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CONNECTING ROD TECHNOLOGY:

There is a high level of interest in this engine, for components in general, and for connecting rods specifically.

Also new from Manley are H-beam and Pro Series I-beam rods for the Ford 6.2-liter Raptor. "And we've launched some programs for some niche-market vehicles. We now have H-beam rods for the Australian Ford BA Falcon XR6 Turbo—which is a very popular performance vehicle down there—as well as new H-beam rods for the Nissan RB30."

Howards Racing Components of Oshkosh, Wisconsin, has also released



The latest simulation software allows connecting rod manufacturers to focus on design details, which would be hard to ascertain on a dyno, according to one manufacturer. In fact, he added, "it's amazing to see how small changes can reduce stress points, leading to lighter and more reliable rods." As a result, manufacturers are making strides toward offering connecting rods that match a specific horsepower and/or application. Photo courtesy of Saenz.

new UltimateX forged billet rods for the 6.6-liter GM Duramax diesel. "Our all-new X-beam design provides the ultimate in strength and durability," said Brian Adix, "and it's been profiled for weight savings." US-sourced 4340 certified aircraft quality steel is multi-phase heat-treated, "then we fully CNC-machine them on the newest generation of equipment to ensure the removal of all surface imperfections. A precision EDM laser burns a hole from the top of the rod bearing journal to the bronze wrist-pin bushing, to supply extra oil to the float-

ing pin. Stress-relieving and shot-peening remove any remaining stress risers. The caps are lightened for easier balancing, and double-ribbed for added strength, and secured with 7/16-inch ARP 2000 cap screws rated to 220,000 psi."

Also new from Howards are Ultimate Duty Forged Billet Lite rods, which pare roughly 50 grams from Howards' continuing Ultimate Duty Forged Billet Lite. Forged Billet Lite rods "are great for fast-revving oval track and drag race applications requiring up to an 800-hp rating," Adix added. "These rods start with the same certified 4340 aircraft-quality, high-nickel steel as our standard Ultimate Duty Forged Billet rods, and are fully CNC-machined with new profiles to lighten non-critical areas. They are heat-treated using our multi-phase process, fully stress-relieved and shot-peened, and profiled for long-stroke applications." Like the diesel rods described above, they feature double-ribbed caps, 7/16-inch ARP 2000 cap screws, and bronze bushings for floating pins.

Meanwhile, Howards continues to promote its standard Ultimate Duty line as "a true American forged billet rod at prices as low as imported billets." Except for lightweight profiling, all the features described above apply to these rods as well—plus the optional availability of 265,000 psi fasteners.

New Products, New Materials

"This year we have some really exciting news," announced Ian Arnold, of Arrow Precision Engineering in Hinckley, Leicestershire, United Kingdom. "We've formed a partnership with ZUHL Ltd., (of Birmingham, United Kingdom), and they and we are pleased to introduce a new generation of advanced, high-performance connecting rods. We've bridged a market gap, offering exceptional strength with increased life at a financially viable price." These new rods were named "Best Technical Innovation" at the Autosport Engineering trade show in 2011.

Key to this new design is Arrow's new W2000/AZZ-2.1 steel alloy. "This material has a UTS in excess of 2100 MPa, with

high fatigue strength," Arnold explained. "It also benefits by maintaining plastic elongation with a high core hardness. Many steels of this strength level are not suitable for connecting rods due to their high notch sensitivity, particularly in the threaded region. However, careful selection of chemistry and heat treatment has led to an excellent balance of mechanical properties and close tolerances for demanding applications. This material is particularly suited to high-stress applications where rod distortion can occur—for example, high-bost engines. Alternatively, its high fatigue strength can be used to reduce component mass." All Arrow connecting rods are manufactured in the UK.

Engine Pro of Wheat Ridge, Colorado, has released 15 new part numbers in its H-beam line. "Our new H-beam rods

"More and more customers require customized design and manufacturing, even in less expensive applications."

are forged from 4340," said Don Weber, "which is then Magnafuxed, heat-treated, stress-relieved and sonic-tested. Our connecting rods are always produced from a one-piece forging—which is very important, because it allows for a stronger grain structure, as both the rod body and rod cap are from the same piece of alloy. The most important advantage of a one-piece forging is the tight 'twist-and-bend' tolerance—within 0.001 inch or less—of the finished product. Our first manufacturing procedure is to parallel-grind both the big end and the pin end of the forging, which ensures that both ends are exactly parallel to each other. This level of tolerance cannot be accomplished with a two-piece forging, since in the first production process they are two different pieces."

All Engine Pro rods come with ARP bolts, which Weber pointed out that the

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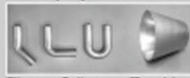
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CONNECTING ROD TECHNOLOGY:

company offers a very wide range of bolt choices for many applications available in a choice of 8740, ARP 2000, or L-19 material. "We always hone-finish our rods with the bolts to be supplied installed, we don't do any 'bolt-swapping.' Rod bolts are installed in the US and both ends are hone-finished in the US," he said.

Saenz is launching a new connecting rod line for sport compacts "that has been welcomed by grassroots race teams for its excellent quality-to-price ratio," said Casella. "Materials are always one of our concerns, so alloy components are strictly controlled. Designations such as 4340 or 300M are just reference points in the pursuit of the very best physical and mechanical properties." At the same time, "our forging and machining processes are constantly improved for efficiency. Our rods are made by people involved in racing, who know that just

ring, and crank manufacturers, we are able to offer complete engine kits, developed and tested, with longer rods."

CP-Carrillo of Irvine, California, has added aluminum rods to its product line, and is developing a line of "sportsman" rods to sell under the company's new, lower-cost Bullet brand. Like all CP-Carrillo products, these will still be 100 percent US manufactured. Carrillo's more up-market Custom rods offers a Lipped Cap option, "which increases split-line stability between the cap and rod," said Cindy Verkooij, "in harsh applications such as NASCAR and Pro Stock drag racing." All Carrillo connecting rods "are designed for optimized weight through analysis of critical engine parameters." Hence designs are application-specific. "And CP-Carrillo is one of the only rod manufacturers that can offer its own high-end piston-and-rod assembly, engineered

"With all the computer programs we have now for designing connecting rods we are making great strides toward making all of our rods match a specific horsepower and/or application."

good is not good enough."

Saenz, Casella continued, "specializes in small production runs, focusing on the specific characteristics of each engine project—not just the brand of the engine, but on the desired end-product and its application." All Saenz rods are made in Argentina using US-supplied steel or titanium.

Worldwide distribution is handled by Top Enterprises of Miami, Florida; but Jacquemin Tuning of La Madeleine, France, has been the European distributor for Saenz for 15 years. "The new Saenz beam profiles have been very successful," testified Jean Marie Jacquemin, "as they have allowed weight reduction with no compromise in reliability. Their quality products and our professional service have been the keys to our constantly growing business. We not only keep all the popular sizes in stock but, thanks to our partnerships with piston,

to perform together as a single unit."

Aluminum rod manufacturer Hussey Performance of Ambridge, Pennsylvania, has moved into a new and expanded manufacturing facility. "We're excited about the move," enthused Mary Saunders. "The new facility allows improved climate control in manufacturing, finishing, and inspection areas, as well as a better shop layout for efficient workflow and production." Further, "we used to maintain one facility to produce our gaskets and another to produce our rods. We can now manufacture all Hussey Performance products under one roof, with room for future expansion and new product development."

Hussey Performance offers "a full line of billet and forged aluminum connecting rods," Saunders added. "Our forged rods are engineered specifically for high-horsepower engines, including Top Fuel, Alcohol, Nostalgia Fuel, Pro Mod, and

other blown, nitrous, or turbocharged applications. They are available with a number of pin diameters and housing core options. We use only ARP fasteners to ensure a complete rod package that delivers performance and reliability."

Lunati of Olive Branch, Mississippi, has improved the machining process on its Pro Series connecting rods. "We've re-engineered the forging and made them a few grams lighter," reported Jeff Sams, "and we now x-ray the forgings for imperfections before we even start on them. We also machine a flat spot to check for through-hardness." Sams described Lunati Pro Series forged rods as "billet appearing" because of their fully machined surface. Lunati offers Pro Series rods for small and big block Chevrolets, and for the GM LS. All come with ARP 2000 fasteners. "On the small block, we've been able to shorten the bolts to provide more cam clearance," Sams added. "We now offer 2,000-inch and Honda journals, which we didn't before. And the new forging allowed us to add some applications, including a 5,400-long Ford." Also new is the option of REM polishing, "which makes the outside of the rod more slippery and oil-repellent. It appears almost like chrome."

On its H-beam rods, Lunati has "tightened some of the clearances, so these are more accurate than they were in the past," said Sams. Lunati's Pro Series rods are 100 percent US manufactured, while the company's H-beams are machined in the US from imported forgings.

K1 Technologies of Byron Center, Michigan, has released new NHRA-approved Chrysler Drag Pack rods. "These rods are made with the correct beam offset for this block," said Tom Molnar, "and will correct the problems caused by the improper offset of the rods that come in these engines." K1, he added, "is constantly working on improving our products and providing the best possible parts in the industry. We are also able to manufacture short-run and custom connecting rods at affordable prices."

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