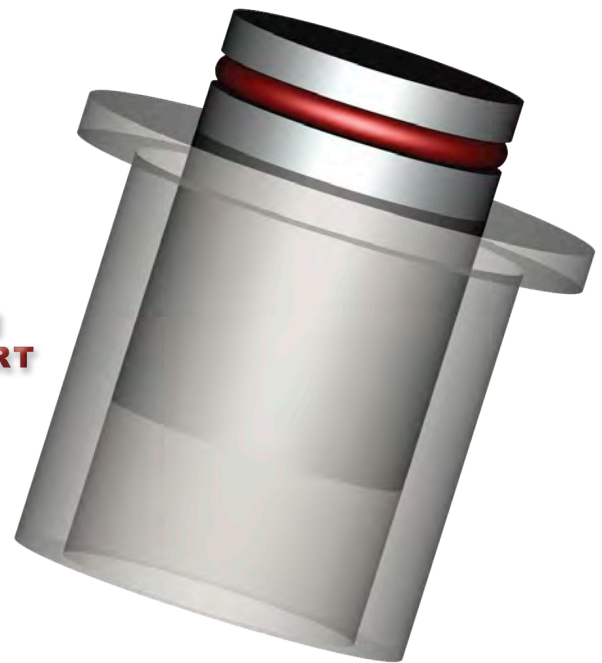




**BY
TOM
STUART**



I have been using O-Rings as piston rings in my Hit and Miss engines for the past 8 years with few problems.

An interesting feature of O-Ring use is the very low friction when the engine is coasting and yet the immediate sealing of the O-Ring to the cylinder wall during a firing cycle. O-Rings do a good job on slow-speed engines. They will probably not survive in a high-speed engine and would quickly convert themselves into a melted plastic ring.

You can modify your engine to use O-Rings with minimal effort (new piston and polishing the cylinder walls) and will probably see an immediate improvement in performance. The improvement I mention is more revolutions between a 'hit' and very little exhaust smoke. Of course O-Rings are easier to 'make' than traditional cast iron rings and you only have to use one.

I've had good success as long as I followed a few simple rules about their application.

Unlike 'normal' O-Ring applications, the dimensions of the piston ring groove are such that the O-Ring is not under compression in the static state and does not effect a aero-pressure seal. It takes pressure above the ring to cause it to press against the sides of the cylinder and the bottom of the ring groove.

For the example shown on the Drawing Page 15, a typical 1.5" bore cylinder in this hit and miss engine example will have 0.002" clearance between the piston and the cylinder. The O-Ring with a 1.5" OD and a 5/32" circular cross-section is made of Buna-N material. The piston ring groove is cut to provide 0.005" clearance top and bottom and 0.005" clearance on the back wall of the groove.

If we need a math formula for the groove it is:

Groove inner diameter = Cylinder I.D. - ((2 x O-Ring circular cross section) + 0.010).

With the values we have, that would be 1.5 - ((2x0.15625)+0.010) or 1.5 - ((0.3125) + 0.010) or 1.5" - 0.3225" = 1.1775".

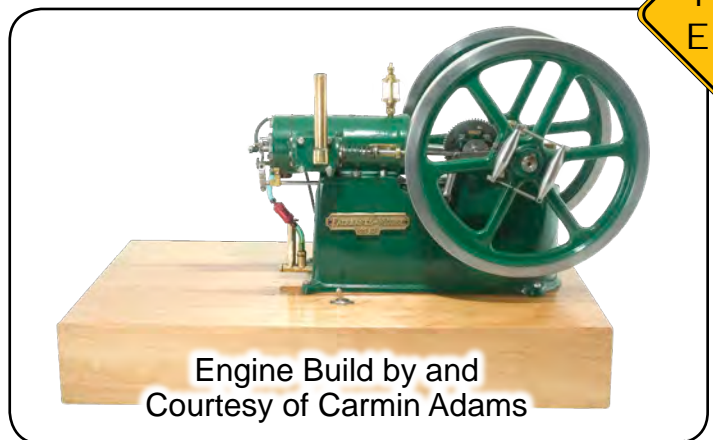
Cylinder wall finish should be as smooth as you can make it. Somewhere between 2 (mirror) and 32 (smooth shaft) micro inches is a good value. Some people actually recycle old hydraulic cylinders since they have chrome-plated inner walls. That isn't necessary for this application but a good smooth surface will help the life of the O-Ring.

During use, you want to have a light coat of motor oil on the cylinder walls. During a full day of running, I oil the engine about every hour.

Editor's Note:

Because we cannot adequately show surface finish in print, I use a BAR S-22 Microfinish Comparator which is a calibrated assortment of different finishes all cast into a single rectangle about the size of a candy bar. The finishes range from mirror to very rough (in machining terms). In use, you visually compare your surface finish to the samples and select the closest finish on the Comparator.

These are available from machine tool stores.



A 1/6th scale casting kit of this 25 HP Fairbanks N engine is available from Tom Stuart, 1157 Fabry Road S.E., Salem, OR 97306, 1-503 362-7107, tomsengines@aol.com