

## **How Long Will Your Engine Last?**

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Ever wonder how long the two-cycle glow engines we use in our RC planes will last? Provided they are cared for, aren't run too lean, and treated to after-run oil after every day's flying, the engines will last a surprisingly long time. They are mechanical, however, and will wear out in time. As long as manufacturers continue to provide parts, it is possible for engines to last indefinitely. Whether you want to continue to replace parts to extend the life of an engine is a purely economic one.

A two-cycle engine is one of the most simple machines invented. Because of this, you shouldn't have to pay someone to repair it; with just a little knowledge and skill, you can do it yourself. This means that the cost of repair comes down to the cost of replacement parts. Unfortunately, the cost of replacement parts is very high, and if required repairs are extensive, it is much more economical to replace the engine than to repair it.

Let's take an OS Max .61FX engine as an example. It is an excellent ringless engine that provides outstanding performance over a long period of time. The current list price for the engine at Tower Hobbies is \$179.97. The list of replacement parts for the engine and the costs for those parts, also obtained from Tower Hobbies, is provided below.

Crankcase	\$88.99
Crankshaft	46.99
Cylinder/Piston	99.99
Cylinder Head	34.99
Carburetor	55.99
Back plate Ass'y	39.99
Front Bearing	15.49
Rear Bearing	16.99
Connecting Rod	21.49
Muffler	41.99
Drive Washer	9.49
Glow Plug	7.99

With screws, O rings, and other small miscellaneous parts, the total cost of building an engine from those parts will be close to \$500, or almost 3 times the cost of a new engine! Fortunately, unless you have a spectacular crash, the only parts you will have to replace over time

are those parts subject to wear. The following is a list of parts that historically need replacement because of wear:

Cylinder/Piston	99.99
Front Bearing	15.49
Rear Bearing	16.99
Connecting Rod	21.49
Misc O Rings	6.58

The total of these parts is about \$160, so if you ever get into a situation where all of the above parts need to be replaced, it would probably make sense to opt for a new engine in lieu of repair. However, if your cylinder/piston is OK, then repair might be a good alternative for you.

The following is the life history of my .61 FX engine which should answer the questions related to how long you can expect your engine to last, and what you can expect for the life of your engine before it gets uneconomical to repair.

#### Repair History of a .61FX Engine

The engine was purchased new in September of 2004. It was installed in a Big Stick and flown for 18 flights. On 3/11/05 it was transferred to a PICA T-28. Somewhere between flights 130 and 150, the engine's performance seemed to deteriorate. It lost about 300 to 400 RPM at full throttle and became more difficult to turn over, especially in cold weather. After 170 flights, the engine was disassembled and inspected. The following problems were found:

1. Piston was badly varnished. Some carbon buildup on the top of the piston
2. Bearings were varnished and sluggish.
3. Connecting rod bearing at the crank pin was noticeably worn.

Engine parts were cleaned in a crockpot using antifreeze as a solvent (see article related to disassembling and cleaning of engines on the website). The connecting rod and all O rings were replaced and the engine reassembled. Engine performance improved significantly.

After 270 flights, performance began to deteriorate once more. At 280 flights, a loss of compression was observed, and low idle could not be maintained. On 11/25/09, the engine was disassembled and inspected. The following problems were found:

1. The bottom part of Piston was varnished indicating compression blow-by. The top of the piston had a significant amount of carbon buildup, and about 1/2 of the piston top edge showed wear. Replacement of the cylinder/piston required.
2. Bearings were varnished and sluggish. Front bearing was noticeably "noisy". The rear bearing looked worn and slid easily off the crankshaft. Bearing replacement required.
3. Lower connecting rod bearing was noticeably worn. Engine "clicked" with piston at top dead center. Connecting rod replacement required.

With replacement costs estimated to be close to that for a new engine, the engine was retired and a new engine purchased..

Based on the above, some generalities can be made for the life of engines, with and without repair. A good ringless engine will probably last for up to 150 flights before needing cleaning and minor repair. It will last for about 280 flights before failing parts and deteriorating performance make it uneconomical to repair. Note that a ringed engine has significant benefits as far as repair costs are concerned. If the .61FX were ringed, the engine would probably have been reconditioned after 280 flights and would still be flying today. The cost of a ring (about \$20) in lieu of a \$100 cylinder/piston replacement would have made economic repair feasible. There's something to be said for old technology!

May your engines be kind to you.

Steve Grabowski