

A complete overhaul process includes the following ten steps: receiving inspection; disassembly; visual inspection; cleaning; structural inspection; non-destructive testing (NDT) inspection; dimensional inspection; repair and replacement; reassembly; and testing and break in. The inspection phases are the most precise and the most important phases of the overhaul. Inspection cannot be slighted or performed in a careless or incomplete manner. It is always recommended that complete records be made of the inspection process and kept with the engine records.

Each engine manufacturer provides very specific tolerances to which the engine parts must conform, and provides general instructions to aid in determining the airworthiness of the part. However, in many cases, the final determination must be made by the technician. Although the determination must be made if the part is serviceable, repairable, or should be rejected, the technician should follow the manufacturer's manuals and information. When dimensional tolerances are concerned, the manufacturer publishes a new minimum and serviceable dimension for all critical component parts. Knowledge of the operating principles, strength, and stresses applied to a part is essential in making decisions regarding visible wear. When the powerplant technician signs the release for the return to service for an overhauled engine, this certifies that the complete overhaul process has been performed using methods, techniques, and practices acceptable to the Federal Aviation Administration (FAA) Administrator.

Top Overhaul

Reciprocating piston aircraft engines can be repaired by a top overhaul. This means an overhaul of those parts on top of the crankcase, without completely dismantling the engine. It includes removal of the units (i.e., exhaust collectors, ignition harness, intake pipes) necessary to remove the cylinders. The actual top overhaul consists of reconditioning the engine's cylinders by replacing or reconditioning the piston and piston rings, and reconditioning or plating the cylinder wall and valve-operating mechanism, including valve guides if needed. A top overhaul is a little misleading, because it is really an engine repair procedure and not a real overhaul as described earlier. Usually at this time, the accessories require no attention other than that normally required during ordinary maintenance functions. This repair is generally due to valves or piston rings wearing prematurely. Many stress that if an engine requires this much dismantling, it should be completely disassembled and receive a major overhaul.

Major Overhaul and Major Repairs

Major overhaul consists of the complete reconditioning of the powerplant. A reciprocating engine would require that the crankcase be disassembled per the FAA; a major overhaul is not generally a major repair. A certified powerplant-rated

technician can perform or supervise a major overhaul of an engine if it is not equipped with an internal supercharger, or has a propeller reduction system other than spur-type gears. At regular intervals, an engine should be completely dismantled, thoroughly cleaned, and inspected. Each part should be overhauled in accordance with the manufacturer's instructions and tolerances for the engine involved. At this time all accessories are removed, overhauled, and tested. Again, instructions from the manufacturer of the accessory concerned should be followed.

General Overhaul Procedures

Because of the continued changes and the many different types of engines in use, it is not possible to treat the specific overhaul of each engine in this text. However, there are various overhaul practices and instructions of a nonspecific nature that apply to all makes and models of engines.

Any engine to be overhauled completely should receive a runout check of its crankshaft or propeller shaft as a first step. Any question concerning crankshaft or propeller shaft replacement is resolved at this time, since a shaft whose runout is beyond limits must be replaced.

Receiving Inspection

The receiving inspection consists of determining the general condition of the total engine as received, along with an inventory of the engine's components. The accessory information should be recorded, such as model and serial numbers, and the accessories should be sent to overhaul if needed. The overhaul records should be organized and the appropriate manuals obtained and reviewed along with a review of the engine's history (log books). The engine's service bulletins, airworthiness directives, and type certificate compliance should be checked. The exterior of the engine should be cleaned after mounting it on an overhaul stand. *[Figure 10-1]*

Disassembly

As visual inspection immediately follows disassembly, all individual parts should be laid out in an orderly manner on a workbench as they are removed. To guard against damage and to prevent loss, suitable containers should be available in which to place small parts (nuts, bolts, etc.) during the disassembly operation.

Other practices to observe during disassembly include:

1. Drain the engine oil sumps and remove the oil filter. Drain the oil into a suitable container; strain it through a clean cloth. Check the oil and the cloth for metal particles.