Gills | HUGHES HEADS FOR PROJECT BAD FISH

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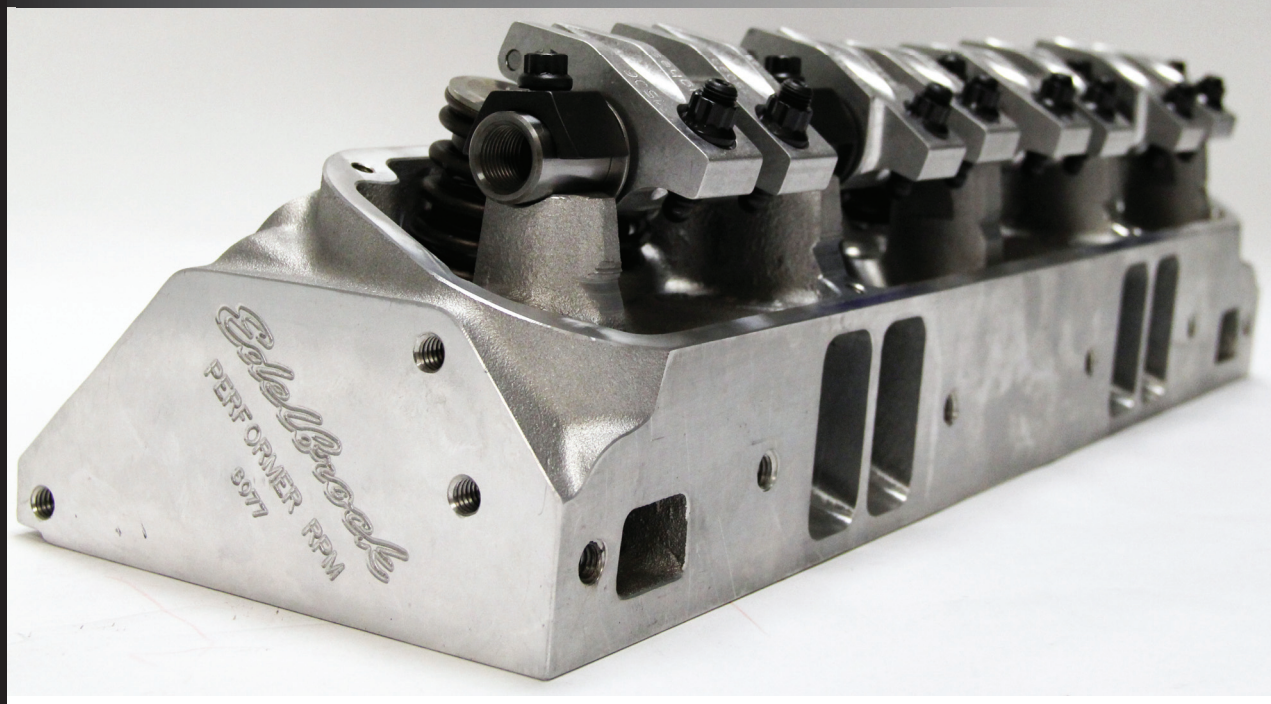
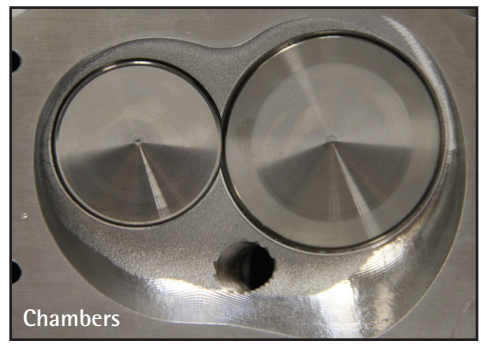


Written by Evan Perkins
Behind the Lens: The Author and Dave Hughes

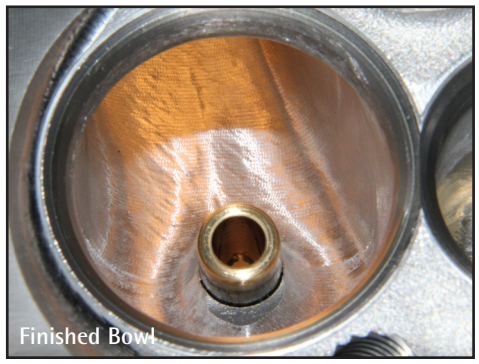
Last month we assembled a fully-forged 408 stroker bottom end for our project Bad Fish '66 Barracuda. But, before we bring you the top end story we had to share the killer set of heads that are not only ready to bolt on and make power, but are a unique departure from the average mopar build.

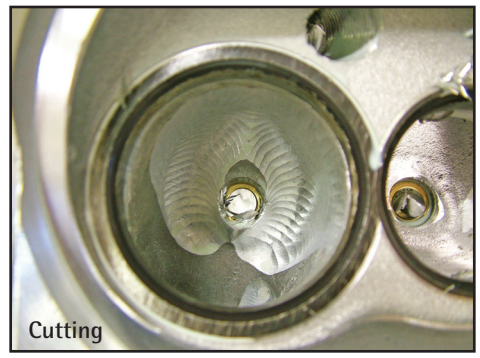
As we found out, quite quickly, when doing research for this build: When it comes to the small-block Mopar, the aftermarket is not exactly flooded with cylinder head options. For those of us staffers with Ford and Chevy backgrounds, that fact was a rude awakening. Few companies offer heads at all for LA block and all of the factory castings (save for the hard-to-find W-series race pieces) are severely lacking in the flow department by modern standards.

Fortunately, Edelbrock had an aluminum head to fit our application and even more fortuitous was the fact that Dave Hughes of Hughes Engines has an innovative "Big Mouth" CNC program that removes the pushrod pinch from the intake runner and yields serious air flow—perfect for our stroker's 600 horsepower goal.


Chambers

The process begins with a set of Edelbrock Performer RPM cylinder heads that are yanked off the assembly line before their intake pushrod holes are drilled. The heads are packaged in the belly of an airplane and travel the 2000-and-something miles from Edelbrock's Calif. production facility to Hughes' Illinois outfit where they get a major reworking.


Finished Bowl


Cutting

Hughes begins by drilling the pushrod hole .375 inches away from the intake port, which allows it to be opened much wider than a factory-style casting. For customers that already own a conventional set of Edelbrock Performer LA heads, Hughes can plug the existing pushrod holes and drill new ones.

"The biggest bottleneck to getting more power from small block Mopars, especially with large displacement strokers, is intake port volume and airflow," said Hughes.

the 411

- The **finished bowl** has a streamlined air-path and the valve-guide bosses have been profiled
- The **chambers** are opened around the valves and the rest of the chamber is nearly as cast.
- The ports are roughed out and note how the guides are pushed out of the head slightly for clearance while **cutting**.
- The **Crane springs** installed in the head have a 1.540-inch diameter and carry a 434 lbs/inch rating.

The Digits

We'll stop stalling and give you what you want. Here are the flow numbers for Hughes Big Mouth heads and their stock Edelbrock counterparts. Pay extra attention to the drastic mid-lift improvements.

Flow @	Intake	Exhaust
.100"	77 CFM	53 CFM
.200"	168 CFM	104 CFM
.300"	236 CFM	145 CFM
.350"	262 CFM	160 CFM
.400"	279 CFM	174 CFM
.450"	292 CFM	185 CFM
.500"	305 CFM	192 CFM
.550"	308 CFM	199 CFM
.600"	312 CFM	204 CFM
.650"	316 CFM	208 CFM
.700"	320 CFM	211 CFM


Crane Springs

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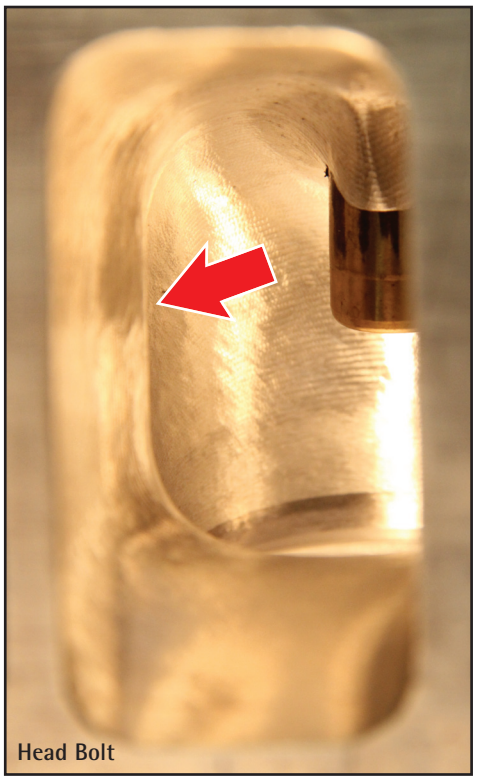
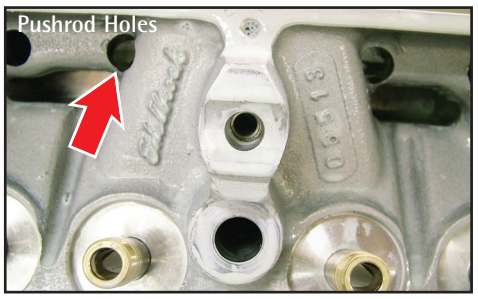
Hughes' Big Mouth heads sport a robust 225 cc runner.


Head Bolt

While most heads spec in at about 180 cc of intake port volume, Hughes' Big Mouth heads sport a robust 225 cc runner—a 45 cc improvement! And, while the cornerstone of the head is inarguably what Hughes is able to do with the intake port, the work doesn't stop there.

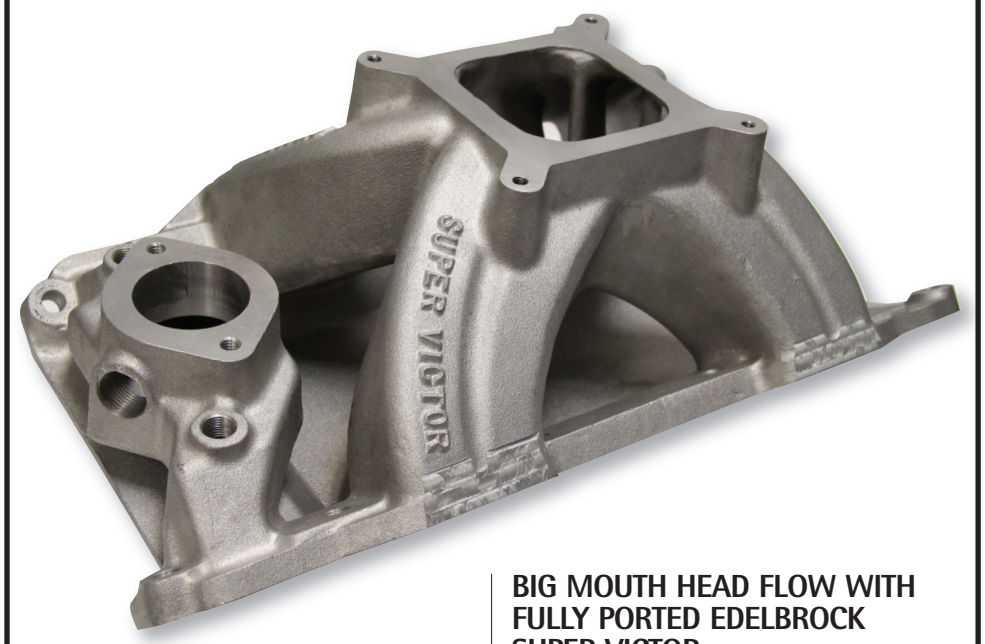
The intake and exhaust ports are treated to full CNC profiling that ramp flow up even further. Hughes also substitutes the Edelbrock-supplied 2.02-inch intake valve for a larger 2.08-inch Manley valve. According to Hughes, the undercut, swirl-polished Manley valve is worth about 13 CFM on the flow bench.

Lastly, the combustion chambers are machined to de-shroud the valves, which allows even more air to pass by them. This process enlarges the combustion chamber volume, which will knock compression down. To combat this, Hughes mills the heads back to 64 cc.


Pushrod Holes

the 411

- The way the heads are designed (by Mopar) a **head bolt** passes between the runners limiting runner width at that point.
- Notice how little the **pushrod holes** protrude into the intake runner path now that Hughes has moved them.
- The **exhaust ports** are opened up as much as possible.
- Hughes includes all of the necessary **spacers** to align the rockers squarely over the valve stems.

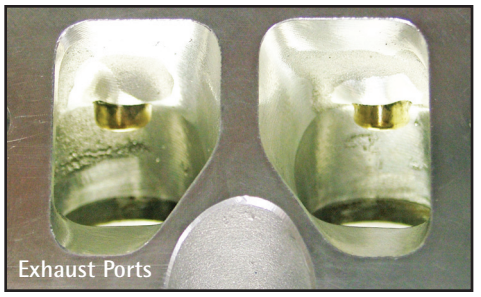


Middle Ground

Between the carb and heads there is one more important part of any induction system: the intake. And, what good is a trick set of high-flowing heads if they are choked by a poor flowing intake? The Edelbrock Victor is certainly no slouch as-cast, but with some attention to detail and careful matching of the ports to the head, Hughes was able to find more CFM in each runner.

BIG MOUTH HEAD FLOW WITH FULLY PORTED EDELBROCK SUPER VICTOR

FLOW @		IMPROVEMENT
.100	123 CFM	+ 9 CFM
.200"	158 CFM	+ 4 CFM
.300"	219 CFM	+ 12 CFM
.400"	258 CFM	+ 23 CFM
.500"	272 CFM	+ 25 CFM
.600"	281 CFM	+ 25 CFM
.700"	289 CFM	+ 25 CFM

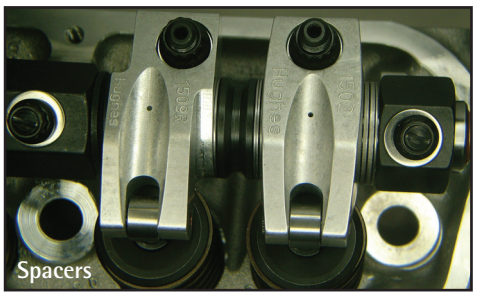

Exhaust Ports

All of the work on the ports bumps the flow numbers to a peak of a whopping 320 CFM intake and 211 CFM exhaust at .700 inches of lift. While those numbers are impressive to say the least, the true character and function of the heads is in their low-lift and average flow.

"Flow at peak lift is a poor way to rate cylinder head airflow," said Hughes. "The mid-lift numbers are much more important because the valve is open longer in the mid-lift range and it is there twice, once when opening and again while closing.

The average flow of the Big Mouth heads between .150 inches and .600 inches of lift is a 248.7, a 37 percent increase over the un-ported numbers. This means the heads have picked up flow across the board, not simply in a small lift section.

In addition to putting together an awesome head package, Hughes team went to work on the Edelbrock Victor intake manifold to make sure it wasn't bottle-necking the flow. As it turned out, the intake dipped flow down considerably. After port matching the intake


Spacers

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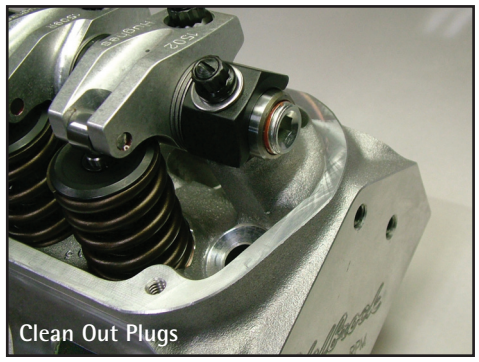
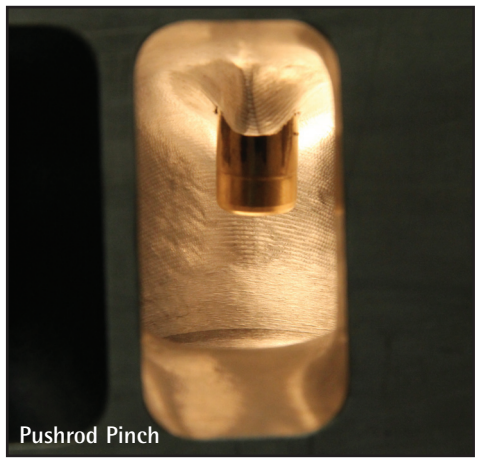
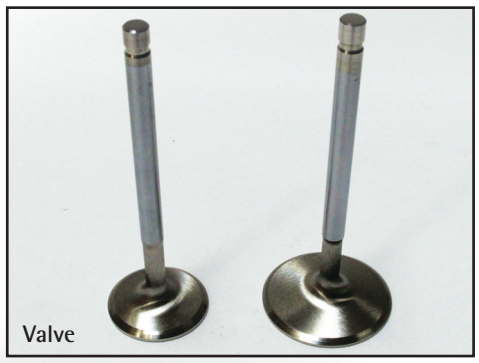

Clean Out Plugs


Pushrod Pinch

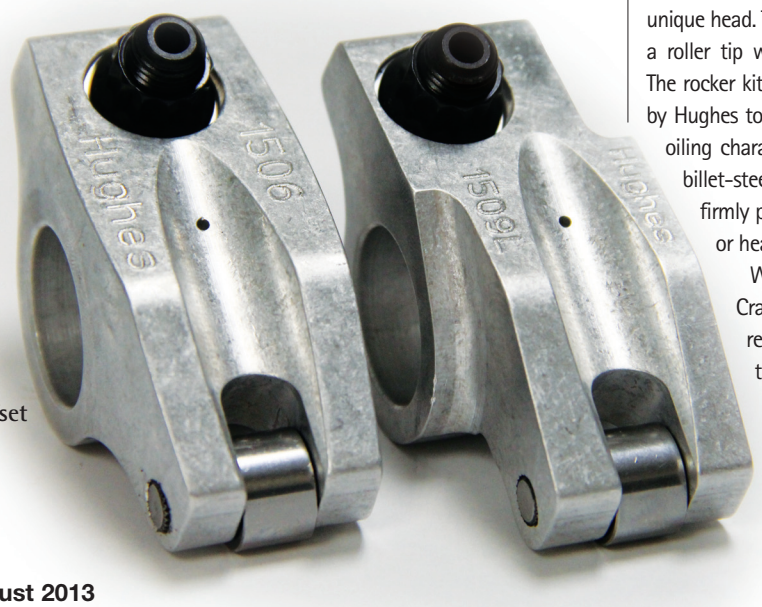

Valve

What's Up Above

Hughes not only redesigned the heads for huge runners and big flow numbers, they also supply all of the valvetrain components to make the setup work on any pre-magnum Mopar small-block. The rockers are aluminum with steel roller tips and ride directly on Hughes rocker shafts that are thicker to reduce valvetrain deflection. The 1.6 ratio rockers are designed to handle serious abuse and have a .350 offset to accomodate the modified ports. Hughes also includes the correct rocker-shaft spacers to make sure all of the rockers are perfectly centered over the valve stems.

the 411

- Note the convenient threaded **clean out plugs** in the end of the shafts.
- Hughes has all but eliminated the **pushrod pinch** from the port. Now, the smallest cross-sectioned area of the port is the intake gasket at 2.58 sq/in and the runner displaces 225cc.
- The heads utilize an Edelbrock supplied 1.6 inch exhaust valve and a Manley supplied 2.080 inch intake **valve** for added flow.
- **Hughes offset rockers** are what make the whole setup come to life. These machined-aluminum 1.6 ratio, roller-tipped pieces are practically art.



Hughes Offset Rockers

to the head and cleaning up the runners, flow improved dramatically.

Because the heads move the pushrod hole over to enlarge the runner, an offset rocker is required to make the valvetrain components properly line up. Hughes Engines makes the exact rocker to compliment their unique head. The rocker is made of aluminum and uses a roller tip with a .350-inch offset and a 1.6 ratio. The rocker kits include stronger rocker shafts designed by Hughes to reduce deflection and provide improved oiling characteristics. Hughes also offers a studded, billet-steel hold-down kit to keep the rocker shafts firmly planted in their saddles even at high RPM or heavy valve-spring pressure.

We had Hughes load our heads with Crane 1.550-inch springs and trick titanium retainers to work with the big, solid-roller that is ready and waiting in the block. Hughes cautions that the 1.540-inch spring is an extremely tight fit that may require rocker shaft saddle shims to clear the rocker bodies.

With the heads in place this motor is in good shape to make some real horsepower. Stay tuned for upcoming issues when the motor gets buttoned up and subsequently takes a field trip to the dyno. ■

SOURCE

Crane Cams
386.310.4875
cranecams.com

Edelbrock
310.781.2222
edelbrock.com

Hughes Engines
309.745.9558
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Manley Performance Products
732.905.3366
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