

SERVICE DEPT.

EXTRUDE HONE

Putty Porting: Salvation or Supplement?

Call it what you may, but there's no denying the fact that racing is a game of time—he who can navigate a given course in the shortest amount of time wins. Simple stuff. And when it comes to any form of motor racing, increased engine performance is a fairly substantial factor leading to decreased lap times.

Different carburetors, pipes, wild porting and head work are all things that have been tried in attempts (sometimes unsuccessful) to build faster and/or easier to ride motorcycle engines. Extrude Hone adds another chapter to that book.

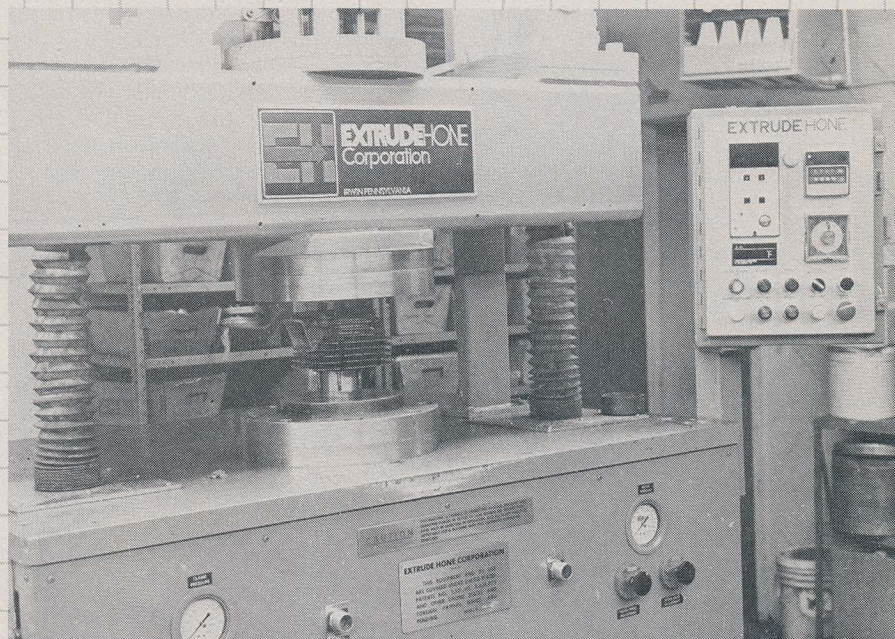
It was originally developed for the aerospace industry to radius and deburr aircraft valve bodies and spools. "Extrude Hone is a process for the honing (finish-machining) of edges and surfaces by the extrusion (controlled forced flow through a restriction) of abrasive laden semi-solid grinding media across those edges or surfaces," states a brochure from the Extrude Hone Corporation.

How can it be used in motorcycle engines and what are its benefits in that application, though? Well, it's kind of like a well done port polishing job, to put it simply, but there's more to it than that. The process, nicknamed "putty porting" by Joe Doyle of Extrude Hone, is done by a computerized machine that controls the flow of a Silly Putty-like organic material which contains silicone carbide, the cutting agent. The machine forces the putty back and forth through a cylinder's (or head's, in the case of a four-stroke) ports under approximately 600 psi pressure, thus giving the ports a polished finish as well as radiused edges.

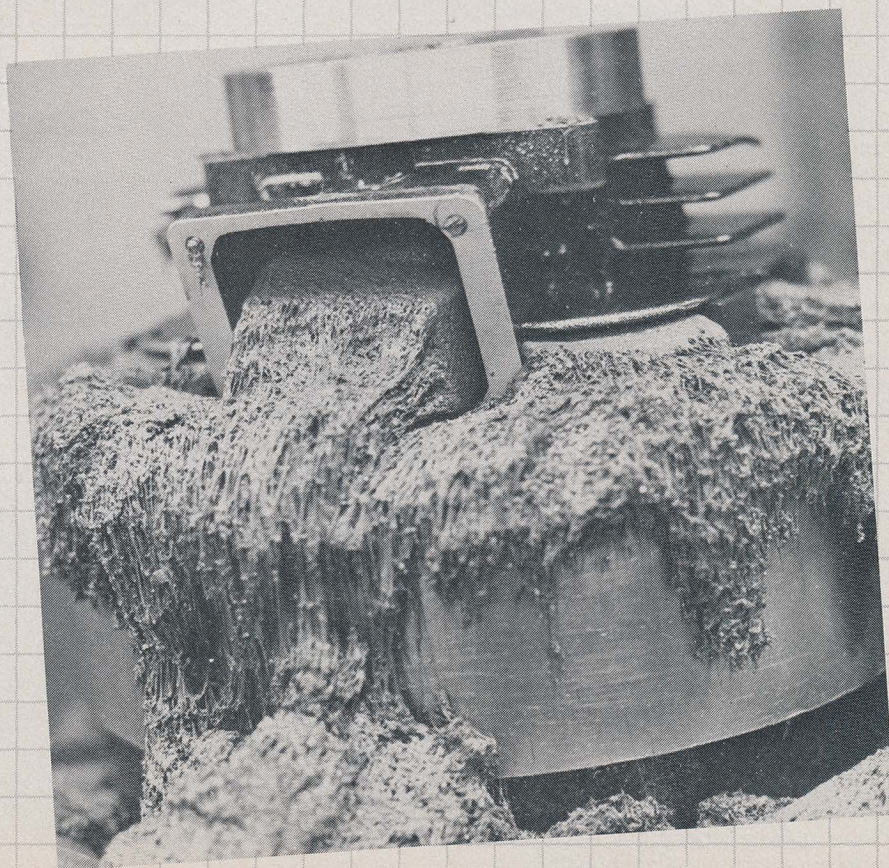
However, "You can't compare our polish with a regular hand polishing job," says Doyle. "How do you know with your hand how much pressure to use to give the port a good, consistent finish? No hand tools are used (with the Extrude Hone process) so human error as far as hand tools and their imperfect use is completely eliminated."

More important than simply the finish of the polish is the directional lay of the metal in the port, Doyle maintains, and with the "putty porting," directional lay goes with the flow . . . of the putty at first and of the engine's gasses later. A manual polish may look good, but under microscopic examination, the port's surface would be rough still.

Due to the smooth port surface areas, gasses attain higher velocities and better



Here's the machine, computer controls to the right, that "putty ports" your cylinders. The barrel shown would be encased in sealed steel cylinders were the process actually happening.



Not a pretty sight, is it? The finished ports, on the other hand, are better looking.

SERVICE DEPT.

atomization, claim Doyle and Ed Melen-dez who has spent 15 years growing up with the different facets of the Extrude Hone process. With the improved atomization, leaner low- and mid-range jetting is often necessary, the powerband becomes smoother, and throttle response improves. The radius on the ports means two-stroke piston rings don't clip a sharp point as they can with a chamfered edge (a chamfer still has an edge while a radius is a rounded contour).

In addition, the process is touted as highly consistent. All four port walls have equal pressures at all times, and the putty's consistency remains constant, though it can be changed if deemed necessary. Thus, the job on one cylinder will be just like the job on another cylinder like it ten months later, Doyle states.

Putty porting does not change the basic shape of a port, nor does it move it around and affect port timing. Putty porting simply improves upon the factory's port work or can be used as the finishing touch for a special port job, Doyle feels.

To test Extrude Hone's claims, our feature editor volunteered his 1982 Kawasaki KX250 motocrosser to be the so-called guinea pig. Kawasaki furnished a new piston and rings to freshen up the top end after the cylinder bore was checked and found to be well within specs. Following a break-in period, there were two stops to make before taking the cylinder to Extrude Hone. The first stop was at Kerker to get dyno figures on the stock engine. The readings: 33.8 horsepower at 7,500 rpm and 23.9 lb./ft. of torque at 7,000.

Next, the cylinder went to Pro-Tec, who agreed to put the cylinder on their Super-flow 110 flow bench before and after putty porting it. Pro-Tec performed two tests on the cylinder: They first tested the flow volume through all the ports, obtaining a reading of 109 cubic feet per minute. The second test involved measuring the flow through the transfer ports, which produced a reading of 96 cfm.

That was it for the standard KX cylinder. Extrude Hone took it, flowed the ports with their abrasive putty and gave the cylinder back a short time later. Visually, the cylinder bore and ports did look different. The process takes a minute amount—20-30 microinches, or four-tenths of a thousandth—off the cross hatch, apparently not enough to harm in the least the Electrofusion coated bore (which Kawasaki says should not be bored or honed).

More surprising was the fact that casting imperfections in many of the ports remained, especially so in the intake tract. When questioned about it, Doyle replied that they concentrate on smoothing passages that are most important to gas

flow, like the bends in the transfers and the exhaust port itself. A second look confirmed that the bends and the exhaust port were finely finished indeed.

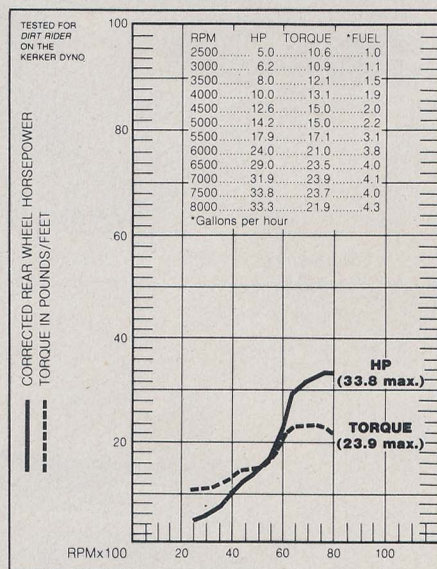
Reassembling the top end and riding the bike with standard jetting proved that the engine did do what was claimed it would. Bottom end and mid-range punch increased, making the KX, admittedly one of the easiest '82 250cc MXers to ride, even easier to get along with. The difference was not an arm-jerking, eyeball-popping revelation; it was an increase felt easily through the pants, though. Then it was back to Kerker.

The post-Extrude Hone dyno run showed the putty ported KX cylinder produced one more horsepower 500 rpm higher, now 34.8 at 8,000, and a tenth less maximum torque, now 23.8 lb./ft. at

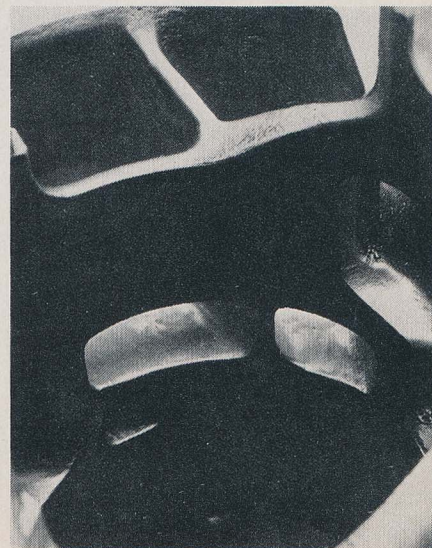
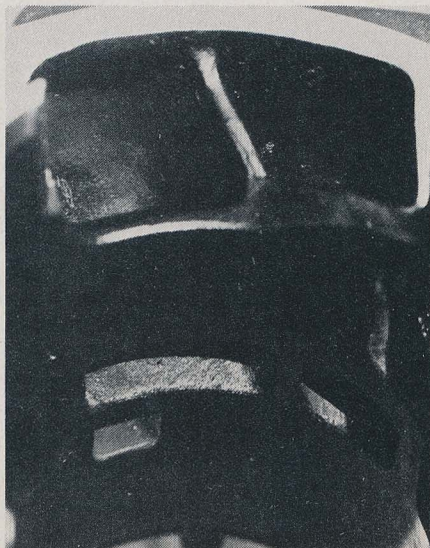
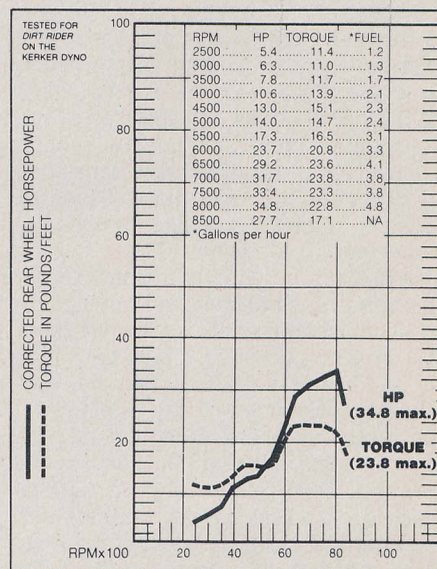
7,000. The massaged cylinder revved now to 8,500 rpm; before, it fell on its face at 8,000. There was more power and torque with the modified cylinder at the very bottom of the rev range as well as more at the very top. In real world terms, that would indicate an engine that pulled sooner and better coming out of a near-bogging situation plus it would rev longer, possibly reducing the number of time-consuming shifts necessary per lap.

Of interest was the spark plug base temperature readings between the two runs. Up to 6,000 rpm, the putty ported engine ran from five to 40 degrees cooler. From that point on, the readings ranged from ten to 100 degrees hotter. Though riding the bike did not indicate leaner jetting was needed for the low- and mid-range, that may have enabled

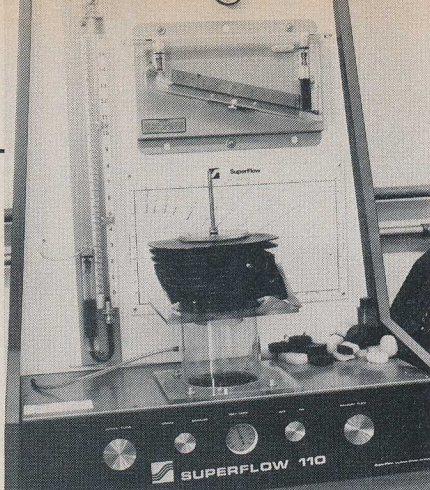
ENGINE DYN0 CHART (BEFORE EXTRUDE HONE)



ENGINE DYN0 CHART (AFTER EXTRUDE HONE)



On the left is the stock KX250B1 cylinder bore, looking into the transfer ports. On the right is the putty ported cylinder. The process does not remove all imperfections.



Pro-Tec's flow bench revealed that putty porting improved air flow markedly.

the engine to produce greater figures in that range for the second dyno run. Too, it may have reduced the range of spark plug base temperature readings during the second run, thus making them more consistent at all rpm.

Maximum fuel consumption was higher in the second run, 4.8 gallons per hour compared to 4.1, and generally higher at all speeds.

The cylinder came off quickly—with practice, most things can be done more quickly—for its second trip to Pro-Tec. The putty ported cylinder flowed 116 cfm through all ports, an astonishing increase of seven cfm. Flow through the transfers measured 101.5 cfm, a 5.5 cfm increase. The seven cfm increase impressed Pro-Tec's Skip Clark, who likened it to the difference between a dirty and a clean air filter—quite respectable, in other words, and enough to get him thinking about using the Extrude Hone process in building his killer thumper engines.

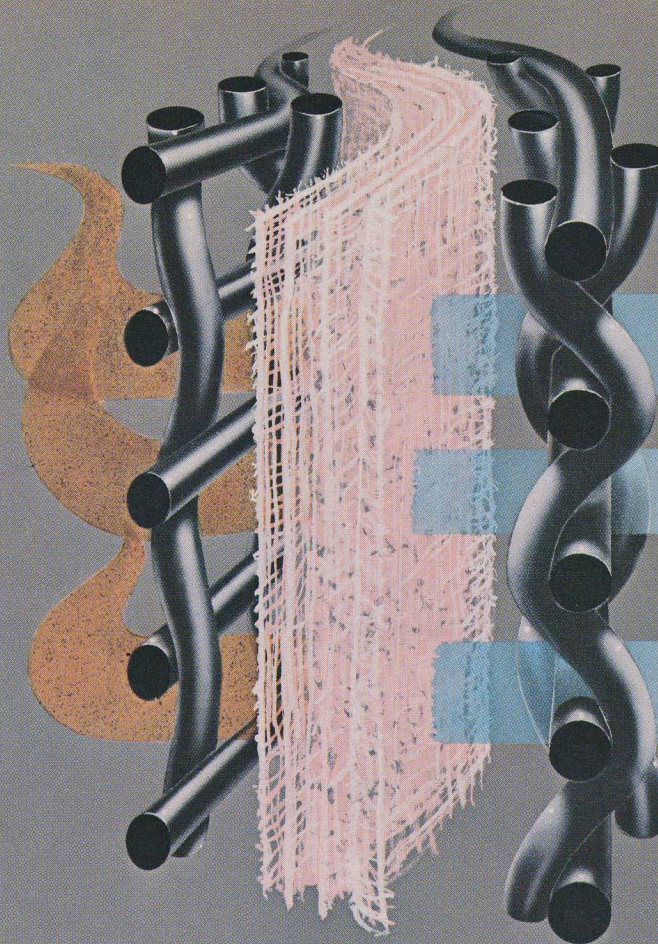
Admittedly this was an experiment of one, and not every cylinder will show the same changes. On some bikes there may be a more noticeable increase on top while others may exhibit little change anywhere. Based upon our experience with the Extrude Hone process, we can say that it does what is claimed of it. If you're looking for Open class-type power out of a 125, though, keep looking; that's not what Extrude Hone's about.

The cost of putty porting your cylinder is \$114 for money order or cashier's check and \$120 for Visa or MasterCard. Extrude Hone generally works on a two- to four-day turnaround. All they require is the basic cylinder (keep the reed valve home) in the case of two-strokes or the head and an old spark plug only (no valves needed) for a four-stroke.

Those in the western part of the country can contact Joe Doyle or Ed Melendez for more information at Extrude Hone, 6845 E. Compton Blvd., Paramount, CA 90723, 213/531-2976.

For those in the east, contact Bill Fehl or John Metechen at Extrude Hone, 75 Pennsylvania Ave., Irwin, PA 15642, 412/863-5900.

DR



K&N FILTERCHARGER® PERFORMANCE - YOU GOTTA FEEL IT TO BELIEVE IT!

NO OTHER PERFORMANCE PART CAN MATCH US FOR "HORSEPOWER PER BUCK"

The K & N Filtercharger is engineered to smooth and straighten incoming air with its unique gauze and screen construction. This reduction in intake friction allows your engine to take a larger gulp of air during the intake stroke. Some engines with Filterchargers will actually flow more air than with no filter at all! The result is increased horsepower throughout the powerband.

The K & N is also extremely effective at filtering air. It is used by the vast majority of off-road and dirt track racers under incredibly dusty conditions.

And unlike other filters you throw away, the Filtercharger can be easily cleaned and re-used for the life of your engine.

In a world of high prices, it's nice to know you can still get your money's worth.

There's a K & N replacement or competition* filter available for most American and imported motorcycles, even the exotics, and for most racing* applications. Get yours now!

*Legal in California ONLY for racing vehicles which may never be used on a highway.



K & N Filters are available by direct mail. Send \$2.00 for Motorcycle Catalog to K & N Engineering, Inc. • P.O. Box 1329 • Riverside, CA 92502 • 714/682-8813.

©K & N Engineering Inc. 1983