

FLEX-HONE®

**Brush
Research
Mfg.**



**Field
Application
Report**

Field Report No. 107 of a series describing Flex-Hone applications.

Deburring/Finishing Tool improves quality for hydraulic tool maker

To maintain a critically important cylinder surface finish in its products, an international hydraulic tool manufacturer has turned to a versatile deburring and finishing tool which meets its strict quality standards.

The manufacturer, ENERPAC, a division of Applied Power Inc., headquartered in Butler, Wisconsin, produces hydraulic tools; such as, cylinder, pumps, jacks, valves and components for a wide variety of industrial construction applications, including all phases of equipment and machine manufacturing.

According to ENERPAC Senior Manufacturing Engineer William Kadlec, the company's product line "any kind of hydraulic lifting device" hydraulic pressure within a cylinder. The tools operate under pressures as high as 10,000 psi for such applications as lifting bridges, railroad cars, or any other high force requirement, e.g., pressing, pushing or pulling.



Operator prepares to deburr part for a hydraulic tool at the ENERPAC Butler Wisconsin facility.

The ENERPAC diversified product line features scores of hydraulic tools, in a variety of cylinder diameters from a half-inch to over 22 inches.

In manufacturing these tools, the boring operation is "critical because of the final cylinder finish necessary for quality," says Kadlec. The company insists on 8-18 micro-inch finish.

"If the finish is too rough, the U-cups and seals wear out. Conversely, if the cylinder surface is too smooth, the seals may leak."

To insure the proper cylinder surface, ENERPAC relies on Flex-Hone, a deburring and finishing tool from Brush Research Manufacturing Co., Inc., Los Angeles, CA. The system consists of a resilient-based hone with abrasive laminated to the ends of high-density nylon filaments.

"We use Flex-Hone to impart a better finish on the cylinders, remove burrs or improve quality standards of certain parts," says Kadlec.

The Flex-Hone is used directly after the boring operation, during which a cylinder of specified diameter is created in the hydraulic tool through the use of vertical or horizontal CNC machine, turret lathes or CNC lathes. During this process, high tool marks or irregularities can occur on the cylinder surface. The surface finish is measured on a profilometer.

"A normal finish in a bore, is you're lucky, measures 63," Kadlec explains. "A 250 finish is rough." Occasionally a finish falls into the ENERPAC required range of 8-18 by using diamond tools, but more often, the cylinder must be roller burnished and/or finished by honing.

Mounted on a spindle drill or hand-held, the Flex-Hone easily and quickly hones and deburrs the cylinder surface at speeds up to 500 rpm. The grit or grain sizes of the Flex-Hone used in the process vary according to the finish needed.



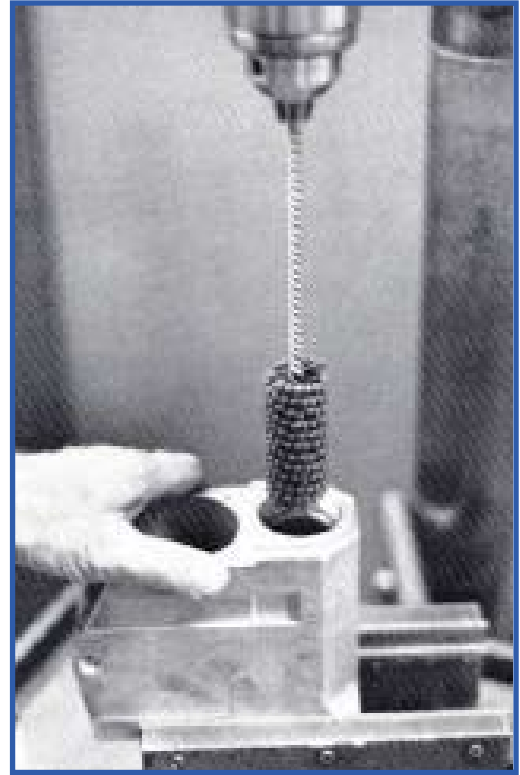
On a too-smooth cylinder finish, the Flex-Hone gives a crosshatch finish to bring the cylinder up to the 8-18 range. On a too rough finish, it brings it down to the 8-18 range.

ENERPAC utilizes a variety of Flex-Hone sizes for its extensive product line, and depending on the application, employs the finishing tool on thousands of units a year in a single product line.

"The Flex-Hone is so versatile, a great tool for out stringent standards," claims Kadlec. "It's mounted on a flexible shaft; you don't have to worry about true position. It's a great tool to maintain finishes or re-work them."

An added feature of the Flex-Hone, according to Kadlec, is that it's used with cylinders in which "cross-holes or connecting circuits create burrs around the edge of the holes. By running the Flex-Hone in the cylinder bore, the burrs are easily eliminated.

"The Flex-Hone allows us to maintain the stringent quality finish we demand, and our customers demand, for our hydraulic tools," Kadlec concludes.



Operator can eliminate the burr around the cylinder's port in two seconds. The company uses a variety of sizes of the hones for different types of parts.

