

wears the cylinder wall more at the top of the cylinder. In most cases, the taper ends with a ridge, that must be removed during overhaul. [Figure 10-6]

Where cylinders are built with an intentional choke, measurement of taper becomes more complicated. Cylinder choke is where the top of the cylinder has been made with the very top diameter of the cylinder smaller, to compensate for wear and expansion during operation. It is necessary to know exactly how the size indicates wear or taper. Taper can be measured in any cylinder by a cylinder dial gauge as long as there is not a sharp step. The dial gauge tends to ride up on the step and causes inaccurate readings at the top of the cylinder.

The measurement for out-of-roundness is usually taken at the top of the cylinder. However, a reading should also be taken at the skirt of the cylinder to detect dents or bends caused by careless handling. A step, or ridge, is formed in the cylinder by the wearing action of the piston rings. [Figure 10-6] The greatest wear is at the top of the ring travel limit. The ridge that results is likely to cause damage to the rings or piston. If the step exceeds tolerances, it should be removed by grinding the cylinder oversize, or it should be blended by hand-stoning to break the sharp edge. A step also may be found where the bottom ring reaches the lowest travel. This step is rarely found to be excessive, but it should be checked. Check the cylinder flange for warpage by placing the cylinder on a suitable jig. Check to see that the flange contacts the jig all the way

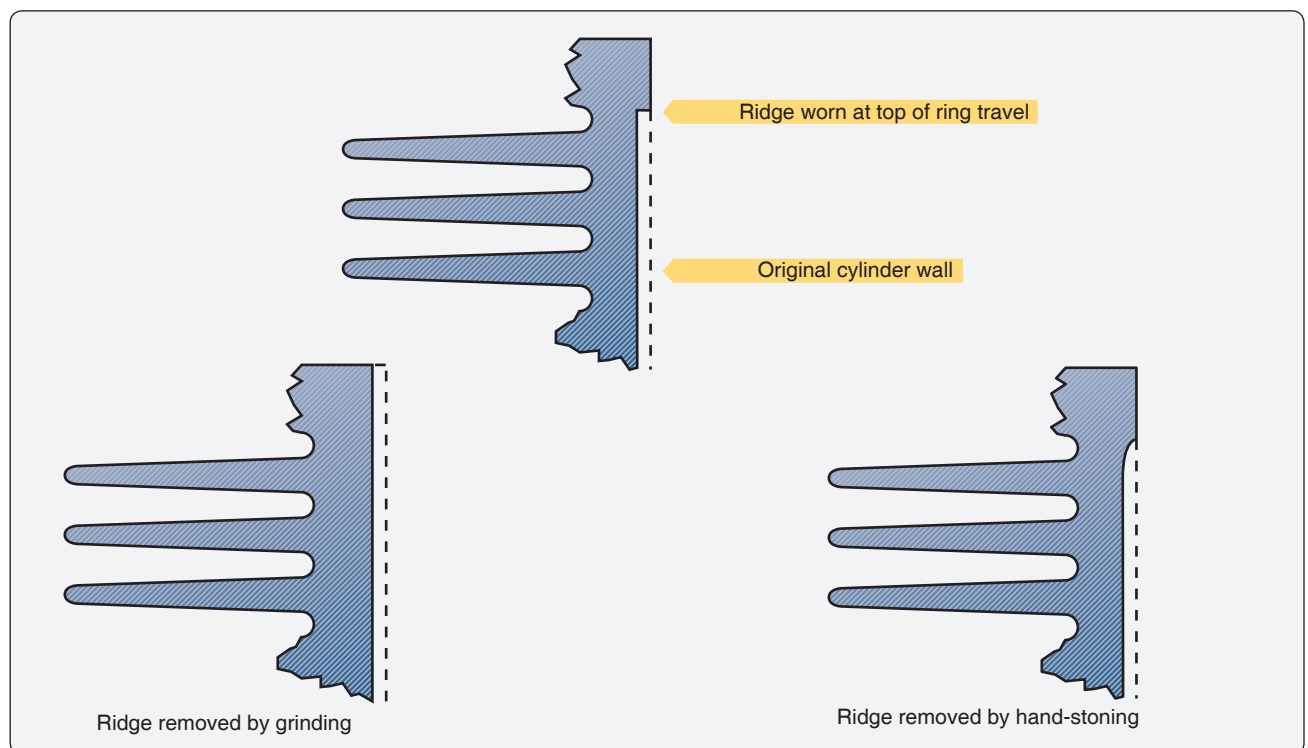
around. The amount of warpage can be checked by using a thickness gauge. [Figure 10-2] A cylinder whose flange is warped beyond the limits should be rejected.

### Valves and Valve Springs

The locations for checking runout and edge thickness of the valves are shown in Figure 10-7. Measure the edge thickness of valve heads. If, after re-facing, the edge thickness is less than the limit specified by the manufacturer, the valve must not be re-used. The edge thickness can be measured with sufficient accuracy by a dial indicator and a surface plate. Out-of-roundness is usually caused by a stuck valve. If a valve sticks, the rocker shaft tends to work up and down when the valve offers excessive resistance to opening. Inspect for out-of-roundness and oversize using a telescopic gauge and a micrometer.

Inspect the valve for stretch and wear using a micrometer or a valve radius' gauge. [Figure 10-8] If a micrometer is used, stretch is found as a smaller diameter of the valve stem near the neck of the valve. Measure the diameter of the valve stem and check the fit of the valve in its guide.

Compression is tested with a valve spring compression tester. [Figure 10-9] The spring is compressed until its total height is that specified by the manufacturer. The dial on the tester should indicate the pressure, in pounds, required to compress the spring to the specified height. This must be within the pressure limits established by the manufacturer.



**Figure 10-6.** Ridge or step formed in an engine cylinder.