't to the floor while you're going down the drag strip when that day comes.

Another thing to consider is that a lot of the cars that are making big power these days are running on E85, and that's another advantage for air-to-air systems. E85 doesn't really care if you've raised the charge temperature up to 150 degrees—or even 200 degrees—because its flash point is so high compared to gas. And when those guys go really hardcore, they typically ditch the intercooler altogether and just switch to methanol. Because of that, air-to-water intercooler designs are kind of fading away outside of specific use cases like positive-displacement superchargers.

It's also worth noting that the temperatures are very consistent with an air-to-air intercooler. For the road race guys, it means that the air temps remain at the same level on lap five and lap 10 as they were on lap one. An air-to-air intercooler doesn't really heat soak—every time you let off the gas, it cools back down. So, at the end of the day, it really comes down to bang for the buck, ease of installation, and repeatability.



**AIR-TO-WATER
INTERCOOLER
ADVOCATE:
BRIAN ELLIS,
VORTECH ENGINEERING**

Air-to-water intercooler systems can be more expensive than air-to-air systems, but they're also more effective.

Water has roughly 13 times the heat dissipating capacity of air. Look at it this way: If you had a hot frying pan that you needed to cool down quickly, would you hold it in front of a fan, or would you dunk it in a sink

"A PROPERLY SIZED AIR-TO-WATER SYSTEM IS ALWAYS GOING TO BE MORE EFFICIENT AND LESS AFFECTED BY AMBIENT AIR TEMPERATURE."

full of water? And because of that, a properly sized air-to-water system is always going to be more efficient and less affected by ambient air temperature.

Some sanctioning bodies mandate the use of air-to-air intercoolers for certain classes, but the racing community already knows that air-to-water is where it's at. With an air-to-air system, the speed you're going and the temperature outside directly affects its ability to work. That's not the case with an air-to-water system, and you also have the ability to super-cool and things like that. You can load ice into your reservoir so the fluid is cooler to start out with, and that provides even more capability to lower charge temperatures.

Sizing is very important with an air-to-water system, though. You're not only sizing the cooler core itself, you're also sizing the heat exchanger and the flow capability of the fluid pump so that the fluid stays in the heat exchanger for the right amount of time—if it flows through too fast, it won't release the temperature back out as effectively. And if it flows too slowly, it

spends too much time in the cooler core and doesn't work as efficiently. There's definitely some science involved in getting it right, but if you do your homework it's going to work better than an air-to-air system all of the time, no matter what.

There's also typically less of a pressure drop through the core in air-to-water intercooler designs than there is with an air-to-air setup. For example, in testing that we did with a late-model Mustang, it showed that at 10 PSI you'd lose .25 PSI through that core with an air-to-water system. With a properly sized air-to-air intercooler, that same system loses 3 to 4 PSI because there's a longer run of ducting and more bends, and the intercooler core itself also has to be larger because you have to fill that volume up with air.

While the amount of CFM running through the system is the same, you're losing manifold pressure as a result, and that means less potential for power. Of course, you can add more boost to make up for that, but that generates more heat in turn, and it becomes a slippery slope very quickly. **PRI**



STOP DOING THAT...DO THIS INSTEAD

TRACK PREP AND MAINTENANCE

Managing your track's "primary revenue generator" involves carefully choosing which equipment can effectively accomplish the task at hand.

By Drew Hardin

A good surface is the primary revenue generator of any motorsports facility," said Kurt Johnson of Total Venue Concepts, Petersburg, Indiana. "Concessions, apparel, parking—that all relies on the piece of concrete and asphalt at the center of the facility that the race cars go down." Keeping that in mind can give a track owner or operator some needed perspective on what can be "not inexpensive" track maintenance costs, Johnson said.

But, he noted, not every track requires the same level of maintenance.

"My company is usually called in by a track that wants to set records," he explained. "If you want to set records, you should own a [tire drag] rotator, which my company sells for \$35,000. But if you're a week-in, week-out bracket track, a rotator is a waste of money. For weekly events, you can have just as good of a surface with a \$5,000 static drag.

Having the right tools for the right job is important when you're watching cash flow. Instead of buying every cool piece in my inventory, have the key components you need to start with, then use the rest of your capital in other places."

To Johnson, those key components start with a quality tractor "with a warranty, which can save thousands of dollars down the road. A tractor can be expensive to fix, and a warranty is money well spent." Next is a "good quality static drag to put rubber onto the race track," followed by "a good torch and rubber scraping device. Scraping the old rubber off the track is just as important as putting new rubber on."

Scraping manually eliminates the up-front cost of buying a scraping machine. But "scraping is a labor-intensive process," Johnson pointed out. "It's hot, it's physical, it sucks. Nobody likes to do it." Looking to "build a better mousetrap," Johnson

"Scraping the old rubber off the track is just as important as putting new rubber on," observed our source from Total Venue Concepts, whose Skid Steer rubber scraper pictured here features twin 100 lb. cylinder mounts and adjustable blade angle for faster operation.



put together TVC's Zero Turn Track Scraper that can "scrape a quarter-mile race track with two guys in two days, and with almost no effort from either of the two people. It will still use about the same amount of propane, and you have some initial investment, but you don't have the employee labor costs and employee toil."

Johnson recommends a regular scraping interval: "The first 60 feet, from the burnout box to the 60-foot mark, needs to be scraped every week. After the first 60 feet, scrape 100 feet of the race track. Next week, after doing the first 60 feet again, start where you left down-track and do another 100 feet. In a matter of 13 weeks [for a quarter-mile], you've scraped the entire track. Then start the process over again."

The final key component is a sprayer to apply traction compound. Whether it's professionally built or a homemade rig, Johnson believes in "maximum effectiveness with the least amount of effort." To that end, he recommends sprayers "that are



Proper track preparation often requires costly labor, but this static drag from Total Venue Concepts, which can easily lay rubber for weekly bracket events, makes the job easier and less expensive.

"A TRACK'S BIGGEST ASSET IS A GOOD EMPLOYEE TEAM THAT WORKS TOGETHER WITH A COMMON DRIVE TO HAVE AS GOOD AND CONSISTENT A TRACK SURFACE AS THEY CAN."

really wide, so all you have to do is one or one-and-a-half laps" to cover the track. "Time is money. The less time you have employees working, the more time you can be racing."

Plus, if the sprayer is too narrow, requiring more laps to cover the full track, "by the time you're done with the outside the inside's not near as good."

In fact, Johnson's goal is "to have consistency throughout the day, a surface that's just as good from the moment we put the first car on it to when the last car leaves that night." He can also deliver surface consistency from track to track, a valuable asset for racing series. In March he

explained, "We just did the NMCA race in Bradenton, and I made that track exactly the same as I will in Atlanta, which is where we're going next in the series. I want tuners to have the same surface at the tracks, so I repeat the same process for preparing the track."

That process involves "a minimum of three hours before a race working on the track," Johnson said, "and many times I'll spend a half-day before, making sure the rubber is applied. Not including scraping, just dragging it and rotating it, using the static drag and the rotator together, and spraying it."

Johnson said he's seen "a lot of tracks that drag the track for 15 minutes, spray it and go

race. If you want a good quality, consistent surface, that's not enough. You're going to get sporadic and inconsistent results when you do that."

Proper track prep "takes quite a bit of labor, which is money out of the track operator's pocket," Johnson noted. "But if you look at any of the top-10 tracks in the country, they have a team that wants to see the track succeed. A track's biggest asset is a good employee team that works together with a common drive to have as good and consistent a track surface as they can. That becomes their reputation, and the reputation of the track." **PRI**

SOURCE

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NEWLY APPOINTED

PETER HOPELAIN

With a class win at the 25 Hours of Thunderhill to his credit, the new head of NASA's West Coast endurance series is all-in on "car count and culture."

By Jim Koscs

Peter Hopelain, a successful real estate agent in San Carlos, California, achieved his dream to go racing two decades ago. This past March, he stepped into a leadership role when the National Auto Sport Association (NASA) named him series director for its Western Endurance Racing Challenge (WERC). Hopelain replaces Neil Daly, who will remain a series advisor.

Hopelain's team, Technik Racing, has been a staple in the WERC, with two third-place finishes and one class win at the 25 Hours of Thunderhill. PRI recently caught up with Hopelain to discuss plans for continued growth at WERC and how he'll apply his business expertise to the new role.

PRI: What was your first racing experience?

Hopelain: Twenty years ago, I bought a Pro7 car and got my SCCA license. It turned out I was pretty good. I was out there in old equipment taking podiums and top-five finishes every race weekend. When I won Rookie of the Year, I knew I had found my place. [Editor's note: Pro7 is a road racing class using 1979-1985 Mazda RX-7s with an unmodified 12A rotary engine.]

PRI: How will your experience as a race team owner and veteran endurance racer serve you in this new role?

Hopelain: As a racer and team owner, I know endurance racing has the highest of highs, and it can also put you on your butt. I hope to create an environment that doesn't

let the series or the teams over-index. We are here to race each other, and we can't make it harder than it already is.

PRI: What particular strengths do you bring to this new position?

Hopelain: I'm quite good at compartmentalizing. As series director, I'll deal with six different classes. Add in three different regions hosting WERC, and it will take some compartmentalizing to get the correct communications to all stakeholders. We need to ensure the product is good to keep people coming back out.

PRI: How will your experience in real estate help you succeed in this role?

Hopelain: The essential part of what I do is keeping people at the negotiating table, and the job of the race series director isn't far from that.



PETER HOPELAIN

TITLE:
Series Director

ORGANIZATION:
NASA Western
Endurance Racing
Challenge (WERC)

HOMETOWN:
Santa Monica,
California

FAST FACT(S):
In his spare time, Peter Hopelain likes to study economic theories and economic strategic problems. And his favorite food is bacon.

My job is to keep both NASA and the WERC racers at the table. If we do that, the car count goes up, the racing gets better and both parties are happy.

PRI: Can WERC participants and marketing partners expect to see any changes for the 2021 season?

Hopelain: Probably not for this season, but insight leads to innovation. I want to learn from the people who held this role before, and I want to hear from the racers. With insight from this year, I hope to do the groundwork for future changes.

PRI: And beyond this season?

Hopelain: I want WERC to be the premier "middle class of racing," a place where a new SRO team can come to warm up, learn lessons, test, and have good multi-class racing. I also want the series to attract regional racers and allow them to take their racing to the next level. As a racer, I want to schedule a challenging season. I like changing the length of the races to keep teams on their toes and make them look at their strategy in a new light. I also think we need to take a hard look at safety in the lower classes and have a crown jewel at the end of the year. But, one project at a time.

PRI: What do you see as the biggest challenge ahead of you?

Hopelain: Buy-in! When I ask drivers if they identify as a sprint or endurance racer, 85% say "endurance." But WERC entries don't reflect that. I've learned that the racer's brand lies wherever they classed their car. So I have a racer

"WITH INSIGHT FROM THIS YEAR, I HOPE TO DO THE GROUNDWORK FOR FUTURE CHANGES."

who identifies as endurance, but their car (their brand) is in sprint racing. I need to get people out of that thinking.

PRI: Give us your top strategic goals for the next 12 months.

Hopelain: Car count and culture, full stop. We've got to get both. WERC was built up from a grassroots level. It's what I love about it, and I hope to keep that spirit and culture.

PRI: What's your most gratifying professional accomplishment?

Hopelain: When the pandemic hit, none of us in the real estate industry were sure how we could do business. It was a scary moment. I knew Hopelain Homes, with our focus on how you live, had an opportunity. We had to pivot, and we needed to time it right. We did. Last year we had our biggest growth yet.

PRI: Who inspires you, and why?

Hopelain: My wife. She reminds me that I am just a real estate agent and race car driver. Professionally, she led a team that changed the way girls play with toys. She makes a difference in the world, and she is present for every part of our family, including racing.

PRI: We understand you're helping introduce racing to at-risk youth.

Hopelain: Technik Competition is an all-volunteer, non-profit motorsport team that provides at-risk youth and, as of 2021, amputee military with vocational training and life-skill development. We have a lot of heart and are driven by our mission. **PRI**

POWER ADDER PROVEN

"World Products gave me the opportunity to achieve what they said could not be done, my dream of 6 second passes came true"

Using A World Products Cast Iron Man O War 9.5 Small Block Ford as the base of his power plant, Frank Marchese has added 57lbs of boost to power his 3950 pound Australian Four Door Falcon to incredible numbers.

His 7.36 at 192mph feat in the summer heat was the quickest and fastest performance in the Australian Drag Challenge's five-year history. And five months later, at the 2019 Australian Jamboree in April, he recorded 6.98 at 209mph at Sydney's Willowbank track, and two hours later he transcended the performance with a time of 6.96sec at 211mph.

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INDUSTRY INSIGHTS

MEGAN LEATHAM

As executive director of the Pikes Peak International Hill Climb, this dynamic leader shares her view from 14,000 feet, including how the event became a proving ground for innovation, the operational challenges of a mountainside road course, and why “there is no other race in the world like it.”

By Dave Argabright

For one day in June, drivers and teams from around the world converge each year on one of the highest peaks in North America. There, from dawn to dusk, a century-old ritual is repeated: driver against mountain, defying all odds, seeking to ascend a pitched and winding road to the peak, faster than all who have tried before.

The Broadmoor Pikes Peak International Hill Climb brought to you by Gran Turismo is a motorsports event unique in every way. The 12.42-mile race is conducted on a public roadway to the 14,115-foot peak, as it has been since the event debuted in 1916. Teams vie for supremacy in six different classes, and across 10 decades few events can boast the emotional and iconic presence of the Pikes Peak Hill Climb, located near Colorado Springs, Colorado.

Megan Leatham joined the Hill Climb in 2011 as executive director, and she has presided over a period of robust growth for the event. Leatham is quick to point out that she had—literally—no motorsports experience when she joined the company, but her dynamic leadership has prevailed. The “Race to the Clouds” is going stronger than ever while preparing for a milestone 100th running in 2022.

A standout basketball player at Whitman College in Washington, Leatham has channeled her competitiveness and leadership skills into a variety of endeavors.

In addition to her role at Pikes Peak, she continues to serve as a volunteer basketball coach at Colorado College. She earned her master’s degree in public administration from the University of Colorado at Colorado Springs and previously worked with the US Golf Association.

The 99th edition of the Pikes Peak International Hill Climb takes place on Sunday, June 27, and as she and her team prepared for the event Leatham took a few minutes to visit with *Industry Insights*.

(Editor’s note: Our interview took place just days after the sudden passing of longtime Pikes Peak International Hill Climb CEO and Chairman of the Board Tom Osborne. PRI extends our sincere condolences to Tom’s family and the staff of the event.)

PRI: The Pikes Peak International Hill Climb is an iconic event in American motorsports, and it has endured for nearly 100 years. Why has this event thrived? What’s the key to people coming back, year after year?

Leatham: There is no other race in the world like Pikes Peak. And a lot of that has to do with the venue. The mountain isn’t going anywhere; I think that’s what makes it so exciting and has helped it endure since 1916. To one degree, we don’t own our venue, so we have many challenges. To the other degree, the venue isn’t going anywhere. Through wars and pandemics and everything the world has seen, the mountain just stays stable. So the history and legacy by far is one of the greatest draws for not only the spectators but also the

competitors. To say you summited Pikes Peak on race day has to be one of the most exciting moments in the world for these champions.

PRI: I’m trying to grasp the logistics of a race course that is 12.42 miles up the side of a mountain. To begin, how is the course maintained throughout the year? Does it require a lot of upkeep?

Leatham: Great question. It’s a really interesting partnership, as I mentioned we don’t own our venue. We have a three-way agreement with the city of Colorado Springs, which is Pikes Peak - America’s Mountain, and Peak National Forest. The maintenance of the road on a day-to-day basis is up to the city of Colorado Springs and Pikes Peak - America’s Mountain. Our agreement is literally for one day per year, and that’s race day. Their job is to maintain that road for tourists for 364 days per year. We have a fantastic relationship with the city, but what makes Pikes Peak so unique is that the road is meant for tourists traveling 30 miles an hour. It’s not meant to be a race course, and that is what makes it so exciting. For one fantastic day each year, everything goes away and the road turns into a race course.

support we have from the local community. We work very closely with every jurisdiction throughout the city. The race course itself actually goes through two different counties, and it weaves in and out of El Paso County and Teller County. We work with law enforcement from both of these jurisdictions. We have about eight fire trucks up there, and it’s really a community effort. That’s one of the most exciting things; it’s an international race but also involves great numbers of local people.

PRI: When you began working with the Hill Climb, were there things about the logistics or planning that surprised you?

Leatham: I’ve been with the Hill Climb for 10 years now, and when I started I was the only full-time staff member. The race has grown incredibly since then. So much has changed from a logistical standpoint. When I first saw the race that first year, there were some huge operational gaps. Everyone was doing a great job holding the race together, but there were no parking plans and no systems in place. It was kind of a free-for-all. And the race has changed so much over time, as the course turned to all pavement. The business model of the organization has also changed. About

“ULTIMATELY, IT’S ONE RUN, MAN VERSUS MOUNTAIN, AND THAT’S WHAT IT COMES DOWN TO.”

PRI: Tell us about the people logistics. How many people do you need to conduct the race?

Leatham: Throughout the calendar year we have five full-time staff members who work for Pikes Peak International Hill Climb. We also have about 10 full-time contract workers with whom we work very closely for 12 months out of the year. Come June, the game changes. We bring in a hefty load of summer workers, summer staff. Some college kids, interns, that kind of thing. And there are 150 race officials, including course workers, flagmen, and we also have people doing some backup timing. We also have our safety workers, our people who handle registration, and another 100 volunteers who handle parking and that sort of thing. It honestly takes a village, Dave, it really does.

What makes this race so unique is the

15 years ago the organization was in some financial difficulty, having a hard time staying stable. That was one of my major goals; we are a non-profit organization and we needed to be really good stewards of the event. We needed to make sure that no matter what comes our way, we have the financial stability to continue on. A great example of that has been the pandemic, something we never thought would happen. We were able to operate at only a slight deficit last year, but because we had been taking care of the financial piece, we could continue the legacy of the race.

The mountain is not going anywhere, but the organization could go away if we are not good stewards with our funds. So we’ve worked really hard on fundraising and making sure we are stable and can endure curve balls that come our way.



PRI: You mentioned the growth of the Hill Climb over the past few years. What's the key to sparking that growth?

Leatham: I don't have an exact answer for you. A lot of things have changed, and one is that the beauty of Pikes Peak can really be captured through photos. I think with our presence on social media, (more) people are seeing that beauty. How often can you say you're above the clouds, the sun is rising, and you're watching an auto race? Social media has opened the world's eyes to Pikes Peak, more than it has before.

Now that the road is fully paved, the manufacturers are putting in a full-blown effort to prove their technology on Pikes Peak. That's another thing that makes this race great—we are a proving ground. The manufacturers want to invest their money and time to be the best and break the record. That's another major thing.

Pikes Peak has been the proving ground for automotive innovation since the beginning. The mountain and the race course itself have been the testbed for brake fluids, tires, batteries, powertrains, and more. And electric vehicles; we're seeing a huge surge in EV from manufacturers throughout the world. People want to prove it; if you can prove it on Pikes Peak, you can prove it anywhere.

PRI: That was my next question. Innovation

The Pikes Peak International Hill Climb attracts a diverse group of participants, from factory-backed prototypes to one-off, home-built vehicles. And that's partly what makes the race so unique, noted Megan Leatham.

Leatham: Absolutely, I think that's another of the things that makes this race great. You can have the local competitor who has been racing for 20 years; think about Clint Vahsholtz last year, he won the overall and he's been racing this event for 20-some years, building his car from his garage in Woodland Park. At the same time, you have Volkswagen come in and put in millions of dollars to prove that they can become an all-EV company. And you can have both at the same time! That makes this race unique. It's really interesting to watch the fans, because many times they are not there to see the full-blown manufacturers; they're there to see the unique one-off cars which they've been following the building process online for the last few months. We've got the full gamut here.

has always been a part of the Hill Climb, and it's always been interesting that you never really quite knew what types of vehicles were going to show up to compete. That seems to be some of the allure there, for both competitors and spectators. It is different, and these are not cookie-cutter cars. We're seeing the cars evolve right before our eyes.

Though not a hardcore motorsports enthusiast, Megan Leatham, pictured on the right, said she "grew up playing sports and coaching. I understand sports and competition. I understand what butterflies feel like. I understand game day."



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Social media posts have “opened the world’s eyes to Pikes Peak,” Megan Leatham said, and drawn a growing number of spectators to the Hill Climb. “When you mix motorsports with the beauty of nature, there is nothing else in the world like it.”

PRI: On the flip side, you and your staff have to manage the innovation through rules and safety mandates. Is it difficult to stay on top of the technical advances of the past few years? And what is the process of adjusting your rules from year to year?

Leatham: We have an 85-page rulebook, and that’s a good read. We have a lot of different committees, and a race director, Randy Ruyle, and a director of competition, Dan Skokan. We have our rules committee or race committee that is made up of board members and technical experts and they drive the rules. They meet and decide the rules and the divisions and any changes. One thing that has changed a lot over the past 10 years is that we are trying to be more consistent. Our goal is to make minor tweaks year after year without major overhauls. That allows people who build their cars to our rulebook to use those cars year after year. Obviously, we are a non-profit, so we are governed by a board of directors. Any change by a committee is approved and signed off by our board of directors.

PRI: Electric vehicles have done very well there in recent years. Why is electric power so effective in the Hill Climb?

Leatham: As you mentioned earlier, not only is the course 12.42 miles, the elevation at the start is 9,390 feet. When you finish, it’s

14,115 feet. So elevation gain is generally the answer to that question. Electric vehicles are sometimes the top choice at Pikes Peak due to the fact that elevation gain does not affect internal combustion vehicles. And electric vehicles don’t have to worry about the thin air at 14,000 feet. Now, the challenge for an EV is that it must be charged. Pikes Peak is one day, one shot. So that’s a lot of eggs in one basket as far as red flags and potential things that can turn around competitors who have to charge their vehicles. Practice days are another thing—most competitors try to get as many runs in as they can every morning; the gas-powered vehicles get back to the bottom, get back in line and head back up the hill. But the EV machines have to re-charge. So it’s a brand new component that is really exciting to watch play out.

PRI: Do you envision electric vehicles becoming more and more prevalent there? What’s your instinct at this point?

Leatham: If you watch the change in consumer vehicles across the world for the next 10 years, I see that filtering down to the Pikes Peak Hill Climb, especially as manufacturers want to prove that EV’s work. I think they will continue to see Pikes Peak as an effective proving ground.

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"YES IT IS A BUCKET-LIST EVENT, BUT NOT EVERYONE CAN RACE AT PIKES PEAK."

PRI: Will we continue to see traditional internal-combustion power continue to be a part of the event for some time to come? Is it part of the thought process there that you want to always have a presence of both?

Leatham: Absolutely. Internal combustion engines will still be prevalent here. We might see the numbers decrease slightly as the years pass, but internal combustion engines are going to hold strong in our competitor fields for many years to come.

PRI: I suspect you have heard many times from both competitors and spectators alike that Pikes Peak is a "bucket list" event. Does the unique nature of the event help in terms of promotional opportunities? Is that something you can leverage in your marketing?

Leatham: Well, yes and no. One of the great things about Pikes Peak, Dave, is that we don't specifically have to market it as much as you would think, because it markets itself. One thing the race committee and board of directors and staff are working hard at is to obtain quality over quantity when it comes to competitors. Our goal is to have the best vehicles and best drivers at Pikes Peak. We want to look at the fastest time of the year and the slowest time of the year and over time shrink the margin between the two. So when you talk about a bucket-list event, of course. It is a bucket-list event for many people.

We have a very stringent selection process, and anyone who is interested in competing here fills out a thorough application. They must submit their racing resume, submit references, submit photos of the vehicles, specs, roll cage design. The selection committee meets and, similar to the NCAA basketball tournament, the field is decided then and there based upon all the factors submitted. Yes it is a bucket-list event, but not everyone can race at Pikes Peak. You must be a professional race driver or have the experience needed to enter the event.

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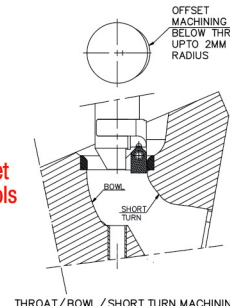
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PRI: Let's talk a little bit about the psychology of those who race up the mountain. What is it about this event that so intrigues competitors?

Leatham: The competitors, honestly, are the true heroes of this event. One of my favorite things is watching them on race day and looking in their eyes and seeing how focused each of them are. It's one run against the mountain. One shot. They work all year long for one shot. I think that alone is what keeps people coming back. You can have great practice day runs, you can have your vehicle tuned to the best of your ability, but because they never get to race the course from bottom to top there is always so much in question each time the competitor steps to the starting line. It's a huge, internationally famous event, but it also has a small family atmosphere at the same time.

The competitors often speak about that. Since the early years, teams have really helped each other out. They know what it takes to get here, and they help each other out as needed. There have been many stories of loaning parts, and long hours

spent working on someone else's car. Last year some of the Porsche engineers worked on Daijiro Yoshihara's Toyota on race day when he was having some issues, and Daijiro ended up winning his division. So you bring in all of that, and you bring in the camaraderie, and you bring in the fact that we have the best spectators in the world, that's why people want to come and race Pikes Peak. But ultimately, it's one run, man versus mountain, and that's what it comes down to.

PRI: That is a fascinating point, the fact that everyone gets just one shot at this and it's another year before they can try again. I would think that would lend a lot of pressure for those of you on the official or operational side as well. Is that the case?

Leatham: Yes, absolutely. From an operational standpoint, we want things to go smoothly for the competitors, for the media, and for the spectators. We only have one shot at it each year as well. And that makes the race so unique. We have a saying: "The mountain decides." That's 100% true about this event. The mountain decides, and the minute you think you have

Part of what makes the Pikes Peak International Hill Climb unique in motorsports is its weather conditions. "We don't know if we'll have rain in the afternoon or an ice storm in the morning, or sunny at the starting line and snow at the finish line," said Megan Leatham.



her figured out, she'll toss things at you that you didn't expect. If it hasn't happened on Pikes Peak yet, it will. The thing you think won't happen, always will. The mountain decides and that's what makes us so unique. Nature is extremely humbling, and when you put on a motorsports event on a 14,000-foot mountain, the mountain decides. She owns it. Every year is completely different, and we don't know if we'll have rain in the afternoon or an ice storm in the morning, or sunny at the starting line and snow at the finish line. Who knows if we'll have a perfectly clear day with no red flags? The mountain decides, not just for us but the competitors as well. We only get one shot at it every year.

PRI: Shifting gears a little bit, let's talk about your role there. How did you get involved in the Hill Climb?

Leatham: To be candid, I do not have a motorsports background. I had never seen the event before I was hired here. I kind of fell into the position more from an operational standpoint, an organizational standpoint. It's a funny story...Tom Osborne, the chairman of the board, took a swing and hired me 10 years ago, and I said to him, "I don't know anything about cars and I've never seen this event, but I know I can do this job." Tom hired me on the spot, and I have loved every day of this job. Tom was a friend, a mentor, a father figure, not just to me but to many people. He was a giant in our city. He'll be missed very much, but I know that his legacy here is exactly what all of us would want to do. Over the last 10 years we've been able to elevate this race from an operational standpoint, and we're going to continue to work toward that goal.

PRI: You have an extensive background in basketball, including an ongoing role as a coach. Coaching is a genuine test of leadership skills, I think. Has your coaching experience helped you in business leadership?

Leatham: I would say yes. Sports have always been in my bloodline, so even though I'm not personally a motorsports enthusiast, I understand sports and competition. I understand what butterflies feel like. I understand game day. Sports have shaped me and helped me become the person I am. I played sports throughout high school, played basketball in college.

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INDUSTRY INSIGHTS

Then I went on to coach, because I know the impact sports makes on a person's life and I wanted to help instill those same values in people I've coached. From a business standpoint, I also agree that coaching is about leadership. Leadership is something that can always be cultivated and done at a higher level, and there is something innate about that. I grew up playing sports and coaching, and knowing what it's like to lose a game, knowing what it's like to hit a buzzer-beater. All of those things, knowing how to pep up your team when they are down. I would not be an executive today without that experience as a coach.

PRI: Many of our readers are probably intrigued by the idea of witnessing the Hill Climb. What would you tell them that might tip the scales and get them to make the trip to Colorado in June?

Leatham: Once you see it, you'll be wondering what you've been missing all these years. For me, one of the craziest parts is, throughout the year I'm up on Pikes Peak quite a bit for different things, and it's very still. It's a mountain. Even though there are tourists up there, you can walk off the beaten path and it's quiet and still. You can hear the birds chirping, you can hear the deer tromping around. And then one day, for one magical day, all you hear is engines running. When you mix motorsports with the beauty of nature,

Participation by OEMs has grown in the years since the Pikes Peak Highway was fully paved, as many seek to prove their technology on the twisting, climbing course. In 2019, driver Robin Shute was first overall in an Unlimited Class Wolf TSC-Honda powered by a 2.0-liter, 650-horsepower Honda Performance Development K20 engine.

there is nothing else in the world like it.

PRI: We'll wrap up with this, Megan. What's on the horizon for the Hill Climb? What's on your wish list that would nudge the event to the next level of success and excitement?

Leatham: Next year is our 100th running, so we are very excited about that in 2022. Our long-term goal is to get this race in front of as many people as possible. We are excited to continue improving our livestreaming, and obviously there are technical difficulties in trying to livestream an event on a mountain. But we are working to improve that. My long-term goal is to have the race broadcast for all the world to see.

PRI: We appreciate you giving us some of your time, Megan. We wish you the best for this year's running, and a special good wish for next year. The 100th running is a great milestone.

Leatham: Thank you, Dave. **PRI**

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SPECIAL REPORT: INSIDE THE PRI ROAD TOUR

It's the story behind the stories from those who helped develop, execute, and participate in one of the motorsports industry's boldest—and most successful—content creation and outreach programs ever.

By Steve Statham

If ever there was a time when we needed something positive to look forward to, it was 2020.

The harsh memories of last year are still fresh for most people. Between the pandemic lockdowns, supply chain disruptions, election drama, rolling furloughs, and empty grandstands at the nation's race tracks, last year was short on hopeful signs for the racing industry. But from such disruptions come opportunities, and great things can be launched.

And thus, the PRI Road Tour was born.

As the embodiment of optimism, hopefulness, a sense of adventure, and service to the industry, the PRI Road Tour came into being as a response to the upended trade show landscape. As large public events of every sort were curtailed by local governments and by event organizers themselves out of an abundance of caution, adaptation was the order of the day.

"We'd been hanging tough with the racing industry. We really thought the PRI Show was going to be possible," said Dr. Jamie Meyer, president of Aliso Viejo, California-based PRI. "The folks at Indianapolis have been great partners and continue to be great partners. But as things started to get more clear with the pandemic impacting trade shows everywhere, [and] the SEMA Show was canceled, we learned a lot from our teammates at SEMA about how this was going to happen and what were the best decisions to make. In the end, just to make sure people were safe, to make sure we weren't hurting our industry or hurting the individuals that would go to PRI, we decided to cancel the Show."

From that difficult decision, though, came the opportunity to try new things. "We went to the SEMA and PRI Board of Directors within a week or two after that decision was voted on and we were asked to come up with an alternative," Meyer recalled. "SEMA had gone with SEMA 360, which was a very forward-looking online community experience. It made a lot of sense for SEMA, which is a much bigger event, a much bigger organization. But the PRI team got together, and we were discussing several alternatives. Everybody was going online, but we felt the community of racers was much more face-to-face, much more individualized. We took cues from a few other advocacy groups and social media influencers and decided the best thing to do would be to take the PRI Show on the road. So within 10 days the trade show team turned into a road tour production team. We had our creative agency already picked out. Driveline Studios works on our social media accounts and a lot of our strategies."



The PRI Road Tour content creators, from left: Bryant Lambert, Justin Cesler, Dr. Jamie Meyer, Ryan Walker, Wade Mathieson, and Michelle Gallegos. "They're the heroes of the whole Tour, to be able to get that content and tell those stories so eloquently," said PRI's Karin Davidson.

The plan came together quickly. "Knowing our group, our industry, our people—we call it our tribe, a bunch of racers—we just didn't know if the virtual route was the best route, to put something together that quick, something that they would use," said Karin Davidson, PRI Trade Show director. "And Jamie had this idea, 'Hey, let's get a van, let's get some creatives, put them in the van with an operational person.'"

Besides delivering hope and raising morale, a Road Tour could deliver definite benefits to the motorsports community. "The idea was getting them additional exposure that they wouldn't have otherwise, free, courtesy of PRI, and to have these creative guys come in and do videos, and product shots, and telling stories about how their businesses started and things like that, and just tell the world what their company is all about," Davidson said.

Kim Pendergast sits on the SEMA Board of Directors, as well as being CEO and owner of supercharger manufacturer Magnuson Products in Ventura, California, which was one of the stops on the tour. "I first heard about it on the Board. There was a proposal that hit my mailbox," she told us. "The minute I read it, I said, 'This is amazing. This is a good thing for our members. I didn't have to think about it for a minute. It was so intuitive, it was so prescient, it was so on the money for what people needed. And having said

that, when they arrived it was so much more than I even understood."

With the concept in place, the next step was to figure out just where to go. In the racing and performance world, there was no shortage of candidates. "The trade show team had these deep connections with the industry and our exhibitors because the Show's gone on since the mid-1980s, and [they] reached out to key people in key locations and very quickly put the route together, starting in Indianapolis, working through the Midwest, Chicago and Detroit, heading toward the Carolinas, going through Atlanta, going through Texas, going through Phoenix, and then spending a week and a half in California," Meyer said. "This was a 77-day straight assignment. It was 100 stops. I think in retrospect it was the chance of a lifetime for the creative people who were in that van."

There was excitement in the Road Tour's

future, but the kick-off included a stark reminder of what the industry was up against. The first video was filmed in the Indiana Convention Center in Indianapolis, and posted online on October 12. The Convention Center is normally a beehive of activity, especially in early December when 65,000 racers and 1,200 exhibitors descend on the facility for the PRI Show. But here Dr. Jamie Meyer sat alone in front of the Road Tour van in an empty Convention Center. There, he quietly explained, "Because you can't come to PRI, PRI is going to come to you." But from such a subdued beginning, things were about to get loud.

TALENT POOL

Justin Cesler's Driveline Studios in Detroit, Michigan, had been chosen to record those stops and tell those stories. Driveline Studios specializes in turnkey content creation, marketing, and social media. For the Tour, his team would handle everything from taking photos and videos, editing that material, turning it into digestible content for any channel needed, and monitoring the response. Driveline Studios had a photographer and two or three video specialists on hand for every stop, with Cesler serving as creative director.

"They're the heroes of the whole Tour, to

be able to get that content and tell those stories so eloquently," said PRI's Davidson. "Everybody just loved it, and the numbers on social media just went skyrocketing. Hats off to all those guys."

For the Road Tour, of course, content-creating talent had to work hand-in-hand with logistics talent. "The setup is the crazy part," Cesler said. "One thing to know about the Road Tour is that it really took an amazing logistics effort, obviously. It was 70 days on the road, it was almost 100 stops, which included everything from the smallest shops to the biggest shops, race tracks, and everything in between. We had an amazing logistics team with PRI. They're the people who put on the Trade Show, and they were able to pivot and instead of doing the Trade Show last year, they just turned to the Road Tour and set that up."

Part of that logistics talent was Michelle Gallegos, PRI housing and travel manager. She served as "van captain," making sure water, food, and snack supplies were well-stocked, secured hotel rooms, and



The creative crew, including Bryant Lambert, seen here shooting video, "really stepped up for this," Justin Cesler said. The team would shoot video and photos during the day, and then edit the material overnight while preparing for the next day's stop.

coordinated with the businesses where the van would be stopping, among other logistics challenges.

Complicating the planning was the need to keep masking and social distancing requirements front and center. "You know,

it's the height of the pandemic, people aren't trusting of each other, some don't want to wear a mask, some want to wear a mask, a face shield, and a Tyvek suit," said Meyer. "We were very adaptive to how our team would approach each stop. And I'm



"This was a 77-day straight assignment. It was 100 stops. I think in retrospect it was the chance of a lifetime for the creative people who were in that van," Dr. Jamie Meyer said.

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incredibly proud of the team and the effort and the industry, to say that we didn't get anybody sick, we didn't transfer a virus. We made it through safely."

"Michelle, of course, was amazing. She's a very special human being," said Magnuson's Pendergast. "She's very professional, she's very wise, she's smart, and she just has a sense of things—how to make you comfortable, and how to keep everybody moving and in the right place at the right time. It was very interesting, for me being a businessperson, to watch how the whole team was managed and the integrity behind that."

The van—a Mercedes-Benz Sprinter—turned out to be a key member of the Road Tour team itself. It was secured from Bandago Van Rental, a company that specializes in vehicles for bands, businesses, and large groups. So it was fairly well equipped for hauling all the gear necessary for the Tour.

"People were kind of amazed by the van," Cesler said. "I think at first people thought, 'Okay, is this going to be a person and a camera, or a person and a Go Pro?' But our crew really stepped up for this one. All of the video footage was shot on RED cameras. It's all 6k, 8k, super hi-res. We had four RED cameras, all of the lenses, all of the batteries, all of the monitors, all of the gear that you would need for a production like that. And really for us, it wasn't about having a lot of gear, it was just being able to switch depending on whatever situation we were in. You're walking into a lot of these shops blind—or all of them blind. You don't know what the



Getting the story meant being flexible, Justin Cesler pointed out. "You're walking into a lot of these shops blind. You don't know if you're going to be trying to get inside a CNC machine, or if you're going to be outside shooting someone doing a burnout."

lighting is, you don't know how big they are, you don't know if you're going to be doing an interview with one person or two people, or three people. You don't know if you're going to be trying to get inside a CNC machine, or if you're going to be outside shooting someone doing a burnout. So we had to have a huge variety of equipment, so that on the fly we could just hot-swap equipment."

If there was a breakout star of the show, it was "Wall-E," a radio-controlled car with a camera mounted on it. Wall-E earned its keep catching dramatic ground-level shots of burnouts, or skittering into otherwise hard-to-reach places for difficult shots.

With so much work involved in doing

the shoots and editing it all into digestible formats, the team needed someone who could just focus on the van and driving safely from spot to spot. And so Wade Mathieson signed on to pilot the Sprinter on its months-long journey.

ON THE ROAD

As mentioned earlier, the first official "stop" on the tour was the empty Convention Center in downtown Indianapolis. "The very first shot we took was in the Indiana Convention Center. Normally that's where the PRI Show is. And we were standing in it, and there was nothing in there. It was just an open convention center. And it really put the weight of it on us," Cesler said.

"This is serious, because people look forward to coming to the PRI Show every year," he continued. "For us, that moment was kind of like, 'Okay, we're doing this, we're here, the van's here, we're ready to go.' It was pretty sobering—you could definitely feel the weight of the project starting to come on. And then literally our first stop was

Pictured are PRI President Dr. Jamie Meyer and the Sprinter van at Don Schumacher Racing, the Road Tour's first stop. "It was just an unbelievable stop," Justin Cesler said. "We got great time with Tommy Johnson Jr. and other members of the DSR team."

Don Schumacher Racing. And it was just exactly what you'd imagine. It was just an unbelievable stop. We got great time with Tommy Johnson Jr. and other members of the DSR team, and just to see the scale of the facility.... We went from, 'Okay, we're a little bit nervous about this,' to 'This is going to be the most fun road trip of all time.'"

The stops were indeed fun, but the workload to turn those visits into interesting content was considerable. "A typical day on the road, we'd wake up early, prep all the gear, and have everyone in the van by 7. We would get to our first stop at around 8:30 or 9:00, depending, and it would be four to five hours at least at each stop," Cesler said. "Every video that you see, every photo that you see from a tour stop, was done in about half a day."

The routine quickly settled into a pattern of shoot all day, edit videos and photos overnight. The teams worked into the wee hours of the morning getting the day's material ready to publish and then getting everything ready for the next day.

For the Road Tour team, meeting new

people and hearing their stories was a daily occurrence, but there was also plenty of news to break at many of the stops. At Paul's High Performance in Jackson, Michigan, Paul Svinicki had managed to get his hands on one of Ford Performance's new 7.3-liter Godzilla crate engines, and had installed it in a 2010 Cobra Jet Mustang.

Paul's High Performance was the first to get one of these engines into a car, the first to take one to the track for testing, and the first to put one into the 10s, Svinicki said. There was a lot of interest across the performance world around this pushrod, big-port, 446-cubic-inch engine.

The Road Tour segment at Paul's delivered

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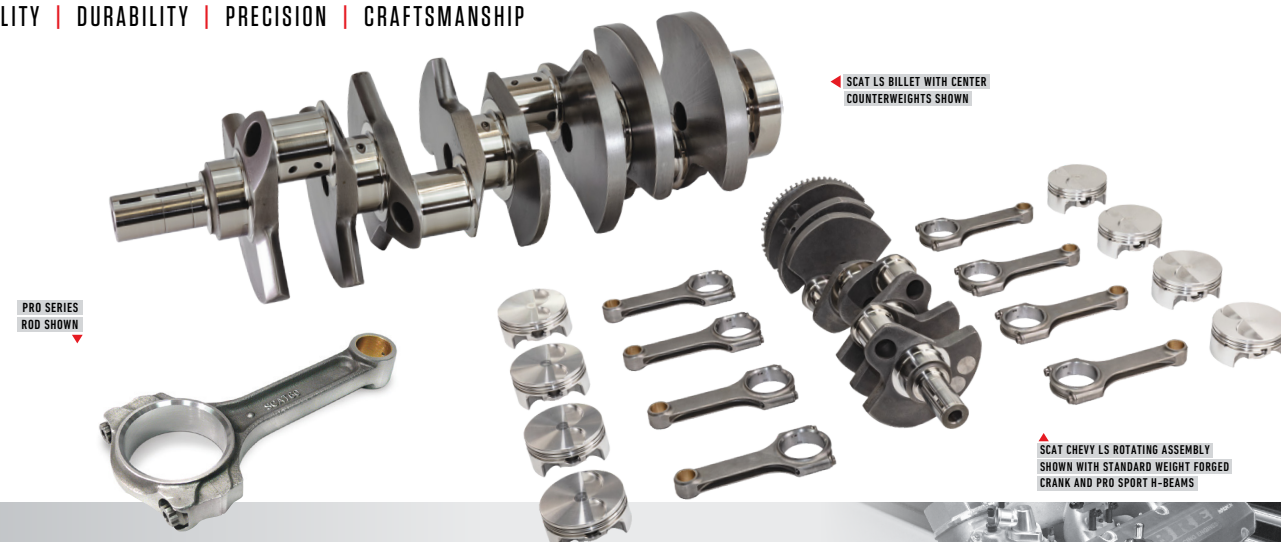
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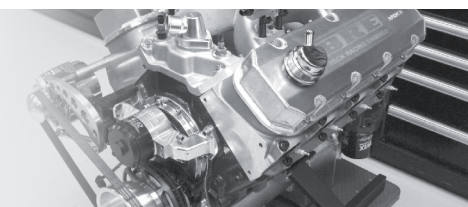
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the goods, culminating in an epic burnout that left two flaming piles of rubber. “I just melted the tires until there was nothing left,” Svinicki said. Wall-E was sent in for a close-up worm’s-eye view of the two burning piles for one of the more memorable shots of the Tour. At press time, the Paul’s High Performance stop has received more than 91,000 views on YouTube.

“I was very excited with what I thought was an absolutely great idea, to actually put a face to a name, having someone show up at your shop,” Svinicki said. “To have someone show a little love to a small shop, it just does stuff. Yes, we work with Ford, we’ve set records, we’ve got a lot of Mustangs, we’ve done a lot of things the last 25 years. So we’ve been in the industry for a bit, we know a lot of people, we’ve done a lot of stuff, but it felt really, really good after all these years.”

The PRI Road Tour team had, from the beginning, made it a point to not interfere with the day-to-day running of the shops, and to make it as easy on the shop owners as possible. “It was pretty seamless. For me, it was answering questions, getting hot tea or water or something to munch on, and then just answer some questions,” Svinicki said. “They’re enthusiasts, right? So they know stuff, and they know how to approach it from an enthusiast’s view.”

As the Tour went on, the arrival of the PRI Road Tour van came to represent more than just a nuts-and-bolts shop visit. “We spent a lot of time preparing, because I felt like this was such a generous gift, for PRI to come to our facility and have these experts give us content. So I wanted to make the best use of the time,” Pendergast said.

“I missed one big thing, which was that the preparing for it was important to our employees, because we hadn’t gone to



Paul Svinicki, below, of Paul’s High Performance got one of Ford Performance’s new 7.3-liter Godzilla crate engines, had it installed in a 2010 Cobra Jet Mustang, and performed an epic burnout for the Road Tour cameras that left behind flaming piles of rubber. So far, the resulting YouTube video has received more than 91,000 views.



any shows. We’d been working, we’d been getting things out the door, it had been very, very stressful, but we really hadn’t been having fun,” she continued. “And we’re all enthusiasts. And so, to have the fun of getting all these vehicles organized to be here and prepare for them to come was part of the fun that we have, it’s part of why you belong to this organization. That was a little bit of a revelation.

“But the biggest thing was, when they

got here, how having PRI here just touched everyone. It sounds corny I guess, but that emotional touch at a point in time when we’d been so isolated and working so hard, and went from January and February when we were just blowing product out the door, to a couple of months where we had good revenues but all kinds of supply chain issues hit because of COVID, and then suddenly it just came roaring back the rest of the year, and we were working so hard but yet we



“Having PRI here just touched everyone, at a point in time when we’d been so isolated and working so hard,” said Kim Pendergast of Magnuson Products. “These people came to our door and just reinvigorated us. They were so kind and so caring and so welcoming. It was the most amazing thing.”

In North Carolina, the Road Tour crossed paths with Bill Rhine, whose Rhine Enterprise restores old NASCAR and other vintage race cars. “I have this old barn, if you think that would be cool,” he offered. The video of the “toys” in Rhine’s barn has generated more than 210,000 YouTube views to date.

were frightened because we still didn’t know what was going to happen. We still didn’t know whether things were going to continue in a positive vein. And these people came to our door and just reinvigorated us. They were so kind and so caring and so welcoming. It was the most amazing thing,” she concluded.

For everyone in the van, each day brought new surprises. “In North Carolina we met Bill Rhine,” Cesler said. “He said, ‘Yeah, I restore old NASCARs, vintage race cars, I have this old barn, if you guys think that would be cool.’ What we learned on the trip was that anytime someone says, ‘I have this old XYZ,’ we were in. It was going to be way cooler than they were giving it credit for. They would say things like, ‘Well, we’re



small shop guys, I don’t know,’ and they would open the door to 50 CNC machines running at full speed just cranking out parts. They would open doors to what they would claim are ‘humble car collections’ and there were hundreds of cars in them. It was super cool to see.”

The racing community agreed—the

segment on Bill Rhine’s vintage race car collection has more than 210,000 views on YouTube as this was written.

Capturing all those surprises required plenty of camera store stops along the way. “We started the trip with one drone, I think we ended the trip with four drones,” Cesler said. “We just needed bigger ones

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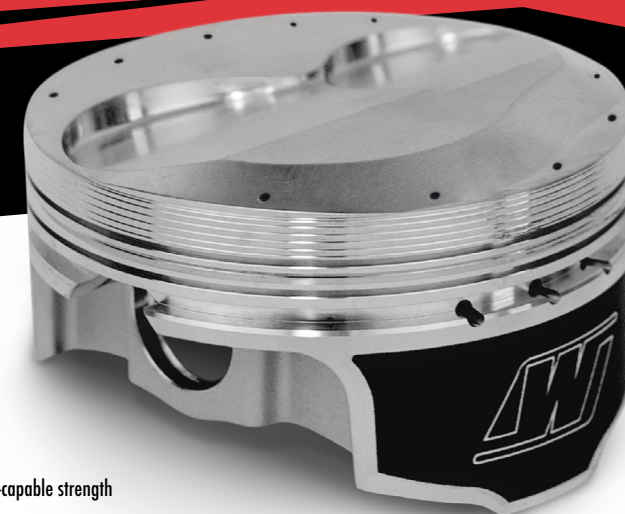
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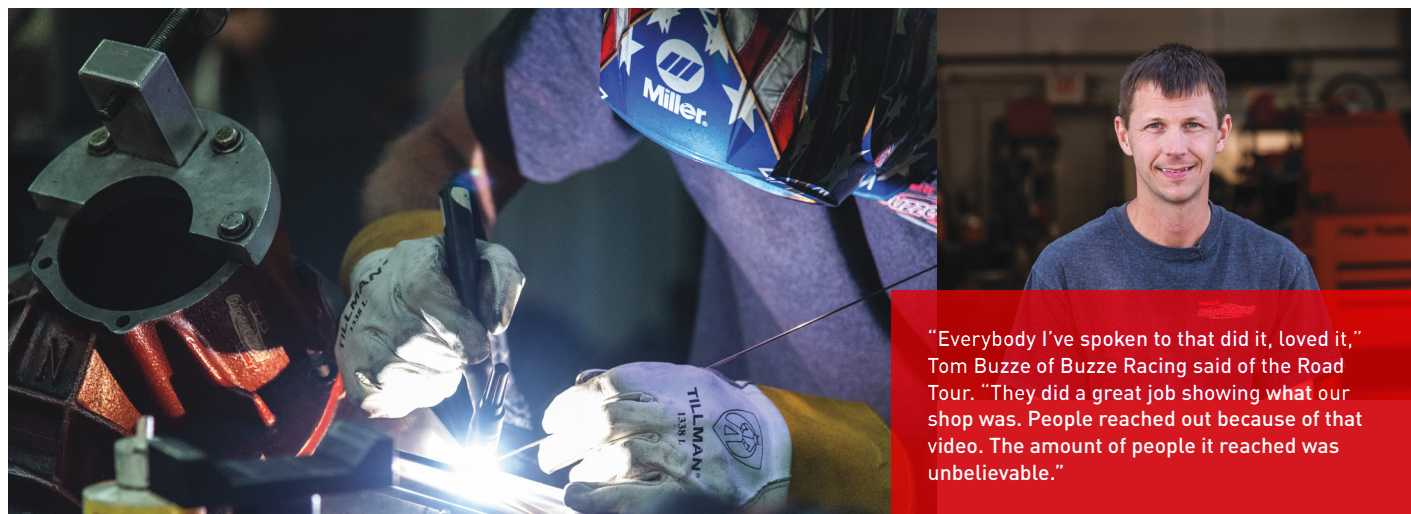
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"Everybody I've spoken to that did it, loved it," Tom Buzze of Buzze Racing said of the Road Tour. "They did a great job showing what our shop was. People reached out because of that video. The amount of people it reached was unbelievable."

or smaller ones, or low-light ones, that could do different things. We had a ton of photography equipment, of course. I don't know how many cameras were in the van at one time, probably five or six still cameras at any moment, and then all of the lenses, all of the lights, that go along with that."

THE RESULTS

Still, the PRI Road Tour was about more than exposure and pretty pictures. Behind it all was a push to showcase new product development, direct new business toward the racing industry, and reach new people across various distribution channels. "Everybody I've spoken to that did it, loved it," said Tom Buzze of Buzze Racing, Mooresville, North Carolina, one of the shops visited in the Tour's first 30 days. "The amount of people that it reached, there are so many customers that called and said, 'Man, we saw your video,' or they sent a message that they'd seen the video and thought it was amazing. They did a great job putting it together and showing what our shop was. There are so many people that know us, and I've reached a lot of new people. People reached out because of the video. Even where I was at quarter midget racing this past weekend, there were people even there who said they'd seen the video. The amount of people that it reached was unbelievable." Being able to put names with faces, and

not just be a listing on a ledger, was another plus from the PRI Road Tour. "It showed that, one, someone cares, and they're able to get out and show people different things—what does this shop do, and who are these people in the industry? One thing I noticed is that it showed everybody has a personality. There's an actual face and a person that's tied to these products and this business," Svinicki said. "Who does that? Nobody. I don't remember anybody doing something like that for a company." Svinicki reported his email queries alone are up by at least 30% since the video was posted.

"All told, we reached over 25 million unique people over the course of the Road Tour and still, every two weeks, we're reaching five million people," PRI's Meyer said.

ROAD TOUR 2.0

The PRI Road Tour was a response to a challenging year, but the concept proved so

sound for the racing community, with such positive results, that the Tour will hit the road for a sequel this summer!

"This was an entire give-back. It's really important for people to understand, we didn't charge anybody anything," said Meyer. "This was a Board-approved expense. This was not a cheap project, to make sure we're helping the racing industry in the worst of times. It's been such a success that we want to continue it, and the Board has approved me to get these guys back in a van and back out on the road."

Although there will be plenty more shop visits on tap, for 2021 the Tour will be focused on visiting as many race tracks as possible. "For 2020, the Road Tour came together as we were making the very tough decision to cancel the PRI Show," Meyer said. "So it was late in the season—we did get to a few race tracks, but for the most part we went to manufacturers. For 2021,

the PRI Road Tour is going racing. The team is putting together a list of some of the best races, some of the most interesting races, some races that I've never heard of, and we're going to take the world's best content creators and we're going to turn them loose at the races this year. I can't wait to see what they come back with."

Capturing the whole gamut of the motorsports industry will be a priority for 2021. "In 2.0 that we're starting up this month, it's going to be more racing related, going to the race track to see how the whole racing industry comes together, whether you're a race team, a racing manufacturer, a machine shop, everybody that races in those cars and everybody driving to the track, we want to show how the whole racing community comes together and goes racing," PRI's Davidson said.

"I'm really interested to see what the new eyes, the different reporters, will find at these races," Meyer said. "We're certainly looking for the different communities of racers to appreciate each other more—maybe seeing a circle track the way you've never seen that

type of race before. Maybe going to a tractor pull and getting a whole new understanding about horsepower control. Going to Pikes Peak and learning what we can find at that incredible venue."

There are few things more exciting than hot laps in a race car, and few gatherings more all-American than a weekend night at a dirt track. But the 2021 PRI Road Tour will also be aimed at people who haven't yet experienced the thrill of racing.

"How do we get people that don't even consider racing to look at it and be fascinated by what goes on in this industry?"

Meyer said. "That 8-second news cycle that we talk about nowadays—how do I have an 8-second Instagram video or an 8-second TikTok video? Or a longer-form LinkedIn story where we relay business advice from the motorsports industry that applies to other people? Maybe they like stick-and-ball sports, maybe they're just movie fans, maybe they never even imagined going to a dirt track race. But they see something, and it's a spark."

Get ready, because the sparks will fly when the PRI Road Tour van hits the road again this summer. **PRI**

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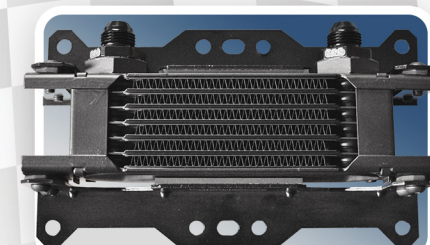
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"For 2021, the PRI Road Tour is going racing," Dr. Jamie Meyer said. It will document "some of the best races, some of the most interesting races, some races that I've never heard of. I can't wait to see what they come back with."



INNOVATION VS. REGULATION

HOW DIRT LATE MODEL RACING IS FINDING A BALANCE

Photo courtesy of World of Outlaws



As teams look to the gray areas of the rulebook to find a competitive edge, sanctioning bodies are walking a tightrope between rising costs and overreaching mandates.

By Bradley Iger

Although the popularity of super late model, crate late model, and other divisions tends to vary from one region to another, one trend is ostensibly universal: As dirt late model racing has seen continued growth in recent years on the whole, the intensity of the competition has risen in turn.

"Even in areas where there may be lower car counts, the quality is up," said Jim Bernheisel of Bernheisel Race Cars, Jonestown, Pennsylvania. "So where there might have been six out of the 20 cars in an event who could potentially win that race in the past, now it's 18 out of 20. They have the experience and the equipment, and they're

race winners."

Close competition is undoubtedly great for the fans and dirt late model racing in general, but as the gaps become narrower and narrower, teams are on the hunt for every possible advantage they can find while still complying with a given rule set as it's written. "It can actually be discouraging for some racers," Bernheisel explained. "There are some that just aren't going to be able to perform as well as others due to budget constraints. Racers tend to be their own worst enemy in that way—they will just spend themselves into oblivion if you let them."

To that end, sanctioning bodies are given the difficult task of curbing the costs to prevent some teams from being pushed out of competition while also being careful not to turn dirt late model racing into a spec-style discipline with an exhaustive tech inspection process and very little room for ingenuity. While that equilibrium tends to be a moving target, officials appear to have honed in on some effective solutions.

SETTING GUIDELINES

In years past, many teams focused much of their energy on refining

their engine package, and that makes sense when considering the fact that many dirt late model racing divisions have very few restrictions on engine modifications. But more horsepower doesn't necessarily translate to a faster race car.

"The majority of these guys are running in the 430-cubic-inch range," said Casey Shuman of the World of Outlaws Morton Buildings Late Model Series, Concord, North Carolina. "There's some that are bigger, and that might help a little during qualifying, but on a nightly basis, most of these racers are putting restrictors in and trying to actually take away horsepower to improve drivability."



So while open engine rules might seem like an inherent advantage for well-heeled teams, outside factors tend to self-police this aspect of the racing. "There's only so much available traction on a dirt race track," said Steve Francis of the Lucas Oil Late Model Dirt Series, Batavia, Ohio. "Pretty much across the board, teams de-tune their engines after qualifying with restrictor plates

and that type of thing in order to keep the tires hooked up to the race track. Over the course of a night, the track surface tends to change and the grip levels go down. But the teams are getting better about tuning for those changes; six or seven years ago you might have seen a track slow down by three or four seconds in a night, but that change is down to about a second now."

More horsepower doesn't necessarily make a faster race car. Teams regularly de-tune their engines after qualifying to keep their tires hooked up during the race, said one source.

Tiffany Olson of Sycamore Speedway in Maple Park, Illinois, pointed out that horsepower advantages can be addressed through other means as well. "We have a three-link super late model division, for instance, so they're restricted to that suspension design, and these racers are required to purchase a specific tire from us. Rules like these allow us to have better control over the parity between the cars."

And this largely hands-off attitude toward engine rules appears to be working. "We don't get a lot of calls from people saying they need more and more power," said Tony Clements of Clements Racing Engines, Spartanburg, South Carolina. "But we do get a lot of phone calls from teams saying that they need better

drivability, and more usable power. We can definitely develop these engines to have more power, but at a certain point the cars become hard to control. If the engine blows the tires off halfway down the straight, it's not making the car faster. It's really more about making the power available where it needs to be."

THE TUNING RENAISSANCE

So if power levels have already surpassed what can feasibly be put down on dirt, where does a team turn their attention to improve the car's performance?

"There's a lot of really smart people involved in dirt late model racing, and they're changing things from week to week, it seems," Shuman said. "But one area where we've seen things change a lot over recent years is the suspension. Teams are really stepping things up with the shock and spring packages they're running, and how it works together with their aero."

And Olson noted that a big part of the change comes from the realization that suspension components tend to be the most cost-effective way to refine the



Instead of asking for more power, one engine builder told us his customers are looking for "better drivability and more usable power. It's about making the power available where it needs to be."

car's performance. "There's been this transformation. The focus used to be all about the engines; now it's the chassis and the suspension setup. When it comes to bang-for-the-buck today, those components tend to play a more vital role than the

horsepower levels do, and racers are doing a better job of educating themselves about it. We've seen teams that were struggling a bit go back and update their chassis, or shocks, or springs, and all of a sudden they're right back in the mix."



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Sanctioning body rules promote an even playing field "and keep the costs down on the cars," said one source. "You shouldn't need a team of engineers to be competitive in dirt late model racing."

And as a result, chassis, suspension, and aero have become a focus for sanctioning bodies and tracks as well. "Aerodynamics play a significant role even in short track racing," said Bernheisel. "And as more and more people get on board with that idea, rules are being developed to try and prevent

it from getting out of hand. That started with car body limits, but racers figured out how to manipulate suspension so they could improve the aerodynamic efficiency while still meeting those requirements. So in order to address that, organizers have also incorporated some chassis and suspension rules to limit those aerodynamic advantages, and it translates to a lot more hoops to jump through in order to build your race car."

But these rules also promote an even playing field. "These kinds of regulations help to keep the costs down on the cars," said Francis. "You shouldn't need a team of engineers in order to be competitive in dirt late model racing. Racers are happy to see the issues being addressed, and the builders are selling more cars and engines than they can produce right now."

At a certain point, however, regulations can become more of a burden than a benefit. "It's just not possible to go through every single rule during tech each night," Shuman said. "And some of the rules are a bit outdated at this point. I think we could focus 10 or 12 of the major ones—places

where costs could get out of control, or safety is a concern—and otherwise simplify things a bit while providing the teams with enough room for ingenuity. Nobody wants to make this into a series where everyone is running the exact same car and setup. I love it when a team can come up with a better way to do things and win a race with it—that's a very cool part of our sport."

And from Bernheisel's perspective as a chassis builder, an overly restrictive rule set can be a source of frustration. "We wish there was enough leeway to have some innovation. If we came up with a new suspension component and it was wildly successful, it would probably get outlawed. And to me, that kind of takes some of the fun out of it. We understand why it's done—they don't want to see everybody rushing out to buy the latest thing and be constantly changing their cars. But everyone already does that anyway."

Motorsports regulation has always been rife with compromise, but all parties seem to agree that maintaining fair, cost-effective competition is the main objective for dirt late model racing going forward.



"When the racing is fair, more people want to come to the races," Olson said. "If you're putting all of your time, effort, and money into something, you want some assurance that your hard work isn't going to just be brushed away."

Francis cited sprint car racing as an example. "Seven or eight years ago it was really struggling with car counts and things like that. They got on a universal tire spec across the country and standardized the rules, and now sprint car racing is doing really well. If you've got one guy that's done something that is way out of bounds, you try to bring that

one car back in bounds rather than forcing two thousand other cars to change to catch up with him. These guys don't want to have

Close competition is good for racing—and for the fans—but as gaps narrow, teams are looking for every possible advantage while still complying with the rulebook.

to buy a new race car every year because it's suddenly outdated."

"Racers want consistency," Shuman added. "I think that whatever rules we're going to have, racers just want to know that everyone is racing under those rules." **PRI**

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THE SCIENCE BEHIND DIRT LATE MODEL SUSPENSION SETUP

With largely unencumbered rule sets in top tier series, suspension tuning has become a focal point for many dirt late model teams' programs, encouraging experimentation and innovation in the pursuit of quicker lap times.

By Bradley Iger

In World of Outlaws and the Lucas Oil Late Model Dirt Series racing, suspension setups have taken on increasing importance in recent years. As organizers seek to maintain parity in race fields while keeping running costs at bay through targeted mandates, it's an aspect of tuning that's still allowed a substantial amount of creative freedom today. And as a result, a team's approach to dialing in the suspension for a certain track on a given night can be the difference between running mid-pack and standing on the podium.



While many popular race series have rules that provide a general path to follow, dirt late model teams still enjoy considerable leeway when it comes to suspension component combinations.

advantage over the guy next to you."

And as such, these tuning strategies have become incredibly sophisticated, leveraging technology that was exclusive to the realm of OE suppliers not so long ago. Armed with volumes of data and driver feedback, teams are aligning themselves closely with suspension component manufacturers in order to develop the solutions that can provide that competitive edge. It's a dynamic that fosters inventive design, and it's pushing dirt late model racing forward in a very tangible way.

"You can't muscle your way to a win with a power advantage these days," said Justin Cockerham of Hyperco, Rosemont, Illinois. "Suspension is the game right now."

"For 99% of the teams, it's now the most important thing," said Marshall Fegers of QA1 Precision Products, Lakeville, Minnesota. "The top-level drivers and teams all have the same equipment for the most part, so it really comes down to

what you do with that equipment—how you set it up. It's a lot like NASCAR in that respect—the cars are designed to be very similar according to the rulebook, so it really comes down to what you can do with the tunable elements of the car to gain that

PAINTING INSIDE THE LINES

Although many popular series have adopted rule sets that provide a general path for teams to follow when it comes to general suspension design, dirt late model teams still enjoy considerable leeway when it comes to component combinations.

"In the top-tier series, most of the rules that the teams have to work with are related to maximum ride height and droop rules based on the chassis," Cockerham explained. "You're also not allowed to run electronically controlled parts, and some series and classes have a limit on the number of springs you can run per corner. But there's a lot of freedom when it comes to spring design—many racers are running stacked springs right now, or dual-rate springs, or soft, long-travel springs. And because of all the variables involved, there are virtually no two setup strategies that are alike. These racers are running at 40 or 50 race tracks around the country every season, and they're optimizing their programs based on the data that they're gathering. And that's why they go

faster and faster every year."

Aaron Lambert of Penske Racing Shocks in Reading, Pennsylvania, also noted that because of the ways the rules are designed, the car's aero kit and suspension system are intrinsically tied to one another. "Along with the droop limiter rule, every major series has a rear decklid height rule, and you're always trying to manipulate the car so that you can pass tech inspection with the rear spoiler up as high as it can be. Aero has become a very big thing in the late model world—we have a lot of former and current NASCAR drivers and crew chiefs that are involved now, and they're bringing over what they learned in that discipline."

And as these teams seek out those aero advantages, sanctioning bodies often turn to suspension restrictions to keep everything in check. "A lot of times they'll create shock rules to negate those potential aero advantages," said Aaron Morey of ThyssenKrupp Bilstein of America, Poway, California. "For example, there are rules that say that your shock can't extend past



Penske Racing Shocks' Aaron Lambert told us that air shocks are growing in popularity because of the "naturally progressive nature" of the shock's air chamber. "You don't see load spikes like you would with a stacked [spring] setup."

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Shocks are often considered “black magic” by many, so few dirt late model teams work on them, said one source. Instead, many teams have developed relationships with shock manufacturers and work with them to get the results they want on the track.

a certain amount in the right front corner because teams were getting the front end on the right-hand side really high in order to bring the spoiler down low in order to pass tech, and they were out on the race track,

they’d be inches above everyone else. But the great thing about dirt late model racing is that, when it comes to what’s inside the shock, just about anything goes.”

So although the rule sets confine tuning

to a general set of parameters, there’s a lot of room for creativity within that sandbox. “Years ago, we would have only run a single spring per corner,” said Jason Young of Öhlins USA, Hendersonville, North Carolina. “Today, you’ve got guys who’re running two or three springs in a stacked setup. Bump rubbers are a bigger player in the market these days as well, along with bump springs and bellow washers. There’s a ton of different options out there now.”

Lambert told us that air shocks are seeing an upswing in popularity, too. “We have a new air shock that’s paired up with an air spring, and it works really well—it’s won

several races already. With that design, we’re able to manipulate the spring curve in ways that we wouldn’t really be able to otherwise—it’s a really big advantage. A lot of these guys are running two stacked springs in parallel on the right front with a bump stop to create a spring curve that yields different spring rates based on where the suspension travel is at a given moment to create a progressive rate system. But the problem with that is when the suspension crosses over from one spring to the next as it’s compressed, you will inherently see a load spike in the suspension, and that load spike transfers to the tires. Any time a tire sees a load spike, there’s going to be a loss of grip. But an air chamber is naturally progressive as it is compressed, so you don’t see those load spikes like you would with a stacked setup.”

DITCHING THE GUESSING GAME

With so many different combinations available and a rule set that encourages experimentation, you might expect each team’s suspension tuning strategy is largely

based on seat-of-the-pants driver feedback and the associated lap times delivered. But gone are the days of lengthy trial and error with a hunch and an arsenal of parts. Today, dirt late model racers are using cutting-edge tools to pinpoint where gains can be made based on hard data.

“There’s been kind of a revolution in late model setups over the past few years,” said Fegers. “Before 2015, to set the cars up we would put them on four-corner digital scales and get our corner weights and ride heights where we want them. But after that, ‘smash

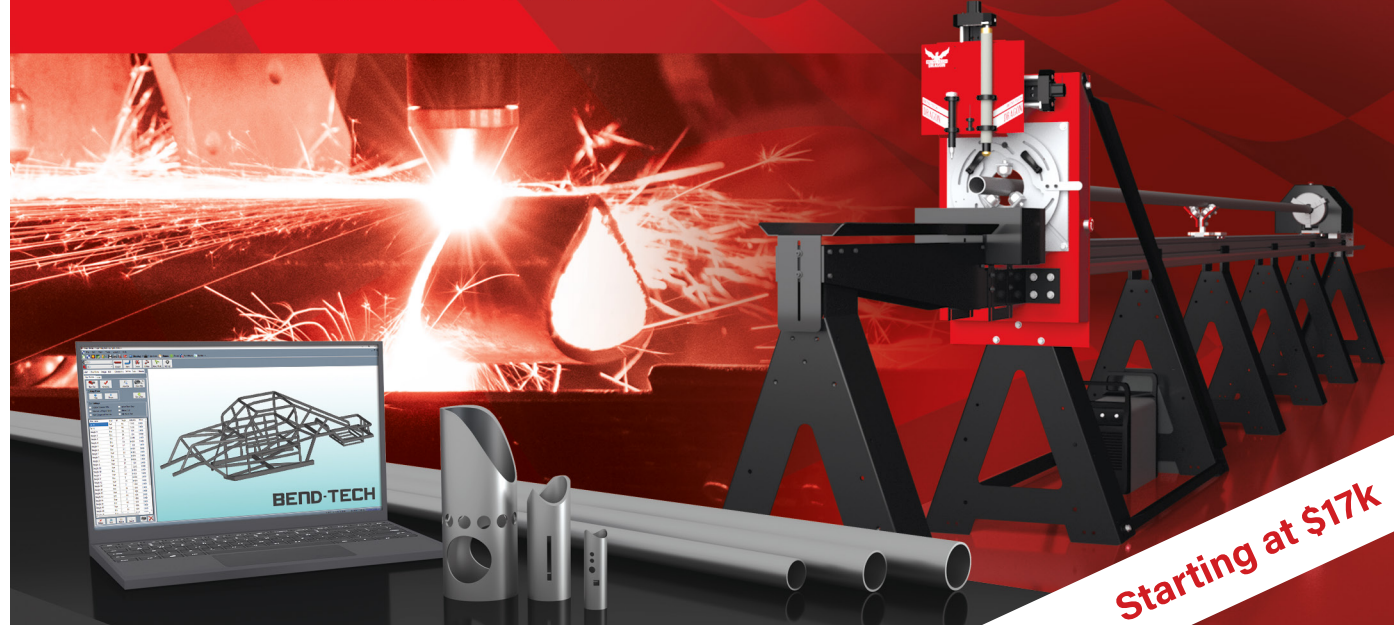
“There’s a lot of freedom when it comes to setups using various styles of springs” in dirt late model racing, said a source. “Many racers are running stacked springs (pictured), or dual-rate springs, or soft, long-travel springs, bump springs or combinations of all the forementioned. With the variations of chassis designs, damper tunes and driver preferences, rarely do you see the exact same spring packages between two competing cars within the same series.” Photo courtesy of Hyperco.

machines’ became much more prevalent. With these machines you can compress a shock with a spring on it to a given center-to-center measurement on the shock mounts, and it will tell you a spring force with a digital



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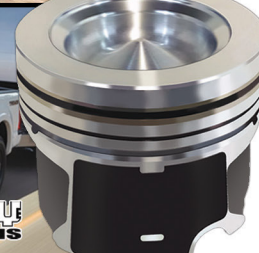
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Race organizers seek to maintain parity in race fields, creating a situation where top-level drivers and teams have similar equipment. Under those conditions, "it really comes down to what you can do with the tunable elements of the car to gain that advantage over the guy next to you," said one source.

readout. The smash machines have led to a major transition in how we talk about setups and what we pay attention to in those setups. Now, not only do we know what the spring force is at static height, we can also look at the dynamic height it will be at when the car is racing on track. That has really changed the game—we don't really worry about our ride heights as much, and we care a lot more about the spring force at the height that the car is seeing at speed. We can tune it to

make sure the bumper isn't going to dig into the track, or the right-rear doesn't compress so far that it starts to pull the left front corner off the ground. It's allowed teams to develop a baseline and make quick, drastic changes as needed for a given track."

Cockerham pointed out that, for teams that want to run up front, understanding how to effectively use this technology has become obligatory for dirt late model racers.

"Every single top-level contender has a

spring smasher in their trailer, and they're constantly testing and looking at travel and load numbers to understand how the changes are affecting the car. Springs are the cheapest form of data acquisition on the car—if you're able to measure your spring's travel at a very precise and accurate level, you can get a world of useful information about the dynamic forces of your race car."

CONDUCTING THE SYMPHONY

While teams are taking a more advanced approach to their tuning practices now, they're also working closer with manufacturers on specific elements

of the suspension system to ensure that overall development stays headed in the right direction.

"Four or five years ago, if you walked around the paddock at a late model race you would have only seen Integra and Penske shocks," said Lambert. "Now we're seeing big pushes from companies like Bilstein and Fox, so that's been really good for the racers, and all of the guys who're running the fast cars in these top series are tied in with a shock manufacturer. Shocks are still considered black magic in dirt late models—not a lot of teams work on them on their own. Instead, they'll explain to their shock manufacturer what the car is doing and what they want it to do, and the manufacturer builds shocks around that feedback to produce those results."

It speaks to the nature of the suspension systems in general—a complex collection of components working in concert, where changes in one area often affect behavior in another. "The teams deliver the feedback to our engineers and we provide the solutions," Morey said. "Sometimes that's

exclusively through shocks, but sometimes it's a combination of shocks and other suspension parts."

Even with these advanced systems, analyzing suspension performance based on data acquisition can still be a tricky proposition for teams, Öhlins' Christer Löf pointed out. "You have to have a lot of experience and know what you're looking for. There's no meter that tells you that the suspension is getting better or worse. But the clues are in there," he said.

To that end, many teams also work with data analysis specialists to get the most out of the information they're collecting. "On a night-to-night basis it's often handled by the teams," Fegers said. "A crew chief will look at the track and look at the car and know what changes they need to make so the car will run faster. But many teams will also bring in engineering support for test days to help dial in the car based on the data."

And it all points the way toward more informed teams with increasingly faster cars in the future. "As we learn more, I think you'll probably start to see more instances where

the suspension is reacting to inputs that are coming from places other than the wheel," Lambert said. "If the wheel is moving, other parts of the car are moving as well, and that has an impact on the suspension's behavior. At the end of the day, if you can do things that can provide more mechanical grip, it's going to give you an advantage." **PRI**

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hypercoils.com

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QA1
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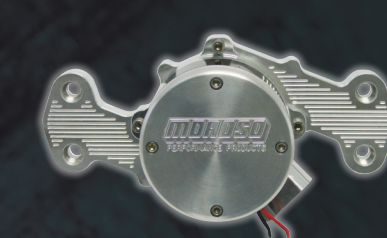
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BUSINESS PROFILE: LONGHORN CHASSIS



One of the preeminent families in NASCAR has shifted its heralded paved stock car operations to dirt ovals, producing dominant dirt late model chassis and propelling its drivers to frequent podium finishes.

By Jim Koscs

As the latest chapter in the Labonte family racing tradition, Longhorn Chassis sprang to life in 2010 and quickly became a force in dirt late model competition.

The Trinity, North Carolina-based operation has since added modifieds to its chassis lineup, and now turns out about 100 cars a year. With multiple national championships to its credit and wins too numerous to count, the builder has solidified itself among dirt racing's elite.

NASCAR and IROC champions and NASCAR Hall of Famers Terry and Bobby Labonte moved on from their own illustrious racing careers to start Longhorn with Terry's son, Justin, who runs the day-to-day operation. A former NASCAR Xfinity Series and Truck Series driver, Justin credits Longhorn's success to the engineering direction provided by Kevin Rumley, a team of dedicated employees, and, of course, its cars being placed in the hands of top drivers.

Rumley, the company's engineer since the start, has guided Longhorn's chassis construction to provide consistent feel, resulting

in early race wins and ultimately a customer roster filled with top dirt late model drivers.

"When we started, our cars ran so well, we were able to build a customer base quickly," Justin Labonte told us. "Jonathan Davenport and the Lance Landers team have been a big part of our success. Now we have many more great drivers and teams running our cars, getting great results and driving growth. Our core group of teams has some of the sport's best drivers."

Among them are Tim McCreadie, driver of the Longhorn house team car; three-time Lucas Oil Dirt Late Model Series champion Davenport; Stormy Scott; Jason Papich; Brandon Overton; and many others. Kyle Larson also has been running a Longhorn Chassis car for Rumley.

The success of its drivers—McCreadie was second in points in the 2020 Lucas Oil Dirt Late Model Series, and Davenport placed third—provides the foundation for Longhorn's marketing: "For us, it's winning races at the highest level," Labonte said. "Winning drives our business."



"When we started, our cars ran so well we were able to build a customer base quickly," said Justin Labonte of Longhorn Chassis. "Our core group of teams has some of the sport's best drivers."

GETTING INTO THE DIRT

Longhorn Chassis, which emerged out of Bobby Labonte's foray into dirt racing, was run out of the 10,000-square-foot shop built in 1990 for Terry Labonte's NASCAR Cup team. The shop remained the base for Bobby Labonte's dirt racing team, which started out driving other builders' cars.

"We'd had some cars from different builders and decided we could develop our own car and have more control over quality," Justin recalled. "It just grew from there."

"WE'RE ALWAYS LOOKING AT WHAT KIND OF MACHINERY CAN HELP OUR BUSINESS GROW."

Bobby ended his racing operation in 2004 to focus on Longhorn full-time. Though founded by NASCAR champions, Longhorn has never rested on those laurels, but rather built itself up on the merits of its product. Even not giving the business the Labonte name—

one of NASCAR's most recognizable—seems to have been an exercise in humility. The company name, Justin explained, came from the family's Texas roots.

WRITING A NEW CHAPTER

Longhorn's 100-cars-per-year pace represents a substantial increase from its earlier rate, when that number was closer to about 25 to 30 machines annually. Labonte told PRI that the company is comfortable at the 100-car level. Longhorn currently sells

through two dealers: Wells Motor Sports in Hazard, Kentucky, and Tye Twarog Racing in Coshocton, Ohio, which both handle their own finish assembly.

In fall 2020, Longhorn entered a new joint venture called Longhorn Modifieds by

Loenbro Motorsports to build dirt modifieds. In the new collaboration, Loenbro Motorsports of China Grove, North Carolina, will assemble cars on Longhorn Chassis, with Steve Arpin heading the operation at Loenbro. Arpin is a successful competitor in rallycross, dirt modified, ARCA, and NASCAR.

"They ran well out of the box," Labonte said about the Loenbro cars. "It's worked out really well. Their backlog is pretty big right now."

Arpin, too, was enthusiastic over the early results. "It's been a whirlwind since we hit the 'go' button," he said. "They have produced a great car, and we have been working back and forth together on growing it going forward. Now that we are more involved with them, it's easy to see why they are consistently on top of the major late model events around the country. The future looks exciting."

A TIGHT CREW

At its core, Longhorn is a family operation. Most of its 12 employees have been with the company for several years. Among the crew are five techs who build frames, as well as machinists and a parts manager. Head fabricator Scott Newton and parts manager Tommy Greco have been with Longhorn from its inception. About five years ago, Dave Dunlap joined the company to manage production, which increased with new efficiencies and equipment in place.

"We've got a good, tight crew," Labonte said. "That's been very helpful for continuity. Most have been with us from the start, including our setup guy. He goes to the track every week. That has been instrumental in development, as has having a house team."

Being in close proximity to numerous NASCAR team operations in North Carolina has always helped Longhorn source qualified employees. But Labonte acknowledged that recruiting skilled and experienced fabricators has become more challenging in recent years. He admitted that he doesn't know the exact reason but speculates that it could be a generational issue.

"A lot of our guys retired from Cup teams," he said.

When a fabricator is needed, the company relies on word-of-mouth and social media to convey a job opening. "We must have experienced people," Labonte added, explaining that the company does not want to teach people their trade.

Nonetheless, a committed team has

helped keep production rolling even through the uncertainty of COVID-19. "Dirt racing in general didn't slow down much during the course of the year," Labonte said. "We were in a strong position when it hit. We kept working on our cars and kept racing. It did not hurt us as much as it did some other companies."

Although Longhorn, like other builders, did eventually encounter some material sourcing challenges due to COVID-19, Labonte said.

"Last year at this time we could get what we needed," he explained. "[But] some things we didn't think of became issues—getting some things from California in particular. Steel and aluminum prices have gone up. And it can be difficult to find a sheet of aluminum right now. I think a lot of stuff is just sitting in ports waiting to be unloaded."

RACERS BUILDING FOR RACERS

Longhorn Chassis maintains all operations, including parts sales, under one roof—thanks in large part to its origins in NASCAR and dirt racing. The shop is well-equipped and maintains a pipeline to top technical talent.

Having committed employees helped Longhorn Chassis weather 2020's uncertainties. "We kept working on our cars and kept racing," Justin Labonte said. "It did not hurt us as much as it did some other companies."

As noted earlier, consistency is a hallmark across Longhorn's dirt late model and dirt modified chassis. The shop boasts some of the latest in automated machinery, including a Flow waterjet cutting machine and a Bend-Tech Dragon plasma cutter. Labonte credited both tools with increasing production while ensuring precision and quality.

"We're always looking at what kind of machinery can help our business grow," he added.

Stormy Scott, who races the No. 2s Lucas Oil Late Model Dirt Series car, has two Longhorn Chassis cars and praises their consistency and parts shareability.

"Working with Longhorn has been an



awesome experience," Scott said. "They helped me get my first Super Late Model win. I've scaled both out, and they're identical. They both drive identically. I can take both to the track and drive either one."

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Stormy Scott has two Longhorn Chassis cars that "both drive identically. I can take both to the track and drive either one." Should he have to go to a backup, "everything comes off one car and fits on the other."

(ALMOST) FREE MARKETING

Promoting its accomplishments through social media, along with the always helpful word-of-mouth are the company's primary—and practically only—marketing outlets. Justin's wife Miranda and Kevin's wife Jacqueline together manage Longhorn's social media accounts. In particular, Miranda oversees Longhorn's Facebook page while Jacqueline handles Twitter.

"We use social media to recognize our winners every week," said Miranda. "We keep involved with our customers' racing. We try to keep people as up to date as possible. We attend a lot of races, and

We can pull shocks from one and put them on the other car. So, if I have to go to a backup, I don't have to worry about anything.

Everything comes off one car and fits on the other. We're on the trail to be running better than we ever have."

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Jacqueline is really great at live updates on Twitter. If we are there, we use our own photos, but if not, we have some great photographers that are always willing to supply us with photos."

At press time, Longhorn's Facebook page showed 33,000 followers, while its Twitter account had 14,500. Both actively engage with fans, too.

LOOKING AHEAD

While pleased with Longhorn cars' wins in 2020, Labonte is working hard to collect still more victories in the current season. "For this year in dirt late model there are a lot of big-money races," he said. "We're excited to be there with guys in our cars

Now building chassis for modifieds as well as dirt late models, Longhorn Chassis turns out about 100 cars per year. The company sells through two dealers, both of which handle finish assembly.

capable of winning. We're expecting a fun and successful season." As of late April, Longhorn Chassis had already notched wins with Davenport, McCreddie, Devin Moran, Overton, and Chris Hough, among others.

As for its business strategy and engineering plans moving forward, Longhorn

remains focused on refining its products to keep drivers on the podium. "Cars evolve over the course of a season," Labonte said. "Seeing how this season goes will determine our direction. The biggest thing with us is we are all racers. We just try to build the fastest, best quality cars that we can." **PRI**



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CORE COMPETENCIES

Our expert sources are here to troubleshoot temperature increases, size up (or down) expansion tanks, break down the differences in radiator type, and more.

Compiled By Drew Hardin

One of the fundamental properties that all internal combustion engines share is the need to maintain a proper operating temperature. Run an engine too hot, and the resulting parts failure could prove catastrophic. Run an engine too cold, though, and it won't operate as efficiently as it should. Now, take that bit of Auto Shop 101 knowledge and put it in the pressure cooker that is racing, and the risks—and rewards—of proper cooling rise dramatically.

It may be fundamental, but proper engine cooling practices require a knowledge and experience base that's distinct from other engine functions. For that reason, we reached out to experts in engine cooling and asked for their most frequently asked questions from the racing community, as well as their answers.

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Northern Radiator manufactures competition radiators with an eight-plate Super Flow Oil Cooler built into the tank. It is "highly efficient" in heat transfer, said a company representative, and can be used with either wet- or dry-sump oiling systems.

racing conditions.

The other factors that determine how effective your cooling system will be are the water flow rate and turbulence of that water as it passes through the tubes. Higher flow rate and high turbulence both work together to achieve faster and more efficient cooling at the extreme engine temperatures that racers need to be competitive. We advise teams to look for dimpled-core tubes, which maximize surface area of the water flowing through the radiator, thereby increasing the radiator's cooling capacity. Power Cool's Ultra-High-Performance and High-Performance radiators use this dimple technology. —Earl Lemley, Power Cool Systems, Indianapolis, Indiana

Is there a difference between a radiator used for racing and one used for another application, like a restoration?

Not necessarily. Most of our radiators have two rows of 1-inch aluminum tubes. They'll cool your 1968 Camaro and your small block or big block modified circle track car that you take out on Friday or Saturday night.

But we do have a difference in our race product that other manufacturers don't: an eight-plate oil cooler we call the Northern Super Flow Oil Cooler. Some manufacturers will put in what's called a barrel cooler, a tube that sits in the tank. While barrel coolers are high flow, they have poor cooling

efficiencies. The eight-plate design is the largest cooler that will fit in our race radiator tanks, and the plate design is highly efficient in heat transfer. It can also handle either a wet-sump oiling system or the higher pressure and volume of a dry-sump oiling system.

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We also have single-pass, double-pass, and triple-pass radiators, all designed to help the racer dissipate heat based on whatever his issues might be. Sometimes a single pass through the radiator is not enough. A double-pass radiator gives the coolant two passes through the core, and a triple-pass radiator gives it three passes through the core. With a double-pass you'll typically get an extra five degrees worth of cooling, while a triple-pass will give you 7% to 10% more cooling. Most double- and triple-pass radiators work well when you have limited airflow at the front of the car and you need that extra time in the radiator to help dissipate heat. —Chuck McKaige, Northern Radiator, Willmar, Minnesota

Is a thicker radiator core better than a thin one?

Let's start by defining "better." In a radiator, better would be defined as exchanging more heat under similar conditions. Heat is transferred from the engine coolant to the radiator fins, and then to the air that has been pulled through the core by the fan or a positive pressure area in front of the radiator. This air then travels to a low-pressure area out of the hood or into the engine bay. The job of the radiator is to remove as much heat as possible from the coolant.

Many assume that thicker radiators are automatically superior in cooling, but that is not the case. The most efficient core would be thin, but tall and wide, which allows the most amount of heat exchange. When you start adding extra rows, they get

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A thicker radiator is not always better at cooling, said our source at FLUIDYNE. In fact, a radiator that's too thick can be less efficient at heat transfer, as the air flowing through it can become turbulent.

less efficient as you stack them. There is a point where too thick becomes a problem, as the incoming air becomes turbulent and the path of least resistance is no longer through the core. As technology progresses, we will evolve into cores that remain thin but contour to the chassis, providing maximum heat exchange in a previously unusable area. —Ryan Williams, FLUIDYNE, Mooresville, North Carolina

With the advancements in core technology, such as cooling tube and fin design, improvements have been made in heat rejection. This has allowed us to utilize thinner cores for a given application, and the thinner core gives us a more efficient core where airflow is concerned. With all things being equal, the thinner core will have less pressure drop from the front side to the back side of the core. This allows the velocity of the air to be higher, which in turn creates another positive situation in heat rejection. Within reason for the application, a thinner core is just more efficient with the given amount of airflow it's seeing.

For example, where we previously used a lot of 55- to 68-mm cores, we can now use a 42-mm core and see better cooling. We also end up with a lighter part and less fluid weight. Obviously, there is a point

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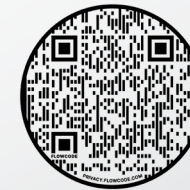


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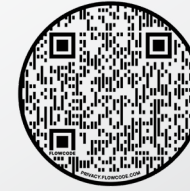


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- Low profile allows for turbo.



Performance retailers can sell direct-fit aluminum expansion tanks to replace plastic factory tanks, which are prone to cracking, according to our source at Moroso Performance Products.

of diminishing returns when it comes to using thinner cores. There will always be a minimum thickness that is desirable.

Another interesting point about core thickness: The thicker the core, the more the air heats up as it passes through it. Thus, the thicker core will have higher temps on the back side of the core, which can have a negative effect on water temp.

With [our partner] PWR building its own cores in-house, it gives us great latitude when it comes to core thickness, cooling tube and fin type, as well as fin density, where we can tailor a core spec to a specific set of parameters for a given application. —Herb Engelhart, C&R Racing Inc. (part of PWR Advanced Cooling Technology), Indianapolis, Indiana



This photo illustrates the difference in thickness between two C&R Racing radiators, a 68-mm core (left) and a 42-mm core. Improvements in cooling tube and fin design have enabled the company to use thinner cores for a given application, which makes for a lighter part and less fluid weight.

Should I install smaller lower radiator hoses or restrictor plates to slow down the coolant and keep it in the radiator longer?

No. A cooling system is closed-loop. The more time the coolant is in the radiator, the more time the coolant is in the engine. Reducing coolant flow will only expand the temperature difference between the inlet and outlet temperatures. That's bad for a whole bunch of reasons.

The inlet and outlets on the engine usually are attached to separate components—the block and heads. If the temperature of one is significantly different than the other, you'll have a problem with

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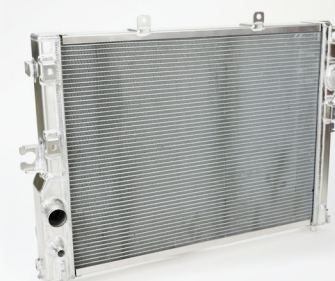
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Space in a race vehicle's engine bay is at a premium, so Canton Racing Products developed a mathematical formula to calculate the correct size for an expansion tank.

thermal expansion. Though it might not be immediately apparent, that poor head gasket is being sheared to death. The heads are growing larger than the block. Your head gasket problem could be a cooling system problem.

There are situations where lower flow has benefits, and others where max flow is required. Too fast or too slow are both problematic for proper cooling. Having the engine's rpm determine coolant/airflow makes it nearly impossible to maintain ideal operating temperatures. That's why Delta PAG manufactures variable-speed brushless water pumps and fans. They're powerful [and] efficient; and because of their ability to operate at variable speeds, they can increase or decrease flow rate from 5 to 60 gallons per minute as needed via a one-wire signal PWM. It has a huge 1.75-inch inlet and dual 1-inch outlets and only weighs 4.60 pounds. —John Pairaktaridis, Delta PAG, Astoria, New York

I put in a new motor and radiator, but the engine is running hot. What should I do?

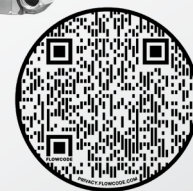
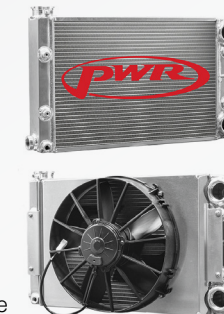
95% of the time, a correction of one or more of these issues will solve the problem:



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Set the proper timing of the distributor; properly jet the carburetor; and/or replace an improper thermostat. If the engine's timing is too far advanced or retarded, that causes the motor to run hot because it's working harder. The same is true if the engine is running too rich or too lean. And if you replace a 180-degree thermostat with a high-performance, 160-degree thermostat, that usually immediately cures the problem. — Rick Hobbes, PROFORM, Warren, Michigan

How does using a high-pressure cap improve performance?

Two important facts here: One, cooling systems like the one in a production vehicle generally work with pressures less than 19 psi. Two, water boils at 210 degrees F.

These two facts are important because they define the need for pressurized caps. One thing we do not want is to boil the water. This will create pockets of air, which greatly hinder cooling performance. As we increase the pressure, we are able to increase the boiling point of the water in our cooling systems. Every pound of pressure is equal to 2–3 degrees F increase in the boiling point. In the top tiers of racing the engine cooling system operates at pressures over 50 psi. They can then tape off the front end, increasing the downforce on the car. Taping off will increase the water temperature, so they are able to run the car at 250 degrees F without having cooling issues. These types of temperatures would overheat a standard production car, possibly leaving you stranded. —Ryan Williams, FLUIDYNE

What is the difference between an expansion tank and a recovery tank?

To properly function, a pressurized cooling system needs a fill, expansion and air-bleed area when filling or topping off coolant. That area needs to be the highest point in the system. In older vehicles, the top of the radiator was the highest point of the cooling system, and it was accessed through a pressurized radiator cap. New vehicles are designed with aerodynamics, styling, pedestrian-protection, and a host of other factors that place the vehicle's radiator lower than the engine in many cases. The

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expansion tank, then, is located at the high point in the cooling system and serves the same function as the radiator cap in older vehicles. Expansion tanks are valuable in helping the cooling system operate properly in race cars as well, as race car designers and builders mount radiators lower—or even at different ends of the vehicle—than the engine. Performance retailers can sell direct-fit aluminum expansion tanks that replace the prone-to-cracking plastic expansion tanks under the hoods of most modern vehicles.

The function of a recovery tank is to contain the system's expanded hot coolant.

This happens when the internal thermal spring of the radiator cap is tripped and sends the expanded fluid out the side bleed hole port of the radiator neck. Sanctioning bodies require race cars have a place for this expanded coolant to go, so a recovery tank should have a vented cap and be plumbed close to the side bleed hole port of the radiator cap neck. As the coolant cools down, the spring in the radiator cap will go back to its normal position, and the cooling process will create a vacuum that sucks the coolant back into the system. —Thor Schroeder,

Moroso Performance Products, Guilford, Connecticut

What size expansion tank do I need for my coolant system?

The general rule of thumb for proper capacity of expansion is 12% of total coolant volume for drawdown and 6% of the total volume for thermal expansion.

Drawdown capacity is the amount of coolant that can be lost before air reaches the water pump and is introduced into the system. Air bubbles in the coolant system can cause inconsistent cooling and can also prevent the thermostat from opening if an air bubble gets trapped underneath it.

“IN A SITUATION WHERE A LARGE ENOUGH TANK ISN'T AVAILABLE, A RECOVERY TANK CAN BE USED TO MAKE UP SOME OF THE EXPANSION VOLUME NEEDED.”

Thermal expansion occurs as coolant accumulates heat from the engine. The 6% of the expansion volume is calculated from the amount that the coolant level will rise at 212 degrees F. This takes into account the density change of the coolant itself and all the components that are in the coolant system. If the volume is calculated incorrectly and an inadequate expansion space is provided, coolant will be discharged from the system at operating temperature. To prevent the possibility of spilling coolant, a catch tank or a recovery tank can be used.

To get the proper expansion tank volume, add together the drawdown capacity requirement and the thermal expansion requirement for an additional 18% total volume required for the expansion tank. As most coolant systems are designed to operate with about 13 quarts in the system, these calculations serve as an example:



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Drawdown = 12% of 13 quarts = 1.56 quarts

Thermal Expansion = 6% of 13 quarts = .78 quart

Expansion Tank Size Required = 2.34 quarts

In a situation where a large enough tank isn't available, a recovery tank can be used to make up some of the expansion volume needed. A recovery tank will collect any coolant that is expelled from the pressure relief. In a setup with a recovery tank, it is important to make sure that the coolant system is still full enough to allow for drawdown. —Iann Criscuolo, Canton Racing Products, North Branford, Connecticut

How much horsepower can be gained by converting to an electric pump?

Since an electric coolant pump works at a steady rate and a belt-driven pump is rpm dependent, it is hard to give an exact number as far as horsepower gain is concerned. As a general reply, we tell our customers what we have seen on various dyno tests, which is somewhere between 7 and 14 horsepower maximum. The details matter greatly when trying to discover what the true number will be for your build. Important factors include the design of the factory pump, most especially the stock impeller diameter, shape and internal clearances. Also important is the target rpm where the power will be used. If that rpm is beyond where the factory pump begins to cavitate and become horribly inefficient, greater horsepower gains may be realized. —Don Meziere, Meziere Enterprises, Escondido, California

Are CVR Proflo Extreme water pumps interchangeable?

Yes. The pumps are designed for use with all of CVR's other (non-LS) mounting kits, so they are interchangeable. Simply change out the mounts/legs and you can move between a Ford 351, a small or big block Chevy, or a big block Ford. That's one of the advantages of a universal pump. It makes it easy for the racer to change from one application to

another, and it also reduces overall inventory costs for the dealer.

Our Proflo Extreme water pumps flow 55 gallons per minute (GPM). That motor, coupled with the CVR elliptical billet impeller, provides the maximum benefit to the racing industry. —Ron Thomas, CVR Products, Arnprior, Ontario, Canada **PRI**

SOURCES

C&R Racing
crracing.com

Canton Racing Products
cantonracingproducts.com

CVR
cvrproducts.com

Delta PAG
deltapag.com

FLUIDDYNE
fluiddyne.com

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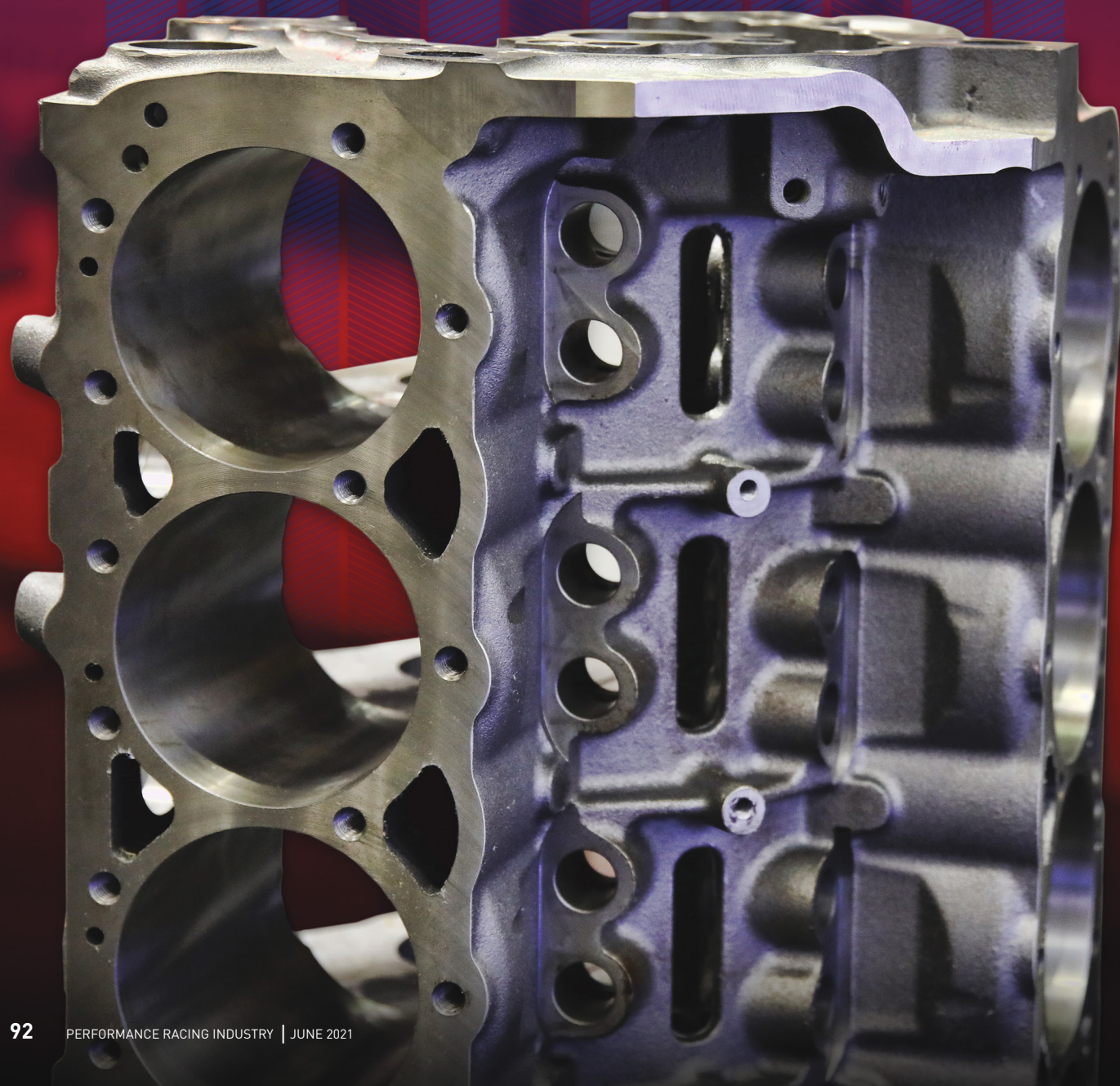
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PRI

BLOCKBLUSTER DEVELOPMENTS

Discover how manufacturers of cylinder blocks and related components are tapping into their collective creativity by expanding applications and experimenting with never-before-tried concepts.

By Mike Magda



For as long as anyone can remember, racers have pleaded with cylinder block manufacturers to make their products stronger, lighter, and less expensive. And many of the new blocks released in the last few years have delivered on those requests. At the same time, however, some dedicated designs are also helping unleash horsepower by correcting and improving valvetrain dynamics.

Tricks like raising the camshaft location and manipulating the lifter-bore locations are alleviating some valvetrain geometry problems when combined with a complementary cylinder head. For example, Dart Machinery recently teamed with Proline Racing to develop a big block Chevy cast-aluminum cylinder block with a number of features that "straighten out the valvetrain" and eventually will be part of a complete and economical power package for sportsman racers.

"We retained the big block architecture but repositioned the valvetrain to work with Dart's 20X asymmetrical cylinder head," explained Mike Sanders of the Warren, Michigan-based company.

At Alan Johnson Performance Engineering (AJPE) in Santa Maria, California, the raised-cam Hemi block is making headlines in Pro Mod and select outlaw drag racing classes.

"RAISING THE CAM ALLOWED US TO STRAIGHTEN THE PUSHROD ANGLES AND SHORTEN THE PUSHROD LENGTHS."

"Raising the cam allowed us to straighten the pushrod angles and shorten the pushrod lengths," said Rick Wilkinson. "A lot is predicated on what you're doing with the cylinder head. You want to let the engine run at higher speed and still maintain valvetrain stability. This is a move in that direction."

More displacement is often on a racer's shopping list—especially when rules allow unlimited bore and stroke—and Mena, Arkansas-based Brodix is helping loyal small block Chevy enthusiasts build 500-plus-cubic-inch engines with a new block that can be machined with either 4.400- or 4.500-inch bore centers. This block also comes with a 5.150-inch crank-to-cam centerline distance,

which is the same as a big block Chevy.

"It uses a standard big block Chevy front drive, and it comes with a 10-inch deck height," said Mark Fretz. "It's one of the most popular items we have right now. We offer multiple lifter locations and layouts, depending on the cylinder head used."

Driving much of this new development in cylinder blocks is the small-tire, outlaw drag racing segment, where engine builders have freedom and there are plenty of classes to spur unconventional thinking. That's why Brodix is offering a choice between the two bore centers for small block racers.

"It all depends on the class," said Fretz. "Those with the 4.500-inch bore spacing may have to carry more weight. This block is for large cubic-inch classes where they require a cast engine block."

With a maximum bore of 4.250-inch available on the 4.500-inch-bore-center block, total displacement upwards of 524 cubic inches is possible. Fretz said a 4.200-inch bore combined with a 4.500-inch-stroke crankshaft is 498 cubic inches and will allow racers to compete in classes with a 500 ci limit.

"And they get the weight break for using a small block platform," he added.

The block's development was spawned by a request from an engine builder who asked

just how high Brodix could raise the camshaft. The first attempt raised the crankshaft-to-cam centerline distance .434-inch because there was a cam drive available at that height. A Brodix machinist then wanted to try mixing up and modifying a few patterns at the foundry and ended up matching the BBC front drive on a small block foundation. That raised the cam a total of .629-inch.

A prototype block was cast and sent to the engine builder, who assembled an engine for test runs.

"It did well at the track, and he ordered five more," said Fretz, noting that when other racers and engine builders discovered the block, more orders followed.



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Brodix has developed a small block Chevy block with the camshaft raised to the height of a big block Chevy. This block also takes a BBC front drive.

It's easy to see how racer feedback, especially from the drag strip, is spurring block development and innovation these days—and how the blocks are being built to suit racers' specific needs. The AJPE raised-cam Hemi, for example, was designed without the traditional inner head studs.

"This allows the user to take off the head without removing the intake manifold," said Wilkinson. "That can really speed up time in the pits."

The main selling point for the AJPE billet

block is the camshaft location that's raised .650-inch over stock. This allows longer stroke crankshafts and beefier connecting rods that won't interfere with the camshaft. Racers also expressed concern about unwanted harmonics due to camshaft flex. Not only does the new block allow for a robust 70-mm cam core, but AJPE engineered a sixth cam bearing in the front section of the block for more camshaft stability.

The new Dart BBC block took a slightly different development approach, in that it was a direct collaboration with the engine-building shop of Proline Racing in Ball Ground, Georgia. The eventual goal is to create an affordable, high-horsepower boosted platform that can be used in a variety of sportsman drag classes. Key to

the foundation is the new BBC block and the Dart 20X cylinder head.

"For this head, we created a one-piece rocker stand with the correct geometry, so you don't have to use offset rocker arms," said Sanders. "We also moved the lifter bores to straighten out the pushrods. It allows a 9/16-inch exhaust pushrod and a half-inch intake pushrod.

"You have to run a different cam core with the 20X, but it straightens everything out," said Sanders, noting that changes to the block also helped design a more efficient cylinder head by moving the pushrods slightly away from the head. "We could then manipulate the turns in the intake port to get a better line of sight to the valve."

The block is available in iron or aluminum with +.400-inch cam location, or it can be ordered in billet with a 1.000-inch raised cam. Proline Racing has already tested engines making 2,500+ horsepower at 9,200 rpm with the new combination.

Dart also revised its small block Ford lineup for 2021, eliminating the Sportsman line and updating the Iron Eagle with six-bolt

cylinder-head mounting capability so it could support a SC1-style head. The oiling system was also revived. Finally, Dart changed the tooling so the lifter angles could be rolled to upwards of 47 degrees.

Small block Ford popularity is also driving sales at World Products in Louisville, Kentucky. Jack McInnis said success on the track is one motivating factor.

"We've been having a hard time keeping it on the shelf," he said, adding that all the blocks are cast and machined in the United States and come standard with ARP fasteners. "A few people have won with it in racing, and word has gotten around."

The small block Chevy remains the sales leader at World Products, though, especially since so many dirt tracks and sanctioning bodies require iron blocks.

"The small block Chevy platform has been the staple of hot rodding for a long time. People are familiar with them, and like everything else, they are cranking more and more horsepower out of them," said McInnis, noting that cylinder head development continues to drive block sales. "Plus, people

are figuring out how to make things work with power adders."

Then there's the most savage racing environment for a cylinder block—Top Fuel—where Energy Manufacturing of Fremont, Ohio, is making headway. Already offering billet aluminum blocks for the Chevy big block, LS, and Ford small block platforms, Energy is working with a leading Top Fuel team to produce a new block that can also be adapted to Top Alcohol. Energy has some traditional Hemi experience by producing cast iron Hemi and Wedge blocks for sister company Callies.

"The nitro block is still in testing, but we'll have it fully launched this year," said Heath Norton. "It's a complicated piece because it has to endure hell. We did some basic prototypes to try out new concepts. Some worked, some didn't, and we learned a lot from that."

Energy's goals were to add strength in areas that were traditionally weak and help reduce main bearing problems. As per the rules, designers couldn't play with certain dimensions or features, such as lifter-bore locations.

"You can get a lot more creative outside of



An iron block undergoes quality inspection at World Products. While the small block Chevy remains the most popular of World's offerings, Ford block sales have grown recently. "A few people have won with it, and word has gotten around," said World's Jack McInnis.

the Top Fuel world," said Norton. "We added rigidity to reduce movement in the main-bearing bore. It is what it is, and once you get it approved you don't change it."



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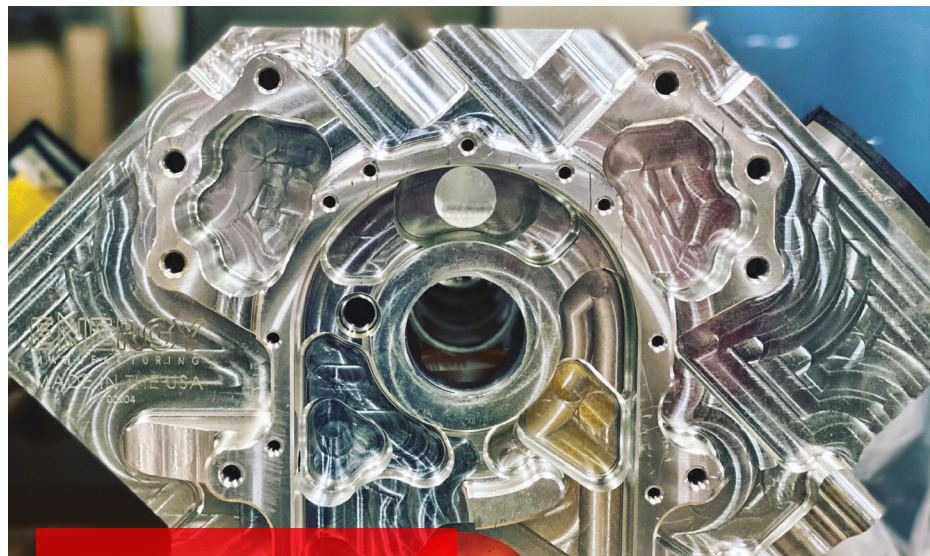


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Energy Manufacturing is working with a leading Top Fuel team to develop a billet block for Top Fuel and Funny Car engines. The block is "still in testing" but should be available later in the year, said a company source.

"As far as durability, Top Fuel is the most brutal environment you can put a block into," agreed Wilkinson, noting that AJPE has updated its Top Fuel offering, too. "We've made improvements over last year, going to a four-bolt main, which has improved crankshaft life."

Energy is also offering more options with

its billet line. The BBC block can be ordered with plus .400- or plus .600-inch raised camshaft location, and it's available with deck heights from 9.800- to 10.600-inch.

"The key thing is that we don't build to order," Norton explained. "We build to inventory, so we can pretty much deliver a block in 30 days."

For the small block Ford, deck heights of 9.750-, 10.000- and 10.200-inch are offered. It also comes with a GM bellhousing pattern for ease in hooking up popular transmissions.

"It has the stock bore spacing, so you can pretty much run it in X275 or Pro 275, Limited Drag Radial—it can be utilized in a lot of classes," Norton told us.

For the foreseeable future, continued power gains will require stronger blocks, and cylinder-head designers will likely seek out more help in aligning the valvetrain geometry to their specifications.

"Everything is growing in power," Fretz said. "What used to be a highly specialized small market is becoming a much larger market because technology, fuel systems, and tuning management is making it easier."

Daido Metal uses a proprietary multi-boring process to eliminate oil leaks at the main bearing. For race teams looking for "every ounce of power from an engine," stopping those leaks and reducing parasitic power loss "is a big deal," said Daido's Dusty Kull.

BEARING CAPABILITIES

Top Fuel and Funny Car teams can download a treasure trove of information from the data recorder on the car, but another useful indicator of the nitro engine's performance are the main and rod bearings, simply because they last only one run down the strip.

"The measuring tool of how that engine operates is how much compression that bearing measures after it comes out of the engine," explained Dan Begle of MAHLE Aftermarket, Farmington Hills, Michigan. "They see how much the upper bearing crushed, and that dictates how good that cylinder was or how bad that cylinder was."



Nitro racing, however, is in a universe of its own when selecting bearings. That's why MAHLE offers four lines of bearings with the H and V series serving as the most popular for most avenues of competitive racing.

"The V is a lead-indium overlay and is used strictly on high-end horsepower engines. The H bearing is a copper-tin-

lead overlay and is used on a variety of performance engines, high-end street cars and bracket motors," said Begle. "If you're looking to make a lot of horsepower, you need the V for the conformability of the bearing. The H is a harder bearing. It's going to have more service life. So it depends on what the customer is doing."



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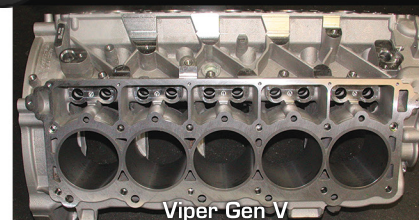
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Basically, the V bearing would be more beneficial on a high-maintenance engine where the pan is pulled often for inspection and the bearings are replaced as needed. The H bearing was designed for NASCAR, so endurance is a priority.

"The H bearing is harder and is going to get more service life, but it is not as forgiving if you have major crank flex like you would have in power-adder engines," added Begle.

Also helping the Top Fuel and Pro Mod teams with their bearing issues is Calico Technologies. The Denver, North Carolina-based firm developed a new CT-11 coating

just for big-horsepower engines.

"Twenty-five-hundred horsepower is probably as low an application that we would put them in," said David Adams.

Most engine builders are familiar with Calico's CT-1 dry lubricant film coating that is a popular option on main and connecting-rod bearings for suppliers such as ACL and MAHLE. But Top Fuel and alcohol teams approached Calico two years ago seeking additional protection. Engineers traveled with and tested the new formulation with teams.

"Everything is so sensitive in those engines. You wouldn't think so with 11,000 horsepower.

CT-11 a totally new formulation with some of the same elements as CT-1 but the binder is totally different," said Adams, noting that engineers continue to analyze feedback as more teams test the new compound. "Everyone who has used it has liked it."

Controlling lubrication at the bearing is something Farmington Hills, Michigan-based Daido Metal addresses with its performance bearing. "We use a process called multi-boring that eliminates a huge oil leak at the main bearing," explained Dusty Kull. "In certain applications, especially NASCAR, IndyCar, Formula One, where they're trying to

get every ounce of power and efficiency out of these engines as they can, being able to cut those oil leaks at the main bearings and reduce parasitic power loss is a big deal."

Traditional bearing geometry has a crush relief—basically extra machining near the parting line. When the oiling hole in the crankshaft passes by the relief, oil can spill out of the bearing. Deep boring profile at the parting line and a continuous surface assure the oil film is maintained in that area.

"Our design and manufacturing method eliminates the crush relief safely without the risk of parting line contact, and [it] also reduces the leak," said Kull. "We've had guys running dirt late models and sprint cars where they've been able to reduce oil viscosity just by reducing the leak at the main."

The technology is also being adapted to the connecting rod bearing for select engine builders who are "really concerned about oil consumption inside the engine." For that, Daido uses the lead-indium inlay material on the tri-metal configuration.

"A lot of guys recall the old Vandervell bearings, which are similar to lead-indium,"

Kull added. "It offers superior performance to lead-tin-copper in most cases through embeddability and conformability—which are very important for performance engines."

Reducing oil loss is also a priority at Grand Rapids, Michigan-based ACL. "Race teams are looking for every bit of horsepower they can get," said Dennis Fox, noting that an LS bearing set offers short groove in the lower main bearing as an alternative to 3/4-groove design. "The short groove will minimize oil usage/loss and save horsepower resulting from an upgraded oil pump."

Fox also told us that durability and precise specs across every set is now a common request from racers. The company recently worked with Pat Musi Racing of Mooresville, North Carolina, to come out with a narrowed version of the GM big block main set, and there's also a line of Calico Technologies-coated bearings available for domestic and import applications.

LINER/SLEEVE SOLUTIONS

Top Fuel and Funny Car teams go through numerous iron cylinder-block sleeves during

a season, but with the cutback in drag racing during the 2020 season due to COVID-19, business was a little slow in that segment for Darton Sleeves in Carlsbad, California. The company used the lull to bulk up on inventory and service its customers, as well as seek out new opportunities.

"We make a piece of pipe, and it is hard to romance a piece of pipe," quipped Dave Clinton. "We have engineered patented products over the years, which are very stable for us, like our MID (Modular Integrated Deck) kits and Seal Tight technology. The new products that we develop are the direct result of what goes on in the industry."

Servicing damaged GM LS and Ford Coyote engines in 2021 has spiked by some 200% over last year, according to Clinton. OEM blocks with spray-on coatings often cannot be repaired, so sleeves are the only solution.

"For a company like us that specializes in the performance industry, that is where we see the growth. Now, from the standpoint of new products, look at the pinnacle of our product category: Top Fuel and Funny Car,"

GEN III HEMI BLOCK SET TO 'CHANGE THE GAME'

Currently there are no Gen III Hemi engine block options in the aftermarket besides the Mopar Performance offering. But Dart Machinery of Warren, Michigan, has a fresh design with poured prototypes and a dedicated machining program underway. As of early spring, the company was just

waiting on additional castings to complete its validation program.

"This block will change the game," promised Mike Sanders. "We've added extra cooling capacity and changed the oiling system."

The new block will not allow MDS (cylinder deactivation) but will be available with or

without provisions for variable valve timing (VVT). It also comes with steel four-bolt mains in all five locations and will be available in either a 9.250- or 9.285-inch deck. Maximum bore will be 4.250-inch.

"Now you can build nearly a 500-cubic-inch Gen III Hemi," Sanders noted. —Mike Magda

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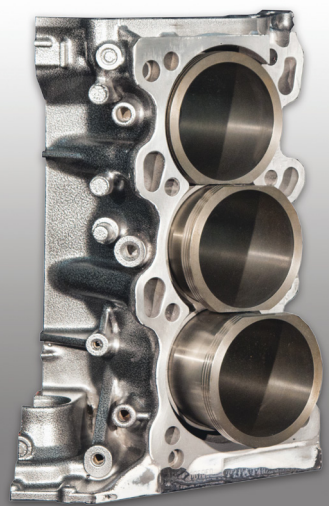
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said Clinton. "For us, they set the bar with the performance standards that we have to live up to. So the rest of our customers benefit from the improvements, strength, and the reliability that we build into the Top Fuel and Funny Car sleeves."

Steve Demirjian of Race Engine Development (RED) in Oceanside, California,



works closely with Darton to install the MID system on a variety of blocks, including first-time efforts in powersports.

"I just did a Polaris ATV and now I'm working on a three-cylinder Can-Am motorbike," said Demirjian. "There seems to be a lot of people interested in powersports."

Beyond designing the fixtures for these small engines, very little in the tooling or machining methods to facilitate MID installation has changed over the years.

"Most of the car blocks are mounted on a 2-inch bar on the machine. You cannot do that with anything smaller," said Demirjian. "The crankshaft bores are so small on these

During motorsports' COVID-related slowdown, L.A.Sleeve began experimenting with a new, ferrous-based cylinder-sleeve material that is "as strong as ductile iron but lighter," said Dave Metchkoff. The technology was initially developed for NASA and is now moving to the racing market.

engines, I had to make up smaller fixtures to get them on the machine table."

The unique MID conversion basically turns a dry liner engine into a wet liner, so there is considerable machining to open up the block and position the liners. The process also converts an open deck into a closed deck design. The limiting factor for eligible MID conversions is that the head studs must anchor in the lower part of the crankcase.

"That represents about 80% of the blocks manufactured today," said Clinton. "The MID kit makes the structure more stable and allows the engine to make more horsepower without distortion, and more importantly, without leakdown. A typical dry-sleeve block, even in the best of circumstances, has a leakdown of 6% or 7%. Most of our MID blocks are 1% or 2% or less, so it is a big factor for us."

The COVID slowdown helped L.A.Sleeve in Santa Fe Springs, California, work with a new material that shows promise. "It's a ferrous-based material that is as strong as a ductile iron, but is lighter," said Dave Metchkoff. "The material's surface, for lack of a better description, has more lubricity than

ductile iron. We're testing it now with some engine builders. It is a really cool material."

With the new material, the sleeves are not manufactured the same way. Metchkoff said it's extruded and was developed for NASA. Now the supplier is testing the automotive market.

"We're talking 14,000- to 20,000-rpm type of high-performance race motor," added Metchkoff. "It has been used in F1 motors. We have also produced some drag race sleeves for compact cars."

As with other aftermarket companies whose sales have increased over the past 12 months, L.A.Sleeve was challenged to produce product for unusual engines that were pulled out of the garage.

"We're talking motor builds that are just out of nowhere," said Metchkoff. "People are pulling projects out that they were waiting to get to for years. I am doing a motor for a compressor. It is a single-engine motor that uses a compressor and then a single-cylinder gas-burning motor. They work together. It is from 1895 and called an American Kellogg. It is just the craziest thing. Mercedes Gullwing: We have not done one

in 15 years. It's so interesting the amount of different projects we're seeing. So, it has been great because we are grateful for any business we can get, but it has been

incredibly stressful because we just have thousands of single, like one-off type of projects. So, it's high stress. It has been one heck of a year for us." **PRI**

SOURCES

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aclus.com

Advanced Sleeve
advancedsleeve.com

Alan Johnson Performance Engineering (AJPE)
ajpe.net

Brodix
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dartheads.com

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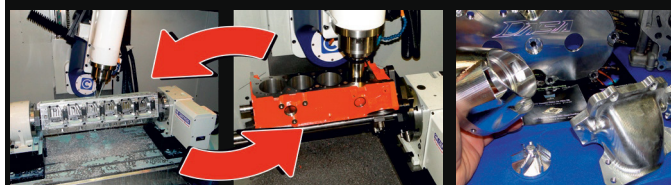
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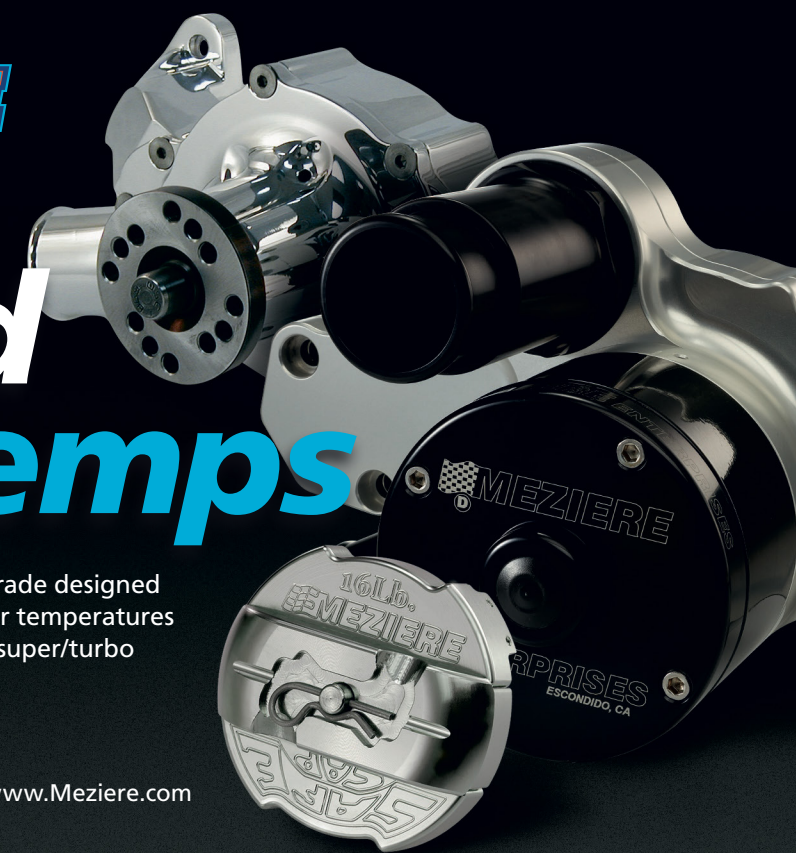
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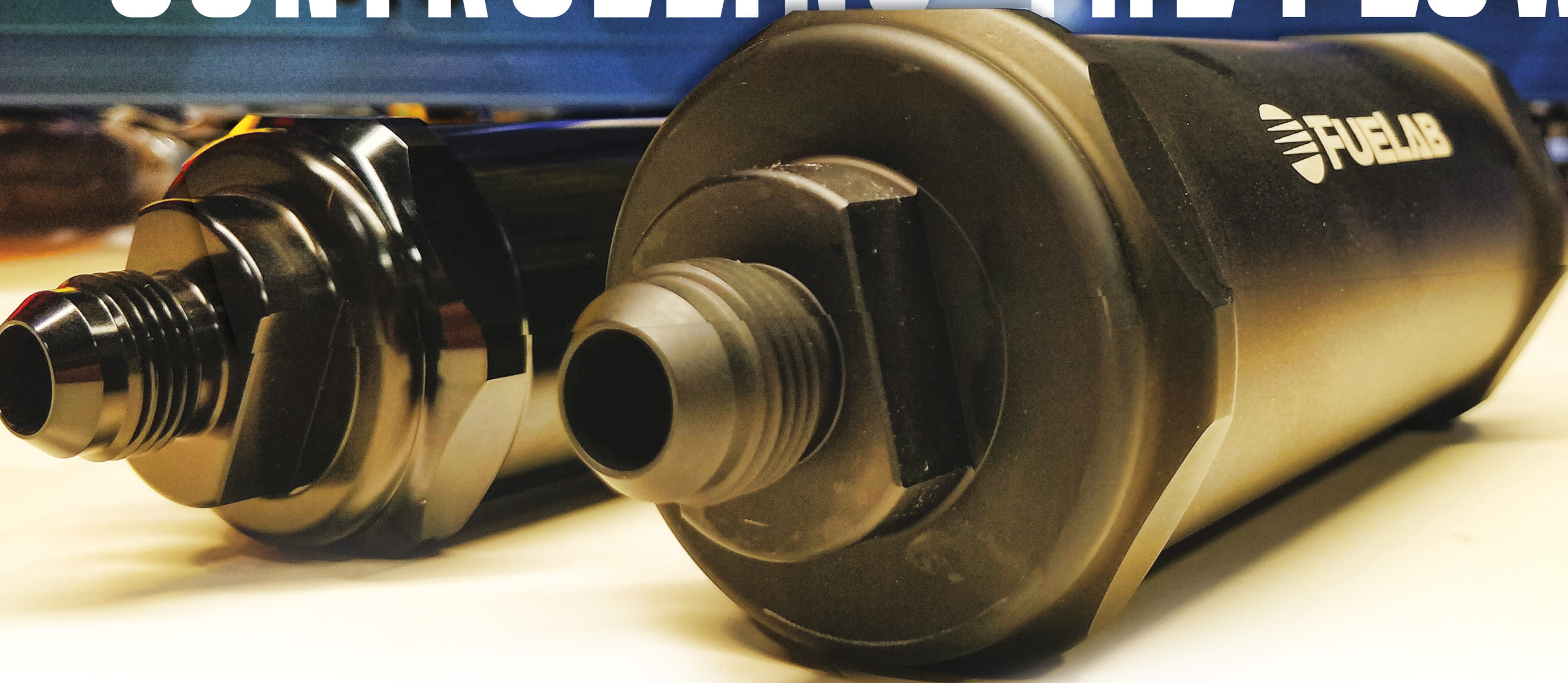
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Considering the different types of pumps, fuel choices, induction systems, car styles, and intended applications, parts selection can be complex. Fortunately, our experts are here to help clarify and simplify the process.

By David Bellm

Fuel pumps aren't supposed to be sexy. They're like a pair of work boots, or a trusty hammer, or a good helmet. They're there to do a job. If you notice them, there's probably something wrong.

But without fuel pumps nothing happens in a race car—instead of the sweet music of internal combustion, you're

left to absorb the deafening sound of silence.

What's more, the work of fuel pumps is actually more complicated than it might first appear, with a demanding array of criteria driving the choice of which one to use. And if you get it wrong, you could not only lose races but destroy expensive components in the process.

To learn more about these essential unsung heroes of the motorsports world, we talked to leading fuel system experts for their insights and recommendations on the subject. They took us through the different types of pumps, best applications, and the pros and cons associated with each one.



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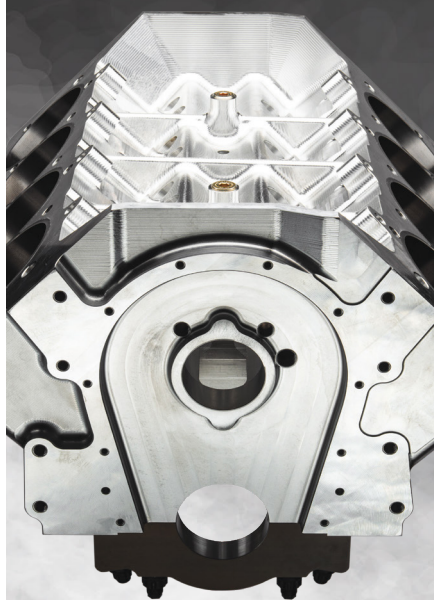
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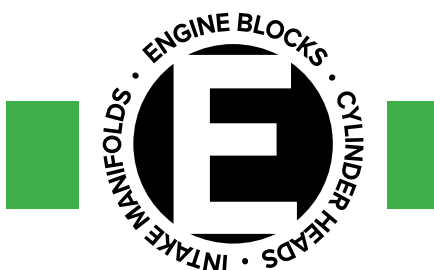
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FUEL PUMPS



The trend toward brushless electric fuel pumps arose out of the need for greater fuel flow from a smaller unit for high-horsepower engines. The speed of these pumps can be controlled to vary fuel flow to meet engine demands. Photo courtesy of Aeromotive.

the pump outside the tank removes many of the space considerations imposed by mounting a pump inside the tank or cell. Because there are fewer size restrictions, a wider array of flow ratings and pump configurations are available. In addition, racers can even run multiple pumps in series if necessary.

That said, inline pumps can take more work to install. They need to be mounted below the bottom of the tank, and no further than two feet away from it so they can draw sufficient fuel into the pump. This can pose challenges in some cars, which can lead to compromised installations that reduce the fuel system's effectiveness.

In-tank pumps are mounted inside the fuel tank or fuel cell. This configuration offers several significant benefits. "The advantages of an in-tank mounting system are one, you exclude the pump from environmental heat," said Brett Clow of Aeromotive, Lenexa, Kansas. "That way it isn't a target from external sources like exhaust or the pavement. And two, in-tank installations are cleaner and easier, because when you install the tank, you've installed the pump and pre-filter and everything. You don't have to worry about how you're going to get the pump low and close to the outlet of the tank and clear the wheelie bar or the suspension or whatever else may be going on in the back of the car."

Another advantage of in-tank units is that the pump is submerged in fuel, which keeps the pump motor cooler. This can allow the pump to run more efficiently and extend its life. In-tank installations also tend to run quieter, which can be particularly important for dual-purpose race cars that do significant amounts of street driving.

One of the few downsides to in-tank fuel pumps is that they can be more challenging to install on OEM fuel tanks or on fuel cells that weren't designed for the particular pump being fitted. In these cases, some fabrication and adaptation may be necessary.

Although the terms "in-tank" and "inline" seem straightforward enough, Clow noted a recently introduced wrinkle that could prove confusing. "The term 'inline' is kind of a misnomer," he said. "It's generally considered to mean the pump is outside the

tank. But from our perspective at Aeromotive, we use the term 'inline' very specifically to define a pump in which the electric motor is in the fuel flow path. It runs wet.

"It's a distinction with a difference in it," added Clow. "When the motor is in the fuel flow, it can run continuously and not have the motor overheat. It's cooled and lubricated by the fuel flowing through it."

This brings up the subject of efficiency, a crucial concern for any fuel pump. The quest for greater flow in a smaller unit has led to the emerging trend of brushless electric motors for fuel pumps. "With a DC brushless motor, you typically get greater power for the given size of the package," explained Rob Scharfenberg of Fuelab, Collinsville, Illinois. "It also gives you the ability to control the speed of the pump, so you don't have to have it going full-out all the time. You can actually control it by your ECU. So, for example, we could have an electronic regulator that's capable of controlling the fuel pump's speed based on the sensed demand within the system. So if you have a really high-horsepower application, you don't have to pull so much fuel pressure. You could make it more streetable."

That said, not all manufacturers are on board the brushless bandwagon. "We don't follow the buzzwords," said Jim Craig of Weldon Pump, Oakwood Village, Ohio. "A growing faction out there are using brushless fuel pumps. But we don't offer a brushless pump. Our pumps are the most efficient fuel pumps on the market. We draw the lowest amount of amperage but provide the most amount of fuel flow. Some of these brushless pumps are putting 18–20 volts to them to get them to spin enough just to keep up with one of our midrange fuel pumps."

"And you can only reduce the fuel flow out of a pump so much until you get to where you can't maintain fuel pressure," added Craig. "A lot of brushless guys are saying, 'Well, my ECU can ramp it in and start from nothing.' But you still get to a point where you can't maintain pressure. So it's only reducing volume so much."

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FUEL PUMPS



An electronic fuel pressure regulator is used to control the speed of a brushless electric fuel pump based on the demand that the system senses.

considered mechanical pumps. At the lower end of the mechanical pump range are legacy OEM-style pumps. These are generally diaphragm-style pumps mounted to the engine block in the factory location, fueling carbureted engines. Although most forms of motorsports have abandoned OEM-style mechanical pumps, they're still required by many stock-car sanctioning bodies and in some stock classes of drag racing. For most street-stock dirt-track racers, these pumps are the only approved choice.

The fundamental advantage of OEM-style mechanical pumps is their simple, proven design. No external fuel regulator is required, there's no additional work to mount them, and the technology itself is durable and reliable. As the mandatory choice in several extremely popular types of racing, these pumps still see widespread use. And so, despite their limited flow capability and complete unsuitability for EFI applications, many suppliers still offer a full product line to serve racers that are required to run them on their engines.

Also commonly used in motorsports are direct-drive external mechanical pumps. These can be driven by a dedicated belt-and-pulley system, mounted to the back of an external oil pump, or run directly by the camshaft through a timing cover adapter. Direct-drive pumps are typically found on dirt-track sprint cars, late models,

and modifieds, as well as engines using mechanical fuel injection.

But perhaps the most dramatic application of this technology is in moving torrential amounts of fuel through high-horsepower, boosted drag cars. "The escalation of power was just outpacing the development cycle on electric fuel pumps," explained Clow. "How do we make more power with a given engine? We just throw more boost at it. We get bigger turbos, bigger blowers, the boost goes to 25, 35, 45 psi, and your total fuel pressure numbers are exceeding 100 psi. And it's really in that area where a mechanical pump's advantage is going to start to reveal itself.

"All fuel pumps have an efficiency factor," Clow added. "They all have internal leakage as pressures go up. As the pressure increases, that leakage increases incrementally with it. It's not a tremendous amount of fuel. But when you look at the flow curve on an electric pump, you see a more dramatic decline from low pressure to high pressure. What's going on there is you're seeing the electric motor with a fixed amount of torque slow down as the pressure increases. So you'd have both the flow losses across the pumping mechanism and the reduction in pump rpm. That's going to result in reducing the flow available as pressures go up. But if you put a mechanical pump on the engine,

that pump isn't going to slow down."

Despite their efficiency and high flow, direct-drive pumps have a disadvantage in that they can't be used with a fuel cell mounted in the back of the car, unless a cumbersome cable drive is used to run a mechanical pump in the back. If a front-mounted mechanical pump is used with a rear-mounted fuel cell, vacuum will go so high at the inlet of the pump that cavitation can occur. This high vacuum flashes the liquid fuel to vapor at the inlet of the pump. The resulting interruption in fuel flow could put an end to a pass and possibly damage the pump at the same time.

Even with this limitation, direct-drive mechanical pumps have found a solid niche in motorsports. But, like so much else in racing, that position is in a state of flux, as continuing development of electric pumps moves the point at which a mechanical pump's advantages outweigh the disadvantages. "We've been progressively increasing the capabilities of electric fuel pumps with our brushless gear pumps," said Clow. "These pumps have come along to facilitate supporting these higher horsepower combinations on exotic fuels, without having to relocate the fuel cell to the front or put a big cable drive system in for a mechanical pump.

"But regardless of how much electric pumps evolve, there will always be a place for mechanical pumps," admitted Clow.



Fuel pumps can be mounted either inside or outside the fuel tank. Each configuration has its advantages and disadvantages. An externally mounted pump, like the 5-GPM Aeromotive Signature brushless electric pump shown here, doesn't have the space restrictions that an in-tank pump would have. But it has to be mounted close to and below the fuel tank.

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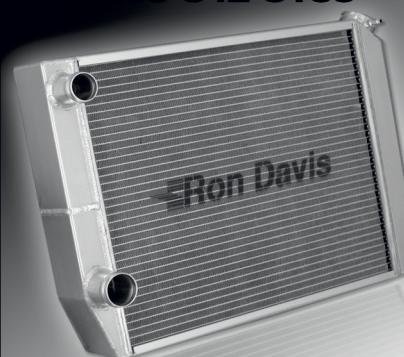
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CHOOSING THE RIGHT PUMP

When looking at the choices of fuel pumps, one thing quickly becomes very clear: It's complicated. If you take into consideration the types of pumps, fuel choices, induction systems, car types, and the intended usage of the vehicle, there are many ways to get it wrong. And the results can be catastrophic. Besides losing races, improper fuel delivery can instantly ruin

components or even grenade entire engines.

And unfortunately, the choices aren't getting any simpler. With forced induction and EFI adding greater complexity, the stakes have gotten mighty high with regard to fuel delivery. "There's a lot greater complexity that's occurring today," observed Scharfenberg. "So the challenge is navigating through a lot of that. The one thing that I think a lot of people need not be

FUEL CELL CONSIDERATIONS

Fuel pumps are a central element of a cohesive, effective fuel system. But without the right components to complement them, they can't perform the way they were intended.

Foremost among those components that must be carefully considered in a fuel system is the fuel cell. Designed to optimize fuel flow and reduce hazards in crashes, fuel cells are a vital part of a racing fuel system and are therefore required by sanctioning bodies for most types of competition.

There are three primary elements to a fuel cell: enclosure, bladder, and foam baffling. Enclosures are typically made of plastic, steel, or aluminum. This material serves as an outer shell to resist punctures in the event of a crash. For greater protection, many fuel cells have rubber bladders inside the enclosure. These soft inner containers are designed to absorb impacts without puncturing, by stretching and conforming to sharp edges during a crash.

Not all fuel cells have rubber bladders—they aren't required for some types of racing.

But whether or not they have a bladder, fuel cells today are all generally filled with safety foam, designed to prevent fuel from exploding if it ignites. At the same time, the foam also limits fuel sloshing to ensure more consistent fuel delivery.

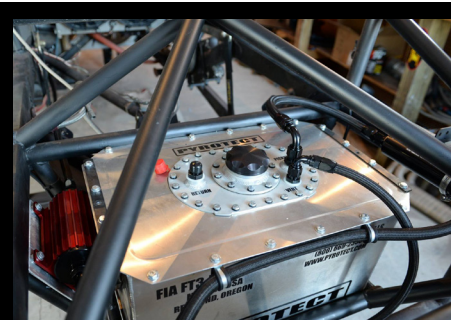
Ultimately, fuel cell choices are largely dictated by the sanctioning bodies. Therefore, the rulebook is the first place to start when considering a fuel cell. That said, many manufacturers feel there is still considerable room for improvement over

what's specified.

"Some rulebooks are extremely lax on fuel cell requirements," said Dave Dack of Aero Tec Laboratories (ATL), Ramsey, New Jersey. "We always encourage racers to make sure the cell is equipped with check valves for both the fill and the vent, and most importantly that they choose a cell with an approval from a reputable, world-renowned organization like the FIA."

Other manufacturers point to the importance of the mounting position and the risks a vehicle is exposed to when choosing a fuel cell, regardless of what's required by the sanctioning body. "A good rule of thumb is that if the fuel cell is in a high-risk area, such as behind the rear axle, or in the side pod of the vehicle, you really need to have a certified rubberized bladder type cell," noted Steve Russell of Pyrotec, Redmond, Oregon. "There are also circumstances, like in high-powered off-road race trucks, that carry anywhere from 80 to 120 gallons of fuel. For those we typically build in the next higher standard, even though it's not required, just because of the sheer speed and impacts they can take."

Beyond safety concerns, practical considerations like line size and mounting points are crucial in choosing a fuel cell. Given the complexity and nuances of fuel systems in general, this unfortunately leaves plenty of room for mistakes. "I see this all the time where guys will have a 3/8-inch or 1/2-inch standpipe for a pump that needs a 5/8-inch or a 3/4-inch pickup tube," observed Brett Clow of Aeromotive,



Not all sanctioning bodies have stringent fuel cell requirements, one of our sources said, making it important to choose a fuel cell approved by a reputable organization, such as the FIA. Note the FIA certification on this Pyrotec fuel cell. Photo courtesy of Pyrotec Safety Products.

Lenexa, Kansas. "And the pump is going to suffer for that because it's going to be starving for fuel, producing a lot of vacuum, and cavitating. And it can boil fuel, because of the restriction created by the suction side of the pump."

To simplify the choices, there's a growing trend in offering preconfigured pump and cell assemblies, which come already set up with the correct enclosure, pump, fittings, lines, and filter. Although the cost may appear to be higher than it would be when sourcing individual components, it can be nearly the same when everything is factored in.

"If you look at one of our fuel cells with a pump in the cell, on the face of it, it may seem kind of pricey," said Clow. "But take and buy a fuel cell, some lines, hose ends, and a 100-micron filter, then compare it to the price of one of our cells with the pump already in it. There's really not much difference." —David Bellm

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shy about is understanding that they need to learn something new. Unfortunately, I think there are a lot of guys out there that are going, 'Ahh, I already know it. So I'm just going to forge ahead.' And I think that that's sometimes where they get into trouble."

According to Matt Henson of DeatschWerks in Oklahoma City, Oklahoma, that kind of attitude often leads to common mistakes. "First off, many people don't realize how fuel system pressure affects fuel pump flow—flow decreases as fuel pressure increases. People don't understand that even though a pump is rated for 1000 hp, it may not support 1000 hp for them, because their particular system might be running different fuel pressures. Second, they don't see how OEM fuel system designs affect fuel pump output. Modern OEM fuel systems use fuel flow from the pump for slosh control and fuel tank delivery issues. This robs fuel flow from the pump, lowering the amount of power it can support. Some guys will also undersize lines on the inlet side and they'll kill the fuel pump. Or they'll use excessive filtration or too tight of filtration on the inlet side, and they'll kill a fuel pump, because you're going straight to cavitation. So you have to size the lines, the filters,

and the pump so that everything works in conjunction with the motor horsepower."

Many racers try to give themselves some margin for error by intentionally choosing a pump that's larger than they need. But this too has significant complications. "Let's say, for instance, you put a fuel pump in your car that's moving 200 gallons an hour, but your motor is only making 1,000 horsepower," said Craig. "That means you're constantly returning to the tank half of what that pump is putting out. That will start to heat the fuel. You'll end up elevating the fuel temperature and turning fuel to vapor, which results in cavitation, erratic fuel pressure, and erratic performance."

Manufacturers have plenty of information available online to help racers choose the correct pump for their specific application. But this can quickly become overwhelming, as racers grapple with factors like fuel weight, brake specific fuel consumption, and the relationship between flow and pressure. Fortunately, some manufacturers also provide far easier methods of choosing a fuel pump. A number of suppliers, including Aeromotive and DeatschWerks, have online search systems on their websites

that guide customers to the correct pump choices, just by answering a few simple questions.

And all suppliers we spoke with agreed on one point: It's always best to call the manufacturer's tech line if you're not sure of something. "Most guys will look online, because there's a lot of information out there," said Craig. "But 90% of them will end up just calling me. And then I walk them through it. I'm an educator of fuel systems." **PRI**

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STILL SPIKING

Motorsports parts sales have surged since the pandemic shutdowns. How long can it go on?

By Steve Statham



By now, it's a familiar story for just about every company that services the motorsports industry—the expectations of a severe economic slowdown following last spring's pandemic lockdowns quickly gave way to the reality of massive demand for parts, resulting in eye-popping sales spikes.

And that demand is still in high gear, with companies from coast-to-coast scrambling to keep up.

"Talking to the customers, the warehouses, the retailers that are out there, everything that Dart can supply them, it doesn't matter if it's a block, a set of heads, an intake manifold, or even small parts for our components, it doesn't even land on their shelf," said Steve Arent of Dart Machinery, Warren, Michigan. "It comes in their receiving door, and out their shipping door within a day or two. I don't know if that's a good thing because the orders that we have, it's the biggest in the company history, as far as the open orders. And they're not stopping. We're constantly playing catch-up to fulfill these orders and the due dates that we're given."

In retrospect, the reasons behind the surge aren't difficult to figure out. During the initial lockdowns people were stuck at home, often isolated, and looking for things they could do. "One thing we have to realize is we're in the entertainment industry. I don't think people quite get that," said Alan Davis of Eagle Specialty Products, Southaven, Mississippi. "People spend disposable income on what we all have to offer. And when they all of a sudden couldn't go out to eat as much, and they couldn't go to ballgames, and they couldn't go to movies and they couldn't travel, they all looked at that project car and said, 'Hey, I'm going to work on that. I've got time, I've got disposable income, money.' I think that's what drove a lot of the spike this summer. A lot of people say, 'Eh, it's just the extra stimulus money.' But you know, it's not that much in the scheme of building a car."

"We saw a lot of, obviously, web traffic that

definitely spiked up by June," said Dave Davis of Anderson Composites, a manufacturer of carbon fiber and fiberglass body parts for late-model performance cars, headquartered in City of Industry, California. "What I tended to notice was that, even if somebody was working or not working, they seemed to have more idle time. They basically were on their phone looking at our products on our website. My goal was to let everybody know that, one, we were still in business, and two, somebody was going to answer the phone."

William Goldman, a veteran Hollywood screenwriter, once said of the movie business, "Nobody knows anything." That could be said of the past year, too, as enterprises of all types struggled to navigate the pandemic. "The crazy thing is, everybody, from what we thought, to what experts thought, to what the industry leaders were telling us, to what our governments were telling us, state, local, and federal—everybody got it wrong," said Eagle's Alan Davis. "Everybody didn't just miss the bullseye, they missed the whole target. Everybody thought everything was going to die, we're going to be in for a recession, blah blah blah. The result of the lockdowns and the pandemic, how we dealt with it, how we're getting out of it—it's all just been wrong. We wake up every day and wonder, 'How in the world did that happen?' Nobody saw any of this coming."

FROM EVERY DIRECTION

As the pandemic spawned shutdowns and economic chokepoints around the country, followed by blistering demand for products, each company had to deal with different problem areas. For some, the big issue was raw material shortages; for others it was shipping delays, or labor shortages, or teams spread far and wide working remotely, or social distancing and sanitation standards. For some companies, it was all of the above.

"IT COMES IN THEIR RECEIVING DOOR, AND OUT THEIR SHIPPING DOOR WITHIN A DAY OR TWO."



In the early stages of last year's lockdowns, much of the country was stuck at home, often isolated, with little to do. "What I tended to notice was that, even if somebody was working or not working, they seemed to have more idle time," said our source at Anderson Composites. "They basically were on their phone looking at our products on our website."

"We never actually laid anybody off back in the spring. My boss is the type where he's really loyal to his employees," said Alan Davis. But some employees quit, and the company struggled to secure replacements. "It was a relentless turnover. It really put us behind. That coupled with the annual Christmas rush, we always have trouble getting parts—forgings, semi-machined parts—from overseas during the Christmas rush, because Walmart and everybody else gets bombarded with their

stock. So things slow down a little bit. And then come February the Chinese New Year hits and the entire country of China shuts down for a month. And all those things—increased orders, sales being what they are, having trouble getting employees to stay, and then increased shipping problems—really put us in the hole by January or February."

The frustrations of hiring and retaining employees led Eagle Specialty Products to some unconventional measures, with surprising results. For online job applications, they included a new question—an almost tongue-in-cheek one, but not entirely. "Are you really interested in getting a job, or are you just wanting an interview to satisfy your unemployment benefits requirements?"

"But the response was not something we expected at all," Alan Davis noted. "The number of people that actually admitted they only wanted an interview so they could keep their unemployment benefits was 80%. People actually said that."

Business restrictions also varied wildly from state to state. Many California-based businesses, such as Anderson Composites, are just now approaching normalcy. "Our team finally came back to the office as a group just this week (mid-April). It all comes down to the availability of a vaccine," said Dave Davis. "We're still pseudo-remote, and we're still working as best we can as far as getting our supplies online, and our parts basically in-house. But they're already pre-sold for all the popular items."

"The rough winter season back East didn't help us out much either. We had notifications and a lot of calls from dealers as far as time delays," Davis continued. "Again, it was logistics for everybody as far as getting things from our warehouse to our dealers and drop-shipped to our consumers. We're catching up with that, and now we're catching up since the port of LA is back open supposedly at full steam again. You could see all the ships lined up outside last month."



Companies like Eagle Specialty Products used the surge in demand as an opportunity to familiarize and educate customers on some lesser-known parts and lines. "It's been a weird way to introduce new products," said our source, "but it's worked."

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They're finally all getting back in line again."

For Dart Machinery, labor difficulties combined with multiple state shutdowns, plus attaining the necessary small parts from the company's suppliers, were the biggest hurdles. "Here in Detroit, with the Big 3, you would think that our employee pool would be bigger than most, but everybody, all manufacturing here in Detroit since January 1 of this year, has turned back on, and they're

Due to restrictions imposed by state and local authorities, some businesses are just now being allowed to bring employees back to their facilities. "We're still pseudo-remote," reported our source from Southern California-based Anderson Composites, "and we're still working as best we can as far as getting our supplies online, and our parts basically in-house."

gobbling up employees left and right," Dart's Arent said. "Any time that we're shut down for a day, it's four days for us to make up. This time we were shut down for a week and a half, and it just puts us further and further behind."

ADAPTING ON THE FLY

Companies have been forced to improvise to meet the surge in demand. "About three or four years ago we introduced a line of connecting rods and crankshafts that was sort of in between our entry level and our high end. As far as strength and everything it was in between, the price was in between, and we really thought there would be a market for that," said Eagle's Alan Davis. "And they've never really sold well. I think a lot of that is just because people are used to ordering what they're used to ordering. So when everything started getting scarce on the shelves, we started swapping those parts."

The past year has proven to be an excellent opportunity to educate customers

on this newer line of parts. "People are going for it simply because they want whatever they can get right now. But it's been a way to put some of this new product in people's hands," Davis continued. "Now, we're starting to see warehouses putting this stuff on the shelf, because the customers got it, because they had to get something, and they're saying, 'Hey, this is not too bad, and I can call and order that again.' So it's been a weird way to introduce new products, but it's worked."

For Dart Machinery, partial assembly ahead of time was better than waiting until every part was in hand. "In March we had 120 big blocks that we made up to a certain point. We were waiting for main caps to come in. As soon as the main caps came in we hammered the rest of them out, machined the caps, the cam tunnel, honed them all up and shipped them out the door. So we're still making parts, but unfortunately we're waiting for weirdo components—to main caps, main bolts, cam bearings—to

complete the machining process."

All of these factors make planning for the next six to 12 months difficult, to say the least. "It's tough," said Eagle's Alan Davis. "There's a side of you that says, 'This is a bubble. This is going to slow down.' And so you're real hesitant to just throw everything in to ramping up production and going crazy. There's a side of you that says, 'We don't want to get in over our head because when this slows down the brakes are going to hit pretty hard.' But then again, we kind of thought that in December, and it hasn't slowed down. So you are just riding this wave wondering how long it really is going to last. Because it does not show any signs of slowing down at all."

"We have far less inventory on the shelf than we ever have," he continued. "So we'd like to get that back up to a normal level anyway. So even if it hits the brakes we'll probably stay in production for several months just to get our inventory back to where we'd like it to be."

"We keep thinking that it's going to slow down," said Dart's Arent. "We figured after last summer it would slow down a little bit, but it hasn't. The first quarter of this year, not only Dart, but all of Race Winning Brands' other companies are banner years so far. Our crystal ball is a little foggy when it comes to the future."

Add reliable crystal balls to the ever-growing list of parts in short supply. **PRI**

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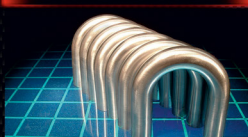
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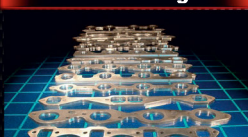
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INDUSTRY NEWS

DARRICK DONG, 69, MOTORSPORTS DIRECTOR WITH PFC BRAKES

Darrick Dong, the longtime director of motorsports at PFC Brakes, has died at 69. Dong was a cornerstone at PFC for some 25 years, where his knowledge and experience made him one of the industry's most insightful, accessible, and trusted authorities on motorsports and braking technology.

"Darrick ate, slept, and breathed racing, and would do absolutely anything he could to help a customer in need. He had an addiction to helping racers be successful; he truly fed off it," said Chris Dilbeck, who was recently named PFC Brakes' new director of motorsports. "Darrick was a true racer, [and] his passion for motorsports cannot be rivaled by many."



Darrick Dong

A highly respected figure in the industry, Dong was known for sharing quotes and bits of knowledge. One classic example was to ask, "What stops the car?" While responses were usually "the brakes," Dong would explain the correct answer was actually the tire. "He would then elaborate on all of the different details about the stopping event. That's one of the things that made Darrick different from most," Dilbeck said. "He wanted to help the customer regardless of if their problem was brake-related or not."

Dong first joined Clover, South Carolina-based PFC as a motorsports sales team member before he was promoted to director of the motorsports division. He helped oversee several significant developments at the brakes and accessories parts manufacturer throughout his decades-long career there, including IndyCar's move to PFC hardware in 2017 (followed by the full package in 2018) as well as PFC's release in 2010 of the ZR43 Zero Drag caliper, which won the Most Innovative New Motorsport Product of the Year Award at the following year's RACE TECH World Motorsport Symposium. Prior to his time at PFC, Dong worked for a number of years at Tilton Engineering as a sales engineer.

HOLLEY ACQUISITION EXPECTED TO BOOST AEM EV CONVERSION DEVELOPMENT

Holley, the Bowling Green, Kentucky-based performance automotive enthusiast platform, has announced the acquisition of AEM Performance Electronics, the developer and supplier of electronic control and monitoring systems.

"We are very excited to have the vast resources that an industry-leading company like Holley provides to help us accelerate the development of our products, particularly in the EV conversion space," AEM Division President Greg Neuwirth said. "Additionally, AEM and Holley each possess unique skillsets, which will undoubtedly complement each other's development."

The move aligns with AEM's recent launch of EV conversion products, or electronic control systems that support the conversion of vehicles originally equipped with internal combustion engines to electric power. There will be no changes in leadership or operations at AEM, company officials added, calling it "business as usual" for the Hawthorne, California-based supplier.

NHRA CREATES EV CLASS FOR SUMMIT RACING SERIES IN '22

The National Hot Rod Association (NHRA) has announced the creation of an all-new electric vehicle (EV) racing class that will join the NHRA Summit Racing Series in 2022. Electric cars will compete within the Summit Racing Series in all seven NHRA Divisions.

According to NHRA, creating an EV class within the NHRA Summit Series accelerates the sanctioning body's commitment to its racers and partners looking to develop new technology. The initiative was established as a way to bring automakers, racers, the safety industry, and the performance aftermarket together, officials noted.

Multiple meetings between the NHRA and global OEMs over the past four years have addressed the technical challenges and opportunities that come with EV drag racing. During that time, NHRA has facilitated the debut of the Chevrolet eCOPO, a match-race between a supercharged Ford Cobra Jet Mustang and the all-electric Cobra Jet 1400,

and a 200-mph EV-record breaking pass by an all-electric dragster.

Rules for the all-new Summit Series EV class will be released at a later date, officials added.

3RD DIMENSION ACQUIRED BY ADDMAN ENGINEERING GROUP

Addman Engineering Group, an additive manufacturing solution provider, has announced the acquisition of 3rd Dimension Industrial 3D Printing based in Westfield, Indiana. 3rd Dimension is a provider of metal additive manufacturing and CNC-engineered solutions.

Addman offers a range of metal printing capabilities as well as traditional subtractive processes. The purchase marks its second additive manufacturing location in the US, with its headquarters and innovation center based in Bonita Springs, Florida.

Located outside of Indianapolis, 3rd Dimension was founded in 2013 by Bob Markley and creates parts for high-profile racing, aerospace, and consumer goods industries. Its facility is ISO9001, AS9100, and ITAR-certified and works with several types of materials, including nickel-based alloys, aluminum, high-strength steels, and other materials currently in development.

FRANK AIRHEART, 90, INDUSTRY INNOVATOR

Franklin B. Airheart, a prolific innovator in automotive and motorsports technology, has died, according to his family. He was 90.

Airheart was a key member of the Airheart Brake team, formerly known as Hurst/Airheart, and is perhaps best known for his innovations related to the disc brake. He is credited with the design of the first hydraulic disc brake caliper, patent number 4535873, dated August 20, 1985. According to patent documents, the invention came out of the need for improvement and more compact assemblies without sacrificing performance.

Additional patents by Airheart cover different stages of disc brakes and include brake assembly with dual compensation adjustment (patented in 1979, number 4180146); parking brake assembly (patented

in 1979, number 4159754); a multi-piece braking disc assembly (patented in 1978, number 4120386); and a split brake disc (patented in 1977, number 4004661).

"His first design was the 'actuator' for Halibrand calipers for Indy car roadsters," said Bob Airheart, Frank's brother. "And I believe Don Prudhomme was the first driver to use Frank's design of brakes for Top Fuel dragsters."

JOHN THOMAS NAMED PRESIDENT, CEO OF TOYO TIRES

Toyo Tire U.S.A. Corp. based in Cypress, California, has announced John Thomas as its next president and chief executive officer (CEO). Thomas most recently served as president and CEO of Webasto Charging Systems in Monrovia, California.

Thomas will report to Tatsuo Mitsuhashi, chairman of the board of Toyo Tire U.S.A. Corp. based out of the company's global headquarters in Japan. All departments at Toyo Tires will report directly to Thomas.

Thomas succeeds Roy Bromfield, who will retire in July after nearly 37 years in the tire industry. Bromfield will serve as an advisor through at least 2021.



John Thomas

PFC BRAKES APPOINTS NEW DIRECTOR OF MOTORSPORTS

PFC Brakes, the manufacturer of brakes and components based in Clover, South Carolina, has appointed Chris Dilbeck as director of motorsports.

Dilbeck will manage the company's race department and help strategically grow the brand and market share across new sports car, open wheel, and other professional motorsports series. He will still be responsible for the management of its current NASCAR and increasing circle track client base.

Dilbeck first joined PFC in 2012 as a short track technical sales representative. He succeeds longtime PFC Director of Motorsports Darrick Dong, who recently passed away.

DAYTONA NAMES NEW TRACK PRESIDENT

Daytona International Speedway (DIS) has appointed industry veteran Frank Kelleher as president of the historic racing facility. In related news, NASCAR recently announced that Chip Wile, the former president of DIS, has been promoted to a new expansive role overseeing 13 NASCAR-owned tracks as senior vice president and chief track properties officer.

CHAMPION OIL ADDS SCOTT BAUBIE

Champion Brands—the blender and packager of automotive, racing, and heavy-duty lubricants, chemicals, additives, and motor oils—has appointed Scott Baubie to its sales, business development, and marketing team.

In his new role, Baubie will contribute to sales strategies and business development initiatives, and design and implement new market penetrations within racing, fleet, and private label markets. He also will focus on delivering an effective internal and external communication strategy.

Baubie brings more than 20 years of lubricant experience within the commercial, industrial, automotive, heavy-duty, and racing sectors, in addition to business development and strategic sales/marketing.

PROTORQUE ADDS TOM KUNDRIK

The Boninfante Group has hired Tom Kundrik as ProTorque's director of motorsports and sales.

"Tommy is joining us to handle what we believe will be an overwhelming response to the new, patent-pending technology [a new stator inside a torque converter]," ProTorque President Joe Rivera said.

In February 2020, Rivera and ProTorque had announced an agreement with the Boninfante Group and moved to its facility in Philadelphia, Pennsylvania.

In addition to providing technical support, Kundrik will also travel the country to attend drag racing events and provide on-site service and support for customers. He will also facilitate the launch of several new product lines, including supercharger-

specific torque converters for ProTorque.

Previously, Kundrik was the motorsports manager for Mickey Thompson Performance Wheels & Tires.

LSI ADDS THOMAS ROBINSON AS MANAGER

LSI Chemical—the manufacturer of high-performance oil and fuel additives—has announced Thomas Robinson as its new business development and marketing manager. LSI created the position in response to the rapid growth of new international distributors authorized to sell LSI Chemical branded additives and the Hot Shot's Secret product line.

Robinson will be responsible for the coordination of all LSI Chemical sales activity, partner and customer support, and international marketing initiatives. He also will manage a trade show and conference event schedule. As the first point of contact for both prospects and existing customers, Robinson will help develop new business and support existing distributors. He reports to LSI Chemical President Todd Cawley.

DYNABRADE PROMOTES CFO TO PRESIDENT

Dynabrade has announced the appointment of Michael Buffamonti as the company's new president. He replaces Hardy Hamann, who retired earlier this year.

Buffamonti most recently held the role of chief financial officer and has been a member of the executive management team for several years. Before joining Dynabrade 25 years ago, he held various management positions at Deloitte LLP.

For up-to-the-minute racing industry news, scan the QR code below or visit primag.com/industrynews.



ADVOCACY CORNER

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

Edited by Laura Pitts

PRI's dedicated advocacy team based in Washington, DC, works nonstop to protect motorsports. We are currently tracking several initiatives on the federal and state levels, including an update on the critically important RPM Act, action needed to help restore the Bonneville Salt Flats, relief for race track operators, best practices for tracks to host fans, and new legislation on tax credits for California manufacturers.

PRESSING CONGRESS TO PASS THE RPM ACT

Congress has seen an outpouring of support for the "Recognizing the Protection of Motorsports Act" (RPM Act) in 2021. The racing community and the motorsports parts industry have blanketed Congressional offices with nearly 1.1 million letters supporting the bipartisan measure to protect Americans' right to convert street vehicles into dedicated race cars. It also enshrines into law that it is legal for motorsports-parts businesses to sell products that enable racers to compete.

PRI thanks everyone who has taken the time to submit a letter to their lawmakers, as members of Congress must be reminded that they need to act in order to protect racing from EPA overreach. The work isn't over, however, as PRI is currently collaborating with the RPM Act's strongest supporters in Congress to officially reintroduce the bill in a way that maximizes its chances of becoming law. PRI is also working with congressional offices that support the RPM Act to find other pathways to enact it.

Recently, six US senators requested that the US Senate Environment and Public Works Committee include the RPM Act in the upcoming highway bill, which must become law before the current authorization expires on September 30.

Passing the RPM Act is PRI's top federal legislative priority. It would reverse the EPA's interpretation that the Clean Air Act

(CAA) does not allow a street vehicle to be converted into a dedicated race car, an American tradition that was unquestioned for nearly 50 years. In 2015, the EPA took the position that converted vehicles must remain emissions-compliant, even though they are no longer driven on public streets or highways. For more information, contact Eric Snyder at erics@sema.org.

TELL THE GOVERNMENT: FUNDS EARMARKED FOR BONNEVILLE SALT FLATS MUST BE SPENT

Money appropriated by the US Congress and the State of Utah to restore the Bonneville Salt Flats is in jeopardy. The US Bureau of Land Management (BLM) and Utah Department of Natural Resources (DNR) signed a Memorandum of Understanding in April 2020 to create the "Restore Bonneville" program, but no action has been taken as of late April 2021.

"We thank the federal and state lawmakers who directed the BLM and DNR to agree to allow increased salt pumping. It was a cause for celebration since it represented years of discussions between the primary stakeholders—DNR, BLM, Intrepid Potash, Inc., and the land speed racing community," said Daniel Ingber, PRI's Vice President of Government and Legal Affairs. "Money has been appropriated, but nothing has been spent to date to save this imperiled landmark. Until the agreement is implemented, it is only a piece of paper, and Bonneville remains endangered."

BLM and DNR must complete a detailed project outline before more than \$2 million is released. The project is modeled after a similar 1997–2002 pilot program and aims to increase salt pumping by upgrading essential infrastructure. Today, equipment is capable of pumping around 300,000 tons of salt per year, but the new program aims to increase it to over one million tons and help

restore the once 13-mile race track, which today sits at under eight miles.

To help, contact DNR and BLM and urge them to implement the previously agreed-upon restoration program at votervoice.net/SEMA/campaigns/60483/respond.

UPDATE ON GRANTS FOR RACE TRACKS

As previously reported (see PRI Magazine, March 2021), the PRI Government Affairs team's main priority in 2021 is to help race tracks receive additional government relief. The initiative began as part of a \$15 billion provision included in a COVID-19 relief bill enacted in late 2020, but unfortunately, it did not apply to race tracks and related outdoor venues.

As of late April, race tracks and related categories were not eligible for the relief, which began as a "Save Our Stages" campaign for theaters, concert venues, and comedy clubs, and was included in the winter stimulus package that Congress passed as the Shuttered Venues Operators Grant (SVOG) program.

"We applaud the US Small Business Administration (SBA) for its efforts to implement the SVOG program, as it will help to save live performing arts entertainment businesses. We do, however, respectfully urge the SBA to determine that other family and community-focused activities, including motorsports, horse racing events, mobile amusement such as carnivals, and a range of recreation venues including county, state, and regional fairs, are also eligible for SVOG," Ingber said. "These live event operators have endured financial hardship through no fault of their own and play an important role in providing entertainment and a sense of community in areas across the nation."

Because of this hurdle, the PRI legal team has recently proposed a broader definition of entertainment venues to include race tracks. The expanded proposal would provide an

additional \$15 billion designated solely for outdoor venues affected by the COVID-19 pandemic, including equestrian venues, fairgrounds, and circuses. PRI has also formed a coalition of businesses, including SEMA, Off-Road Business Association (ORBA), United States Motorsports Association (USMA), United Four Wheel Drive Associations, American Horse Council, and Diving Equipment & Marketing Association (DEMA) to help to get the word out on the initiative.

Motorsports facilities—and the racing community at large—are encouraged to contact lawmakers at votervoice.net/SEMA/campaigns/79360/respond.

PRI PUBLISHES BEST PRACTICES GUIDELINES FOR RACE TRACKS

With state and local COVID-19 restrictions easing around the country, many race tracks can once again host events with fans. Participants, workers, and spectators' health and safety are everyone's top priority, and PRI has race facilities covered.

In addition to maintaining an up-to-date directory of each state's motorsports reopening status, PRI has published a step-by-step "Back to Green Flag" guidance document to help ensure track operators can responsibly get back to business. The guidelines, which cover everything from event ticketing to participant safety and concession procedures, can be downloaded under the Published Guidelines section at pages.message.performanceracing.com/racetrack-info-state-list/.

The document has been shared with race facilities around the nation and will help benefit the entire racing industry.

"Several states are requiring event organizers to submit COVID-19 mitigation plans in order to reopen," Ingber said. "PRI has published the 'Back to Green' guidance document with the goal to get everyone back on track faster, and to do so safely. This will benefit all parties involved, from the tracks to racers, support businesses and fans."

Each track's circumstances are unique, and PRI encourages track owners to work with local, regional, and state administrative officials to adapt this guide to their specific situation.

For more information on the "Back to Green Flag" guide, please contact prisupport@performanceracing.com.

CALIFORNIA INTRODUCES MANUFACTURING TAX CREDIT LEGISLATION

California Assemblymember Tim Grayson (D-Concord) has introduced PRI-supported legislation (AB 904) that would create a new tax credit designed to stimulate long-term capital investments in manufacturing.

If enacted, the measure would provide Golden State manufacturers with more than 100 employees with a 5% credit against taxes imposed for the purchase of qualified tangible personal property, which includes equipment, machinery, computers, or computing software involved in the manufacturing process. Small manufacturers with fewer than 100 employees would be eligible for a 6% tax credit. The credit covers up to \$1,000,000 in qualified investments and can be carried over for up to five years beginning in 2022.

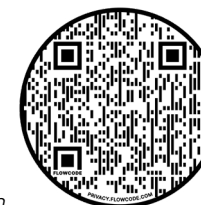
"The hope is that the tax break will spur motorsports manufacturers to invest in cutting-edge tools and processes that will give them a leg up on their competition," Ingber said. "California is notorious for being unfriendly toward businesses, and we've seen dozens of stories in the media about companies relocating to more welcoming environments. The goal is to make the state more competitive at the global level, with a particular focus on small businesses."

The legislation would help generate new opportunities for California's manufacturers and create high-paying jobs, which is critical as the state recovers from the pandemic. AB 904 would also help revitalize California's diverse workforce and enhance technical skills that lift the entire economy.

Assemblymember Grayson is a member of the SEMA State Automotive Enthusiast Leadership Caucus and was the 2019 winner of SEMA's Stephen B. McDonald Legislator of the Year award. He and his wife Tammy are auto enthusiasts, and included in their collection are two classic Ford Mustangs.

Request support for AB 904 by contacting state assembly members at votervoice.net/SEMA/campaigns/83618/respond. For more information, contact Christian Robinson at christianr@sema.org.

For more information and to contact lawmakers, visit votervoice.net/SEMA/campaigns. **PRI**



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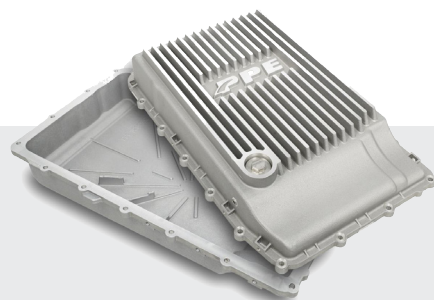


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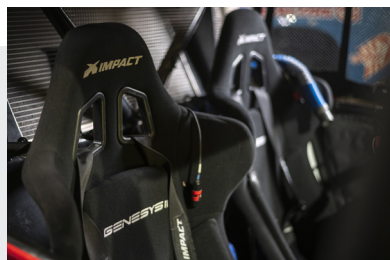
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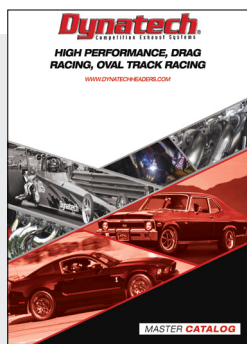
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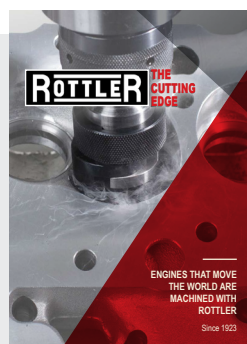
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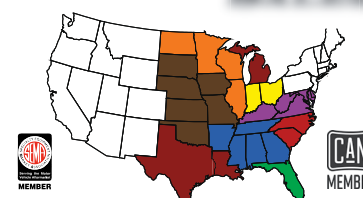
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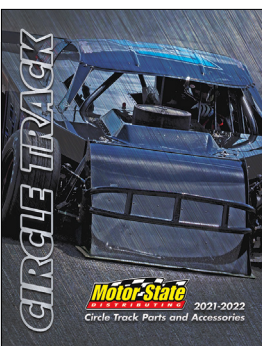
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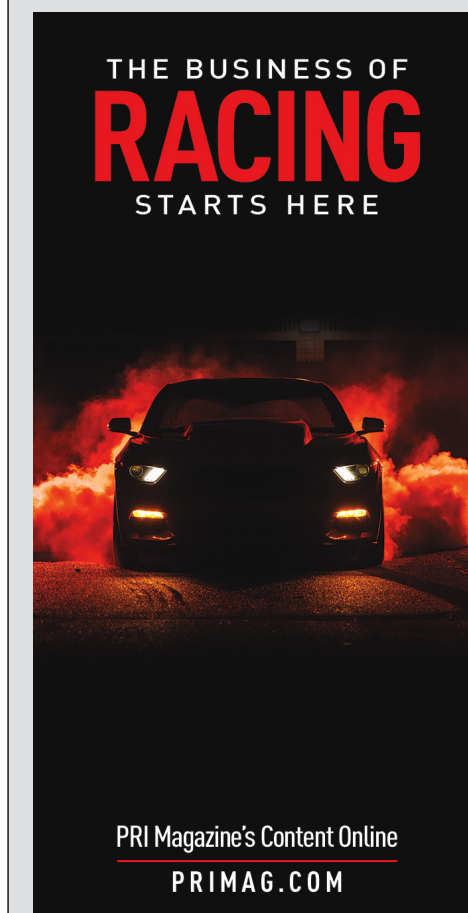
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SOCIAL STATUS

A closer look at racing and performance companies' winning strategies on Facebook, Instagram, TikTok, Snapchat, and more.

This month, we're looking at social media through the eyes of Vengeance Racing, a leader in late model vehicle performance parts, installations, and tuning, and provider of high-performance vehicle enhancements.

Vengeance Racing currently utilizes Facebook, Instagram, and YouTube, as the company has found that these are the largest platforms for its market. It also uses LinkedIn for business-focused announcements and posts. "We have looked into TikTok as it progresses into becoming a staple of social media. We feel that many businesses may look at TikTok, Snapchat, and some other 'younger' social media platforms as ineffective in generating revenue. However, we feel that engaging this younger audience is important as they, too, will one day be potential clients, and the earlier you can expose them to your offerings, the more likely they will be to stay loyal to your brand when the time comes for their first vehicle modifications," explained Coleman Kilpatrick, social media director at Vengeance.

"In its purest form, we aim to use social media as a tool to spread awareness of our brand, promote products, and connect with our audience and followers," he added. "Not only do we share posts highlighting our customers'

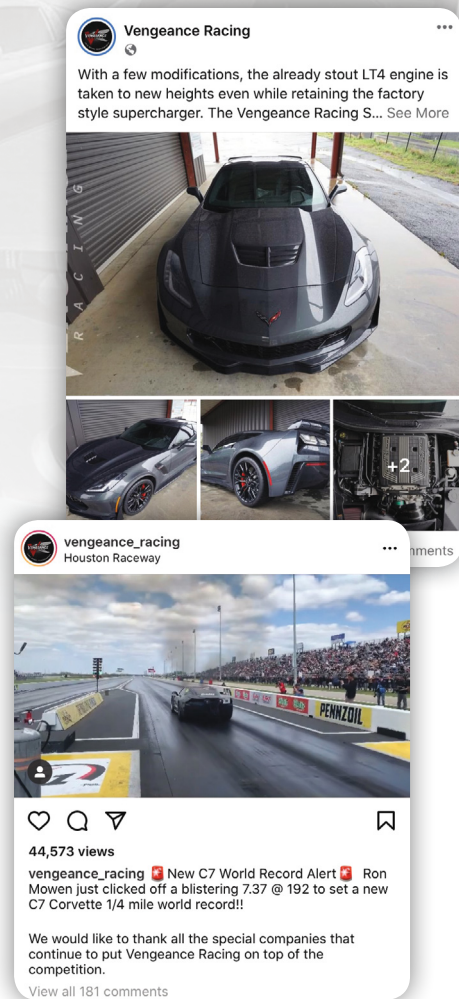
achievements and build overviews, but we also focus heavily on providing factual, in-depth information to our followers so that they are better informed to make the best decisions on how to upgrade their vehicles. We feel that this level of transparency arms the customer to be more engaged in the build process as well as feel more comfortable with their vehicle after the modifications are complete."

Various factors play a role in growing one's social media presence, including understanding the different platform algorithms and studying audience behavior and feedback. "The main way we have helped our platform grow is knowing how the algorithm works as well as staying engaged with our target audience," Kilpatrick confirmed. "By reading commentary left by our audience and analyzing data that is provided through different platforms, you can help determine what type of content they enjoy seeing and thus strategize your posting around what is truly popular and engaging to your followers.

"Regarding the algorithms, replying to comments and messages in a timely manner can significantly help your reach, as well as posting during the most popular viewing times for your audience," he added. "Instagram likes early morning posts because many of its users get on in the morning when they are starting their day. But we have had more success on Facebook posting later in the day."

Analyzing data is especially important when deciding which type of content to use on different platforms. Vengeance Racing's content is generally the same across its social networks, but the company sees different reach and engagement potential depending on the type of post. "We have found that longer and more detail-rich posts, such as our build overviews, do much better on Facebook rather than Instagram," Kilpatrick said. "We feel that this is a factor due in part to the age variance of users on Facebook vs. Instagram, and also the way the platform is structured.

"We have had more success with our 'quick tease' short videos and picture-heavy posts



on our Instagram page where, based on our analytics, we have a much younger viewer base," he continued. "It's no secret that the younger generation is more receptive to digital content that is more focused on images and video over a lengthy text-based write-up."

In the digital world, "sharing" posts or content is the new word-of-mouth. And it can be highly effective. "We have noticed great spikes in followers and engagement any time a manufacturer shares one of our posts highlighting their product on a build, or a racing event shares a video on one of our clients setting a record at their event," Kilpatrick noted.

That said, traditional word-of-mouth and networking has helped Vengeance grow its virtual audience, too. "We feel that getting out in the car community is still a tried-and-true way to generate more followers," he added. "Any time that we've attended a major racing event, attended a trade show, or even made a presence at a local weekend car meet, we have always seen a supplementary increase in traffic on our pages." **PRI**



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