



Photo courtesy of Lunati

The Growing Demand For Complete ROTATING

SIMPLY PUT, sales of rotating assemblies are on the upswing. “Our rotating assembly sales are up 15 percent over last year,” reported Tom Lieb of Scat Enterprises, Redondo Beach, California. “It’s one of the biggest growth areas in our business.”

And why not? Buying a complete rotating assembly—all parts matched and balanced, packed in one box, with a single part number—benefits customers, distributors, and even manufacturers. “Packaging these components together takes out the guesswork and simplifies the purchasing process,” commented Jack McClinnis of PBM Performance Products, Louisville, Kentucky. “We can match up the crankshaft counterweights, piston weight, rod length and compression height, ensure that the ring package is suited to the application, that the bearings are appropriate for the crank, etc. Getting all this right benefits both the engine builder and the manufacturer because it saves time and money as well as eliminating returns. It also ensures that the engine will perform as intended.”

“Packaging a complete rotating kit takes some of the guesswork out of assembling the bottom end of the engine,” agreed Alan Davis of Eagle Specialty Products, Southaven, Mississippi.

“Everyone from the weekend do-it-yourselfer to experienced engine builders can save time and money by selecting kits that have been proven to work well together. With so many choices in after-market parts, there is no guarantee that a particular selection of components will not require clearancing—or will not somehow complicate the balancing process. “Buying a complete and balanced assembly solves the problem—and eliminates one more ‘unknown’ for the engine builder.”

“Not only does a complete rotating assembly make it easier for individual customers to build their own engines,” commented Tom Molnar of Molnar Technologies, Kentwood, Michigan, “but we are seeing more and more engine shops who like the one-stop-shopping method. It reduces the amount of time they need to spend poring through catalogs—and frees up time for them to spend doing things that can



Removing the guesswork with matched, balanced and packaged parts has created a thriving marketplace for an increasing number of engine platforms.

make them some money.”

That said, the impressively huge selection of parts produced by today's performance aftermarket can still complicate the issue, as we'll see a little later. We'll also look at where sales are growing fastest, and at some of the newest kits on the market. We should note that most manufacturers define a complete rotating assembly as a crankshaft, rods, pistons, rings, and main and rod bearings. Most balance what they sell. There are exceptions, and we'll note them as we come to them.

Happier All Around

Lieb maintains that the trend toward packaging complete rotating assemblies began with the decline of local jobber machine shops. “So while you can still go out and buy a crankshaft, rods, and pistons—what are you going to do with them? You have to get them balanced. So now we're providing a service that you can no longer get in your neighborhood.”

Beyond that, Lieb cited three major advantages for customers. “First, they have just one person to talk to. They open one box and it's all in there: crank, rods, pistons, rings, bearings, and a dampener if there's a dampener. The second major advantage is compatibility. So often people buying individual parts will buy six-inch rods for a small block Chevy and somehow end up with

pistons for a 5.700,” he said.

And third, the combination of parts is not merely compatible, but optimized for the particular application. “We don't have mass-produced rotating assemblies sitting on a shelf,” Lieb continued. “We have a hierarchy of parts. We know this piston weighs this much, so the rods that we use have to weigh this, and the crank has to weigh that. Then we balance it and it goes in a box with the customer's name on it. And so it's custom-assembled for that individual's application—it's their kit. It's no different from what they would get from a jobber machine shop or an engine builder.”

Clint Anderson of CNC-Motorsports in Brookings, South Dakota, cited similar advantages for racers. “One is price, and two, we make sure all the parts are compatible,” he said. “We can assure them that the rotating kit is going to work for their application—and even offer them specific advice based on our previous experience.”

And yet another plus was noted by Kirk Peters of Lunati in Olive Branch, Mississippi. “It's made it easier for counter or phone sales people to look up and match the end user's specs, and make the sale with one easy part number,” he explained. “That allows the sales force to be more productive—while builders

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By John F. Katz

Buying a complete rotating assembly—all parts matched and balanced, packed in one box, with a single part number—simplifies the process for customers, distributors, and even manufacturers. Packaging these components together removes any guesswork. Pictured here is a Ford 4.6L kit from Scat Enterprises.

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and racers know all of the homework has been done, and the parts are matched, balanced and ready to assemble.”

Growth Areas

Not surprisingly, the newest kits on the market are engineered for newer engines—while kits for all the old favorites remain popular. Lunati, said Peters, is expanding its LS selection to include bigger cubic-inch-diameter and forced-induction applications. “The Lunati Voodoo Series for an LS with a 4.00-inch stroke is our top seller to date and a favorite of drag racers. Our Ford kits are also popular, for both big and small blocks.”

Scat, too, reported strong growth in kits for the GM LS family, and for the new Chrysler Hemis. “And on the vintage side we’re seeing an increase in Ford Flatheads,” Lieb added.

Livernois Motorsports of Dearborn Heights, Michigan, has new kits based on the LS2, LS3 and LS7, as well as the

new Gen 5 LT1 and LT4. “For Fords,” said Mike Schropp, “we now offer kits for the 2.3- and 3.5-liter EcoBoost engines, for the 5.0-liter Coyote and 6.2-liter Raptor.” All of these are available in racing and street versions—“and we’ve started offering Hemi 6.4 kits for drag racing.” The four new Ford kits are currently Livernois’ best-sellers. “Most often they’re used in drag racing,” Schropp added, “but we also sell a lot for road racing and desert racing.”

PBM has introduced two new rotating assemblies for building a 454 cid small block Ford (yes, a Ford); one set up for street/strip, and the other a dedicated drag race engine. “Both feature a forged 4340 crankshaft, H-beam connecting rods and forged pistons,” said McInnis. “The drag race assembly includes pistons with 6.5cc domes for higher compression, and rods with ARP 2000 bolts; where the street/strip assembly has 22cc dish pistons and standard ARP fasteners.” Meanwhile, “drag

race packages for big block Chevys continue to be popular; we offer kits for 540, 565, 598 and 632 cubic inches.”

New kits from CNC-Motorsports are for the Chrysler 5.7- and 6.1-liter Hemis. “They’re pretty popular,” said Anderson, “and, of course, the LS market is huge—while the conventional Chevrolet and Ford engines remain very popular as well.”

Other manufacturers have updated their kits to feature their latest components. “Eagle recently released a forged 4340 steel I-beam rod that is lighter than our H-beam,” said Davis, “and suitable for moderately modified competition engines. So we have been putting together combinations with these to help fill the gap between our entry-level kits and our full-competition assemblies. We have also been adding kits with pistons for non-standard cylinder heads, such the Twisted Wedge Ford small block, P51 Ford big block, and others.”



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Assembling the Assembly

Naturally, we wondered how these various manufacturers choose the individual components that will make up a complete rotating kit. Their answers varied, but Davis summarized the basics nicely: "We consider combinations that are popular and that are possible with common components. We look for reliability, consistency, and the market segment the kit is intended for. We value customer feedback—in fact, it may be the single biggest factor that determines what areas of our lineup we need to expand, and what sort of combinations we need to put together."

"Feedback definitely plays a role," Peters confirmed. "Did our rotating assembly help the engine builder assemble a race-winning engine? Knowing the answer helps us refine the process for even better results." And because Lunati manufactures such a wide range of components, "we can also set the customer up with the

Suppliers of rotating assemblies can assist in the sales process by matching up the crankshaft counterweights, piston weight, rod length and compression height, as well as making certain the ring package is suited to the application. Such coordination benefits both the engine builder and manufacturer, as it saves time and money, and nearly eliminates returns. It also ensures the engine will perform as intended. Photo courtesy of PBM Performance Products.

right camshaft and valvetrain to optimize the whole package."

PBM, said McInnis, considers horsepower level, rpm range, and type of fuel, as well as rod-to-cam clearance. "For example, in a small block Chevy with a stroke greater than 3.750, the rod configuration is critical to avoid interference. We regularly consult with engine builders, and can customize the rotating assembly to suit specific applications. Customer feedback can also be a valuable tool, particularly in very specific racing classes where subtle differences in these components



can yield a big gain in performance."

In fact, he said, "Information is the critical element in packaging a rotating assembly to meet the racer's needs. When racers call, we need to know what heads will be used on the engine, the deck height of the block, the intended compression ratio, the type of fuel, intended use (e.g. 90 percent race/10 percent street, etc.), so that we can select the correct components. Probably the No. 1 problem we encounter is a customer not knowing their combustion chamber volume. Also, are the valves in the stock location, or are the



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centerlines moved? The more information we can get up front the better.”

“Livernois targets the intended application,” said Schropp, “and then designs a kit around it. The majority of the components we use in our kits are custom designed and built for us. This helps us to tailor the components exactly to the application, and ensures a good match.”

Sanctioning body rules can also influence component selection. Dakota Engine Builders in Jamestown, North Dakota, builds concept engines under WISSOTA, USRA and USMTS rules. “For E-mods and street stocks we can use Scat or Eagle rods, a Scat or Eagle stock-replacement crank, and a set of Mahle pistons, which are stamped ‘WISSOTA,’” reported Jim Beyer. “But that’s only a 400-hp motor. When we build 600–700-hp motors for street rods, or even a 550-hp motor for an A-mod, then we use a 4340 crank.” Beyer offers rotating assembly kits, but

emphasized that most circle track teams opt for a fully built engine. “They’d rather just jump in and drive. So when they hear our price for a fully built concept motor, they order one.”

He also credits the three sanctioning bodies with promoting such successful concept-engine programs. Most of his rotating assemblies are sold to hot rodders building big cubic inches, or to pure stock racers trying to stick to a budget. Even for the latter, Beyer will cut a stock crank, “re-size the rods and put the bolts in them, sell them a set of Speed Pro pistons,” and balance the assembly.

“For us, there is more total revenue in one part number when sold as a kit,” said David Butler from Butler Performance, Lawrenceburg, Tennessee, “and then this also allows us to provide a better value for the customer as we build discounts into all of our balanced assemblies. The customer is also assured that all parts are matched

and correctly balanced together.”

Butler Performance is an engine shop and parts distributor, so “we have fitted these parts as well as dyno-, street- and track-tested the kits ourselves. We take our own experience plus feedback from customers as well as other shops and suppliers that we network with to help ensure we are offering kits that guys are looking for and that these kits provide the performance and durability needed,” Butler said.

Butler Performance’s stroker assemblies are its most popular. “We also add a longer rod to these kits when possible and lighter weight components, so we’re not just increasing the stroke, but also raising the rpm limits while adding durability at the same time,” Butler said.

Butler is “always working to add new combinations and the latest advances in design and options, such as the newest coatings, ring packages, etc. All of the rotating assemblies listed on our website

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The advertisement features a large, detailed image of a key on the left side, set against a dark blue background. The key's shaft is a long, polished metal rod. To the right of the main key, there are several smaller, vertical metal components, likely valves or valve stems, arranged in a row. The text is centered and uses a mix of white and light blue colors. The Ferrea logo is in the bottom left, and social media icons are in the bottom right.

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include balancing in the price, but we will also offer the kits unbalanced to shops who prefer to do their own balancing.”

Toward Total Custom

Given the wide variety of engines used in racing today, and the enormous range of parts available for them, optimizing the package can become rather complicated. Anderson related how “often a customer will call and say, ‘I’m looking at this rotating assembly, part number whatever, but I’d like to change this, because this is what I’m doing.’ And then we take that kit as a basic guideline, and put together a custom assembly designed for that customer specifically.”

“We have 1500 different part numbers,” said Lieb, “but for each of those we have different bore sizes. So you can have the same kit with .030-over pistons, .060-over, .080-over, whatever, so that increases the number of SKUs dramatically. What’s happened is rather interesting. If we go



The growing use of rotating assemblies has helped standardize combinations, as well as provide an easier solution for builders and racers to research engine builds, according to one source. The 3.5 EcoBoost kit pictured here is available from Livernois Motorsports.

back just five years, our standard part number included .030-over pistons; and if people wanted something else, we’d sell it to them, but it could be all over the map.” Since then, however, demand for .030-over pistons has declined, “and what have increased are standard and .040-over. That’s because old blocks are being re-bored for the second time, while at the same time used blocks are becoming so

scarce that we have new World blocks and Dart blocks and even Chinese blocks, and they all come with the standard bore size. And most folks will opt for the standard size, allowing themselves a re-build sometime in the future.”

Regardless of bore size, Lieb continued, Scat selects “the best piston for the money for each application”—“best” here meaning the lightest, which generally means machined from the forging that was already closest to the final size and configuration. He cited flathead pistons as an example: Three major name brands make perfectly respectable pistons for the vintage Ford V8, but a weight difference of 150 grams separates the lightest from the heaviest. “So we use a Ross piston in that application, but we might use a Mahle in another, and a Diamond in another.”

Similarly, Molnar Technologies has “partnered with four of the very-high-end piston manufacturers,” said Molnar, “and three

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different bearing manufacturers. By not being locked into only one or two brands of pistons or a limited list of assembly packages, we are able to put together rotating assemblies that can be tailored to suit the exact needs of the racer or engine shop. This includes custom pistons, if needed. We also offer in-house balancing for those who want that service.”

At Crower in San Diego, California, every package is custom, as the company caters to hardcore racers who demand nothing less. Crower sells crank, rod, and bearing assemblies. “We’ll turn the crankshaft down to the lowest possible rotating mass,” said Kerry Novak, “and we’ll recommend a piston manufacturer,” but Crower does not include pistons in its kits. “The problem with pistons is that there are so many cylinder heads, with so many different valve angles. And then you have different compression heights, and so many different variations, with flat tops, domes,

dishes—there are just too many variables.

“We do work with piston manufacturers,” he continued. “They will contact us and ask which connecting rods we are using for a particular customer. And they might ask us if we can narrow the wrist-pin area because they are trying to make the piston lighter.

“Or our dealers will call us and ask, ‘Can you change this rod from a .927 pin’—for example—to an .866?’ And we say, ‘yes,’ so the next question is, ‘How wide is the pin end of the rod?’ And that, for example, may be one inch. So they’ll ask, ‘Can you make it .900?’ Then they want to know the dimensions from the inside of the rod to the top of the rod. So the piston manufacturer is building a piston, and we’re building a rod, but we’re working together to meet the customer’s needs. And the piston manufacturers are saying the same things: ‘Yes, we can do it,’ or ‘No, we can’t do it.’ That’s how we work.”

Here, too, customer feedback can drive innovation. Novak added, “Every conversation at the PRI Show went something like, ‘I am building this engine; what can you do to make it so I have better throttle response, better speed off the corner, and longer life?’” Customers also ask about weight—a lot. “We put together stock-rule applications, where the crank has to weigh 50 pounds, or 48 pounds. And we make a crankshaft for that specific application—because if it has to weigh 50 pounds, the racer doesn’t want it to weigh 51 or 52, he wants 50, exactly.”

Similarly, some drag racing classes require rods that weigh the same as the stock unit, “so we have to make rods that are legal for that particular class.” Drag racers’ needs differ from those of the oval track crowd; rather than mid-range flexibility, drag racers need “the reliability to launch hard, round after round after round,” Novak concluded. 



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