

Ignition Systems-Start Selling More!

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Race ignition systems are usually one of the first systems that is suspected when a car slows down or isn't running as well as it should. Keeping up with advances in technology becomes particularly difficult when there is a bewildering array of options for customers. Any racing retailer who simply stocks ignition systems but lets technology and proper education slip by loses invaluable opportunities to gain the trust of racers who could turn into customers for life.

Numerous challenges exist regarding ignition systems- no secret to PRI readers. Consider the concern for proper installation and connections and ensuring proper ground, solid connections and securely routed wiring. Maintenance of ignition systems is another key area of relevance. Vibration and heat are natural enemies of ignition components. Power leads and grounds can often shake loose or even wear through insulation causing the system to short out or burn up. In turbulent economic conditions, racers are also trying to get the most bang for their buck.

Systems

Greg Nakano, AEM, Hawthorne, California, said he often sees mismatched components as a major challenge. "Education is the key to success and knowing what conditions the ignition system will have to endure for the correct components to be selected," Nakano said.

Todd Ryden, MSD, El Paso, Texas, believes the most useful tool to overcome ignition questions and concerns is with superior technical support. He said retailers should "ask questions about what the customer races or expects and put the right product in their hands. When a race shop can help a racer with their questions or issues, they'll have a customer for life." Beyond that, MSD offers a useful handheld tester that can easily be connected with the ignition and will run the ignition so a racer can test the ignition and the coil as well as any rpm limits, switches or accessories.

"The key challenge is the maximum utilization of available power from the combustion process," explained Martin Uhlir, Brisk USA, Houston, Texas. "It's important to recognize that Different race applications benefit from different types of spark plug firing tip design. At any given time ignition systems supply only the voltage necessary to ionize the A/F mixture between the electrodes gap with given cylinder pressure and mixture. In order to best use the available ignition energy and ensure consistent, dependable operation, it becomes important to properly match spark plug firing tip design with the given applications and ignition systems."

Ron Turnpaugh, of Comp Performance Group's electrical engineering team in Memphis, Tennessee, spoke of the challenges by racers using new late model engines. "Most have now been introduced to coil on plug technology where each cylinder/spark plug has its own ignition coil." As an example, he cited a V8 engine having eight ignition coils where, at 6000 rpm's, there are only 2.5 milliseconds before the next ignition coil needs to fire. "There's a lot going on in the very short time you have between each cylinder firing," he concluded.

Michael Konstandinou, ICE Ignition, Cheltenham, Victoria, Australia, believes high compression engines, particularly those using alcohol or alcohol-based fuels, such as E85, can be difficult to start. "It's also difficult to get a complete burn with these fuels given the limited spark duration and energy of traditional CDI systems-especially in the low- to mid-rpm range," said Konstandinou. In addition, the choice of distributor firing versus crank trigger control also creates performance compromises with most systems that are built for the superior accuracy of crank triggers. "Distributors are all subjected to varying degrees of harmonics and drive run out that can cause signaling errors," he added. "The most obvious symptom of these problems is intermittent and premature triggering of rev limiters and unstable timing."

Brian Scott, Scott Performance Wire, Mooresville, North Carolina, is in the business of custom making spark plug or ignition wire sets for engine builders. Scott said, "Spark plug wires don't go bad if they're made correctly." Problems arise when the wires aren't kept out of harm's way on the track or while mechanics are working on other engine parts. "We have wires cut to a length that fit the motor properly so there's no excess flopping around," he added and cautioned others to do the same.

Set it and forget it isn't an option with ignition systems. "You may have hooked up your ignition box in the beginning of the

year and everything works great," explained Tim Musiek, Accel and Mallory Ignition, Cleveland, Ohio. "But out of nowhere your ignition system quits working. Regular maintenance like periodically checking all wiring, especially grounds and power leads can help." Musiek also cautions racers to not forget about spark plug wires, which are often overlooked until it is too late.

Solutions

Racers tend to push the life expectancy of ignition wires, turn a blind eye when they are subjecting the wires to high heat situations and have certain needs for their applications. Add this knowledge to a list of seemingly never-ending challenges, the difficult task then becomes providing products and service to help overcome these problems. In racing, it is no longer a one spark plug firing tip design that fits all applications scenario.

Seeking the best alternative spark plug options for given applications is one solution provided by Brisk, according to Uhlir. "Brisk offers spark plug firing tip designs distinctly created to maximize the performance in specific applications." Uhlir went on to highlight some of those products, including ones for naturally aspirated applications with powerful ignition systems. "It is beneficial to use a spark plug's firing tip design with relatively high ignition voltage requirement and higher capacitance such as Brisk Premium LGS or ZS spark plugs. These spark plugs take advantage of the available and otherwise un-utilized ignition coil power and provide unparalleled spark plug exposure without ground electrode shrouding. And there's no need for indexing."

Uhlir also noted that high compression, forced induction, nitrous, alcohol, E85, or LPG applications have completely different demands on spark plug firing tip design. For these, he recommends Brisk Silver Racing spark plugs to reduce the strain on the ignition systems and signal distortion in the amplification process caused by heat build up in the ignition coils and modules.

To take the guesswork out of setting the mechanical advance, Steve Davis, Performance Distributors, Memphis, Tennessee, makes sure that all of his company's distributors are calibrated on their distributor machine. From there, Davis said easy-to-understand instructions aid in setting the total advance. He also cited the DUI Distributors. "They're inherently easy to wire into the system-just one hot wire and one tach wire," he said.

Konstandinou offered, "The issues of difficult starting, ignition box failure, and unreliable operation can be overcome with a Digital Inductive Spark system.

"This totally digital system controlled by high speed microprocessors produces a much longer, powerful spark for much greater total spark energy from moderate to very high rpm's." For those facing problems using distributor firing versus crank trigger, Konstandinou recommended using the separate Twin Table programming in the one ignition box.

In terms of products, Turnpaugh recommended Comp Performance Group's XIM, the Xtreme Ignition Module, which can be used in conjunction with its XFI Fuel Injection computer utilizing CAN communications or in 'stand alone' mode. "It can drive up to eight individual ignition coils of any model," he added. "And it plugs directly into any of the OEM's cam and crank sensors as well as all of the different designs of ignition coils."

Terry Johnson, Crane Cams, Daytona Beach, Florida, also believes in the importance of education. "We go around to retailers, jobbers, and engine builders and we help school them on the basics so they can pass on that information to their customers. If you're comfortable because you understand something, it becomes second nature to help someone else with it," said Johnson.

Maurizio Colombo, Magneti Marelli Motorsport, Corbetta, Italy, said retailers should educate themselves in understanding the application requirements as well as budgetary constraints of their customers in order to provide the most suitable product line. Magneti Marelli helps retailers by offering three major product lines including 100 percent custom solutions for top-end applications, OE-derived solutions with custom windings expressly tuned for racing and managed with midrange ignition drivers, and OE coils particularly suited for racing to be managed with standard ignition drivers.

Accessory options are also a good way to help retailers aid their customers. Thor Schroeder, Moroso, Guilford, Connecticut, recommended different items such as wires, spark plug boots, distributor boots, universal wire sets where racers can cut and terminate the wires to the length they need, and tools to help in the building and maintaining of wire sets.

Rick Ojeda, Taylor Cable/Vertex, Grandview, Missouri, sees a lot of heat-related issues and also suggested keeping

heat-related products that protect on hand; items such as boot protectors, exhaust wraps and wire sleeving. "We have space age boot protectors that slip over existing sets of wires or where you can just slip them on while you're putting the boots on," he said.

Allen Alvarez, Daytona Sensors, South Daytona, Florida, said, "Pick products that use the latest technology and are US made. Our CD-1 ignition is a terrific example. No compromises were made that affect reliability." Alvarez reported that Daytona Sensors' products are manufactured in the USA in an ISO9000 rated facility.

According to Rick Gorski, Custom Wire Sets and Performance Products, North Ridgeville, Ohio, offers a simple and convenient way to get quality and trusted products. "For custom-built sets, human hands custom cut their specific length ignition leads, and our machines do all of the crimping," he said. "Then back to human hands for testing and shipping." Custom Wire Sets also offers a tech line for race customers. Gorski believes this is important because, while customers are always looking for a great deal, they're also looking for peace of mind. "Knowing that customer service is a priority to their retailer is what lasts in the mind of the consumer."

Trends in Ignition Systems

Musiek noted that he likes to visit drag strips, circle tracks and car shows to see what the latest trends are and to look into the future in order to supply great ignition components. One such trend that is popular with street and strip racers is upgrading the newer factory ignition systems. "As technology improves, we make improvements by having smaller, more powerful ignition systems," he said.

With data acquisition becoming so important to all levels of racing, Gorski believes it is ultimately important that ignition systems emit as low as possible EMI and RF noise levels. Racers rely on clean data reporting on everything from O2 and EGT sensors, nitrous controllers, and driveshaft pickups. "If an ignition system is emitting all kinds of RF noises, it makes it nearly impossible for correct tuning and data reading," he concluded.

One of the challenges that racers are faced with today is the complexity that modern ignition systems offer, noted Mark Chollet, Modotek, Concord, Ohio. "The variety of ignition units and add-on products available today makes it difficult to determine what system is needed and how to set up the system to get the best performance," he explained. "There is a learning curve with every system and we in the industry need to help make this as easy as possible."

Modotek offers a full-featured CDI ignition system, the DCDI, which "is a complete capacitive discharge ignition system for four-, six- and eight-cylinder engines," Chollet said. "It provides 135 mJ of spark energy while requiring less than five amps at 8000 rpm's. It has multiple rev limiters along with 3D ignition mapping, boost proportional retard, nitrous system integration and 16 MB of data logging memory.

"The unit comes complete with high output coil, and basic setup can be achieved through manual mode switches," Chollet continued. "Advanced programming is done through a USB interface to a Windows computer."

"Racers across all classes currently face a range of problems with low energy output of current ignition systems," noted Richard Hann of Blue Phoenix Ignitions in Jacksonville, Florida. To address this situation, Blue Phoenix Ignition has "a unique high voltage secondary side spark amplification system that amplifies the high voltage spark generated from a standard racing ignition CDI module or magneto to a high energy plasma spark.

"The innovative technology behind the spark amplification module is based on Jet Turbine Ignition and Pulsed Plasma thrusters used to power satellites by NASA," Hann continued. "The plasma spark amplification system discharges a pulse of DC current exceeding several hundred amps amplifying the plasma kernel of a standard ignition spark to a very high energy plasma spark that creates a large corona, a highly dense energy field that completely surrounds the spark plug tip along with a burst of photonic energy.

"The peak power output is in the megawatts and the RMS or average power output is in the kilowatts," Hann added. "The very high energy plasma kernel, which can only be described as a bolt of lightning, is virtually impossible to put out and thus eliminates the problem of dropped cylinders as well as loss of power at higher rpm's or spark blow out in the case of high compression ignitions. The corona ignites a substantially larger amount of fuel in a single instant, initiating a massive flame front that rapidly expands throughout the combustion chamber, allowing timing to be adjusted toward top dead center, thereby increasing engine efficiency. The energy dense corona generated by the spark amp module from Blue Phoenix is powerful enough to ignite water mist."

When it comes to considering what's ahead, MSD's Ryden said, "Programmable ignition controls and systems are the future. For late model vehicles and engines, there will be more laptop controls and accessories. And phone apps are not too far off in the performance ignition aftermarket!"

For racers looking for components that enhance reliability and save weight in all aspects of their programs, not just ignition systems, Konstandinou sees a trend in digital ignition systems because they are lightweight, compact and do a better job of standing up to the punishment that all racing classes can dish up. "The use of digital ignition controllers will be more widespread and while the ability to program these systems using a laptop will become more common, it doesn't suit every racer," he added. "The majority of racers will still be looking for ignition systems that are simple to use, effective and offer greater long-term reliability."

Nakano also sees a trend of moving away from distributed ignition systems and going to a full digital system that offers a wide range of programmable controls, mapping ability and data logging. "With this movement away from distributed ignition systems, the natural direction has been toward coil-on-plug-style ignitions or individual coils per cylinder," said Nakano.

Performance rather than longevity: That's what Uhlir sees as a current trend. The utilization of better electrode materials for race applications, specifically the use of silver than iridium, platinum and/or copper/nickel is a strong focus. "Silver is the best material for performance and racing spark plugs," he said. "Silver is metal with the most free electrons and conducts heat and electricity better than any other metal." Uhlir added that there is a general trend in the spark plug industry to minimize spark plug thread diameter and/or stretch the spark plug body in order to provide more room for direct injection, intake and exhaust valves and ports and increased rigidity of the cylinder head. "In the future, we'll see more 12 mm and 10 mm, 26.5 mm spark plugs Brisk M and C-style such as those used on some later model imports and domestic applications and further miniaturization like on F1 style spark plugs," Uhlir concluded.

Colombo said he sees a continual demand for higher operating temperature and increases in required breakdown voltage on turbocharged engines. "There is also an increase in required energy due to engine evolutions," he noted. "Especially on top end applications. GDI injection will have a significant impact on ignition systems with particular emphasis on breakdown voltage and spark energy."

Sparking Inventory Excitement

MSD has upped the ante on the high end racing ignition side with its new Power Grid Ignition System. "This is the next generation of our programmable ignition," stated Ryden. "It has more power, new software, improved data acquisition and can be added to legacy MSD ignitions, as well."

Ryden also stressed the importance of having smaller accessories in plentiful supply. "Think about wire retainers, heat sleeve, the coil selector, and other items that add to the durability of the ignition system. Spark plug wire separators, maintenance parts such as cap and rotors are all low cost items to stock with good margins."

The most popular ICE Ignition product retailers should consider stocking is the 7Amp Street/Race kit, said Konstandinou.

Musiek said his company is always working on or developing new products. "Some of our new items include ACCEL's new lightweight battery cables, offered in three different sizes of cable in 4, 2, and 1/0 gauge," he explained. "The cable delivers the same amount of voltage as standard battery cable but at half their weight." Another new product being offered is the ACCEL Corrected HEI Cap and Silver Tip spark plugs.

New products at AEM include Twin-Fire Ignition System, EPM (Engine Position Module) and CDI Pencil Coils. Nakano described the Twin-Fire Ignition System as lightweight, small and a cost-effective, high-output ignition module. "This unit is available in a four-channel configuration, works with OEM coil-on-plug and distributed spark systems, and is ideal for race applications that utilize aftermarket stand-alone engine management systems." He added that the EPM easily adapts to any positive-drive, half-engine speed device such as a cam or distributor drive, and can be used with any aftermarket engine management system that recognizes the common 24 and 1 pattern for crank and cam signals. Meanwhile, the CDI Pencil Coils allow the conversion to coil-on-plug ignition systems and will work with aftermarket engine management systems, as well.

Uhlir said retailers should stock Brisk Racing and Performance spark plugs that are relevant by their fi ring tip design to the field of their racing application specialization. Regarding new products for the 2011 race season, he mentioned the Gen. 3 Hemi spark plugs, which have a variety of fi ring tip styles and heat ranges from stock application to several

thousand horsepower, Ford engine applications such as the new Coyote 5.0 liter engine, single piece metal shell Ford 3 spark plugs, and new NASCAR plugs, also in a variety of styles such as Brisk Premium Multi-Spark DR08ZS, DR10ZS, GO11LGS-T and H011LGS-T.

Comp Performance Group is introducing FAST's XIM with the stand-alone mode, which can be sold to customers that aren't using fuel injection but are retaining the coil-on-plug ignition systems. "Another great point about this product is that one part number will work on all of the different engine models and families," explained Turnpaugh. "This really simplifies things on the retailers' side, especially if the end-user decides to go with a different engine family. The module can fit anything out there."

New this year for Taylor Cable/Vertex is the Thunderbolt S50 Sleeved Wire. Ojeda explained, "Each wire is number coated, earmarked with the number of the cylinders so all your cylinders are labeled for the proper application, which wire goes to which cylinder." There are two sizes available, the 8.2 mm and the 10.4 mm. He also encourages retailers to keep repair kits on hand.

Davis mentioned that he is now offering DUI Distributors with an adjustable slip collar featuring 7/8 inches of up and down play. "This is great for situations where the block has been decked or the heads have been milled," said Davis. He also suggested racing retailers stock Racing DUI Distributors and Live Wire Plug Wires. "If a customer doesn't need a complete distributor, he can bolt on our Racing DUI Coil Kit and Dyna-Module."

Daytona Sensors covers most drag race and circle track applications with its CD-1 system, which offers data logging, according to Alvarez.

Crane Cams just released a new digital ignition system for circle tracks: the HI6RC. "It has adjustable rev limiting, multi spark, status LED light, and an ability for start retard built right into it," explained Johnson.

For this race season, Colombo is offering improved versions of top end closed core coil with higher possible operating temperature and increased performance and SRA, SRT and SRB open ECUs that can manage higher primary currents, which allows the use of high performance coils. "SRAs and SRBs with open ECUs are a good compromise between performance and cost," he said.

Gorski said the FireCore50 Ignition is quickly becoming popular. "Our sets can be made to your specs, with your part numbers," he said. "This will not only free up retailer technicians from the tedious job of custom making every set for each engine, but is also extremely cost-effective."

Schroeder explained a new introduction from Moroso: Part Number 72256 Ultra Crank Trigger Distributor. "This new product is designed for small block and big block Chevrolet engines with either short or tall decks," he said. "Featuring a unique threaded, adjustable billet collar with integrated hold-down, this distributor easily adjusts to different intake manifold heights to optimize gear meshing. Without touching the distributor holddown, our cap design allows you to adjust rotor tip phasing simply and efficiently." He also pointed out that it is an evolution because it combines new technology with build-quality that was reserved for the top levels of NASCAR at a price point for the sportsman racer.

Scott Performance Wire works to ensure its custom wires are cut to the right length so the engine builders they serve can in turn give their customers a complete, professional looking package. Scott recommends retailers take the same approach when stocking merchandise. "You're not just selling a piece," he explained. "You're selling several pieces so the racer gets the product right the first time, and they're not forced to come back to spend extra money later. The ignition systems you provide aren't complete until all the components work and fit together."

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