LIFTING THE SHROUD

JON KAASE'S CANTED-VALVE P-38 WINDSOR CYLINDER HEADS AIMS FOR BETTER CYLINDER FILLING

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With a mechanical roller camshaft, the valve springs have an installed height of 1.95in and generate seat pressures of 240lb. Open pressure is 500 to 600lb. As the action is quicker on a mechanical roller system, greater spring pressure is required to maintain contact between the roller tappet and the cam lobe. In contrast, seat pressure for a hydraulic roller system might be 145 to150lb

Naturally, the P-38 head employs stud-mounted rockers. Most rocker arms will readily adapt to the P-38 cylinder heads but because the valves are canted, the ends of some of the fulcrum shafts may need a touch-up with a hand-grinder. Trend pushrods operate within these guide plate slots, which prevent the rockers from rotating on their axis and ensure that the ends of the rocker arms remain centered on the tips of the valves

Engine philosopher Jon Kaase (Jon Kaase Racing Engines, Winder, Georgia) had an idea, an idea that nagged. For too many years, he'd watched the ubiquitous 302ci Windsor amass part upon improved part, but observed nary a deviation from the original cylinder head configuration. He thought he could produce cylinder head castings that looked like ordinary Windsor 302/351 parts on the outside but inside would be entirely different from the original blueprint.

Being a racer, he knew the value of stealth. But more importantly, being an engine builder he knew the prime advantages of canting the valves to open towards the centre of the cylinders and so mitigate the natural shrouding effect of the cylinder wall.

The P-38 cylinder head was designed primarily for the 302W (8.2in deck height, 4x3in bore and stroke, 5.095in rods); its derivative the popular 347ci (over bored by 0.03in and stroke increased to 3.4in); the 351W (9.5in deck height, 4x3.5in bore and stroke, 5.96in rods), and the 427-454W Sportsman-type Dart block (9.5in deck height with 2.75in Cleveland main journals, 4.125x4in or slightly larger bore and stroke). Combustion chamber volume is typically 60-62cc.

For better cylinder filling, Kaase envisioned valves canted at 8x4.5 degrees (8deg from the engine's left to right, and

The head of the 2.100-inch intake valve maintains stems measuring 11/32x5.45in; the stems of the 1.6in exhausts are 11/32x5.46in

In addition to the P-38 head kits, Kaase constructs fully built P-38 engines, each complete with dynamometer sheet and video

As a canted-valve construction, the arc of at least one of the rockers on the P-38 interferes with the conventional rocker cover. Kaase's exclusive cast aluminum covers eliminate the problem. As a clean-sheet design, it was also easy for him to increase clamping power: the rails on the P-38 head are configured for eight (rather than the usual six) fasteners

The P-38 conversion accepts any Windsor intake manifold, including EFI types, but the Edelbrock Super Victor and Victor Jr. have proven the most effective so far

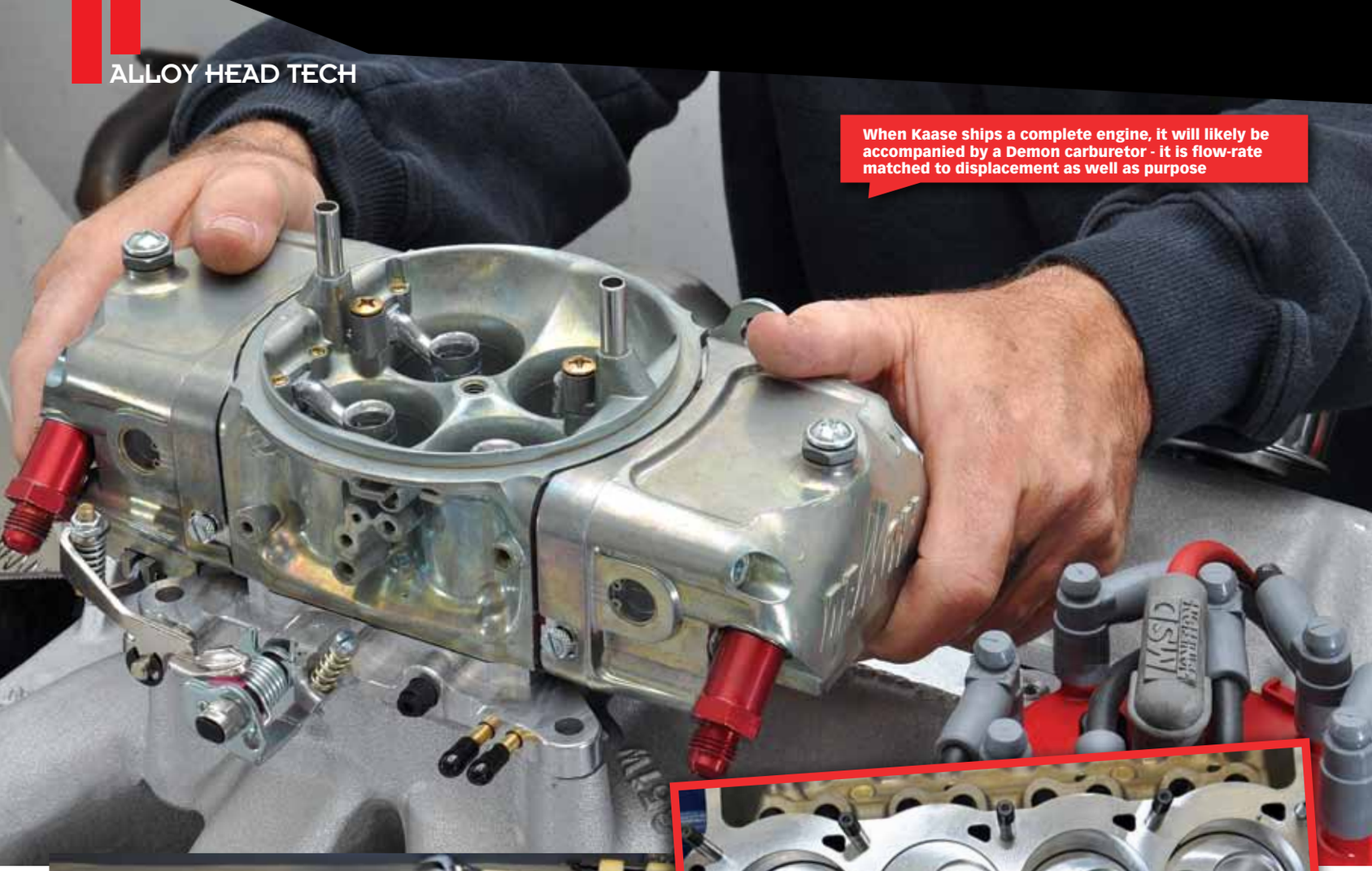
The P38's Advantage: Extra Cylinder Filling

4deg from the engine's fore to aft) on the intake and 10x4 degrees for the exhaust. The new territory produced by this modification would allow him to increase the diameter of the valve heads to 2.1 inches and 1.6 inches and by astute CNC porting he would induce far superior air flow and cylinder filling compared with any conventional layout. The revised angles place the intake valve advantageously in the cylinder bore and the CNC porting is much more efficient than the original. It also has the qualities of a sweeping short-turn radius (on the floor of the port) and deeper valve bowls, giving the atomised fuel improved entry to the combustion chamber.

Assume a 2.1 inch intake valve yields 350cfm in a port with a given cross-sectional area. Then assume that you increase valve size to 2.2in and the engine yields 360cfm; the result could actually indicate a loss in performance. Such is the consequence of increasing the intake port and losing the air velocity because the opening is larger. Sophisticated petrol heads know it doesn't pay to increase CFM unless the air speed remains at, or improves towards, the optimum velocity.

Then, because the P-38s flow so well at 0.4-0.5 inches of valve lift, the camshaft could be tailored with 5- to 10-degrees less duration. This usually

When Kaase ships a complete engine, it will likely be accompanied by a Demon carburetor - it is flow-rate matched to displacement as well as purpose



The P-38 cylinder heads have mounting provision (2in centers) for conventional tubular exhaust headers as well as wider (3in) centers that allow for larger exhaust ports

Most Kaase crate engines employ Diamond forged pistons engineered for the application. On the other hand, if conventional pistons are required, they need a small valve relief (no more than 0.125-inch at the outer edge) to accommodate the canted angle of the intake valve. This is a simple fly-cut operation aided by a hand drill

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results in smoother idle and better low-end manners. These Kaase heads favour camshafts with close lobe centres that tend to produce more power.

Though the 351 Cleveland could be coerced, its coolant returns via the front of the block. With the Windsor, coolant returns to the radiator through the intake manifold. Certainly, the Cleveland's redundant passages could be blocked off, but Kaase's wisdom is to use the aftermarket Windsor block that is stronger, readily available and requires no modification.

On pump fuel and with barely 9.0:1 static compression, a modest mechanical roller camshaft, and an Edelbrock Victor Jr. intake manifold, the Kaase 302W easily produces 500hp at around 7,500rpm. At the other end of the power spectrum, a Kaase-equipped 392ci OE cylinder block belts out 650hp all day long but is fully capable of producing 700hp and beyond if desired.

Including valve covers and valve cover gaskets, the P-38 heads are supplied with larger valves, springs, seals, retainers, rocker studs and guide plates installed. Complete P-38 engines are also prepared at Kaase's facility. These are accompanied with dynamometer test results and often a video. Dyno tests ensure the engine is producing the expected power output and is free of oil and water leaks.

Kaase: the Pro Stock engine master who achieved a remarkable 1.7lb.ft per cubic inch (103lb.ft per litre)