

General Application and Selection of the Flex-Hone Tool

The Flex-Hone Tool is a resilient, flexible honing tool used to improve the internal surface finish of a bore or cylinder. It is comprised of abrasive globules laminated onto the ends of flexible nylon filaments. Its unique construction allows the tool to be self-aligning, self-centering and self-compensating for wear. The tool provides the benefit of removing loose, torn and folded metal and creating a substantially flat or plateau surface. An additional important application for the Flex-Hone Tool is burr removal from cross-drilled holes.

We manufacture the Flex-Hone Tool in 8 different abrasive types and 11 different grit selections and a wide selection of sizes to work on a broad variety of base material and surface finish requirements in diameter from 4mm to 36".

Tool diameter is determined by the nominal bore size in which the tool is to operate. The Flex-Hone tool is always produced and used in an oversize condition that allows the soft cutting action to take place. A 1" Flex-Hone size is ordered if a 1" bore is to be finished and the tool is provided oversized. If the bore to be worked is between standard Flex-Hone sizes, the next larger standard Flex-Hone size is required. For instance, if the nominal bore is 1.093" then the 1-1/8" Flex-Hone is ordered.

Abrasive selection is largely dependent on the base material being finished and whether the application is for surface finishing or deburring. Silicon carbide is by far the most popular abrasive type. It is used to finish mild steel, stainless steel and cast iron. Aluminium Oxide is the next most popular abrasive and it is used to finish aluminium, brass, bronze and softer metals. Zirconia Alumina (Z-Gran) has very similar cutting properties to silicon carbide and can generally offer longer tool life. It is available in two grades: #1525 (25% Zirconia, 75% Alumina) and #1549 (40% Zirconia and 60% Alumina). It is used to finish low carbon to medium carbon steels, stainless steel and cast iron. Boron Carbide is used to finish medium to high carbon steels and heat-treated steels to 50 Rc. It is also useful in titanium, inconel and Monel. Tungsten Carbide is used for the hardest heat-treated steel alloys and more exotic space age alloys. Levigated Alumina is a super fine abrasive used for a final polish on many materials. Should be used where Ra requirements are very low. CBN and Diamond are experimental and are not commercially available at this time.

The amount of work to be performed and the degree of surface finish improvement required control grit selection. Coarse finishes may require progressively finer Flex-Hones to meet final surface finish requirements. In very general terms, final finish will be in the following ranges. This chart is intended to offer a starting point in selecting a grit but the final selection must be verified by actual trial.

<u>Grit</u>	<u>Finish Range</u>
800-LA	Ra 3-10 (.05 - .2 Micrometer)
600	Ra 8-12 (.2 - .3 Micrometer)
400	Ra 10-20 (.3 - .6 Micrometer)
320	Ra 18 -30 (.5 - .7 Micrometer)
240	Ra 24-32 (.6 - .8 Micrometer)
180	Ra 30-40 (.7 - .1 Micrometer)
120	Ra 35- 50 (.9 - 1.4 Micrometer)
80	Ra 45 – 64 (1.2 - 1.6 Micrometer)
60	Ra 60- 80 (1.5 - 2 Micrometer)
40	Ra 70 – 125 (1.7 - 3.2 Micrometer)
20	Ra 125 -250 (3.2 - 6.3 Micrometer)

The Flex-Hone Tool is a low RPM tool. Precise RPM is dependent on the diameter of the tool and the application. General speed ranges are given but again, machine trials are required to verify the parameters.

<u>Hone Dia.</u>	<u>RPM</u>
19" to 36"	60 - 120 RPM
12" to 18"	80 – 350 RPM
8" to 12"	300 – 500 RPM
4" to 8"	400 – 600 RPM
2" to 4"	600 – 800 RPM
½" to 2"	700 – 900 RPM
4mm to ½"	800 – 1200 RPM

Stroke rate is a function of Flex-Hone diameter, stroke length and cross hatch angle specification, if any. High crosshatch angles require faster stroke rates. The larger diameter tools might feed as slow as 10 – 12 IPM while the smaller diameter tools with high cross hatch angles might require feed as high as 250 IPM.

The Flex-Hone Tool always requires the use of a lubricant or honing oil. Finer surface requirements dictate better quality honing fluids be used. Many fluids may be used general applications: water soluble oils, mineral oils, motor oils and cutting and tapping fluids are adequate to keep the tool from loading and to insure exposure of fresh cutting particles. Solvents should be avoided, as they tend to degrade the adhesive bond in the tool.