



PushRod Engine with Gearbox



Bootjevaarder

[VIEW IN BROWSER](#)

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Summary

This 4 Stroke PushRod Engine with Constant Mesh Gearbox can be assembled and disassembled with Allen bolts and nuts.

[Learning](#) > [Engineering](#)

GENERAL

The model is designed to be (de)mountable with allen bolts and nuts. As such the finished model is very suitable for educational purposes.

Engine

A Overhead Valves engine is an internal combustion engine with the valves placed in the cylinder head. In this case the valves are operated by rockers and push rods.

This single cylinder engine has two valves, with an engine capacity of 123 cc.

Gearbox

In a constant mesh gearbox all the gears of the main shaft are in constant mesh with the corresponding gears of the countershaft. A sliding dog clutch is provided on the main shaft.

The constant mesh gearbox has forward neutral and reverse gears.

Primary Drive

For the primary drive there are 2 options: by chain (80 parts!) or gears. Chain tension and gear adjustment can be obtained by sliding the gearbox on the sledge.

Dimensions: 232 x 129 x 255 mm.

Weight: 0.9 kg.

PRINTING

The parts should be printed on a smooth build plate.
Try to avoid elephant foot.

I printed the model with PLA+ filament on a Prusa Mini.
Sliced with PrusaSlicer, 0.15 mm layer height, organic support where needed.

Printing hints are added for most parts.

ASSEMBLY

For assembled and exploded views, see the “3D Views” folder.

Assembly is in alphabetical order (A1 → M2).

A small amount of machine oil will help a smooth running of the assembled model.

Valve timing is done by putting the piston in the top position, and at the same time aligning the camshaft pointer with the corresponding pointer on the crankcase.

METAL PARTS

Two coil springs are needed for the valves, 16 mm width x 20mm height.
Wire thickness 0.9 or 1.0 mm (AliExpress).

Engine

Nine M6x16 mm allen bolts.

Two M6 nuts.

Four M5x16 mm allen bolts.

Four M5 nuts.

Two M4x12 mm bolts.

Gearbox

Four M6x16 mm allen bolts.

Two M5x16 mm allen bolts.

Two M5 nuts.

Sledge

Eight M6x16 mm allen bolts.

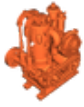
Although metal parts are preferred for strength, you can also use the designs for valve springs and bolts and nuts.

Model files



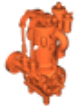
3D Views

9 files



model-assembled.stl

☐ Do not print.



engine-assembled.stl

☐ Do not print.



crankshaft-exploded-view.stl

☐ Do not print.



valve-train-exploded-view.stl

☐ Do not print.



printed-valve-springs.stl

☐ Do not print.



carburetor-exploded-view.stl

☐ Do not print.



gearbox-assembled.stl

☐ Do not print.



gearbox-exploded-view.stl

☐ Do not print.



chain-exploded-view.stl

☐ Do not print. Use a vice to press fit.

**a1-crankshaft-cheeks.stl**

☐ Cheek with small shoulder is Camshaft Gear Side.

**a2-crankshaft-pin.stl**

☐ Support everywhere. Use two M6 x 16 mm allen bolts.

**a3-piston-rod.stl**

☐ Support on build plate. Use two M4 x 12 mm allen bolts.

**a4-piston-and-piston-pin.stl****b1-crankcase-camshaft-gear-side.stl**

☐ Support on build plate.

**b2-crankcase-primary-drive-side.stl**

☐ Support on build plate. Use two M5x16 mm allen bolts and nuts.

**b3-crankshaft-bearings.stl**

☐ Press or glue to Crankcase B1 & B2

**b4-cylinder.stl**

☐ Support on build plate. Use two M6 x 12 mm allen bolts.

**b5-head-gasket.stl**



c1-cylinder-head.stl

☐ Support everywhere. Use two M5 x 16 mm allen bolts and nuts.



c2-valves.stl

☐ Print with layer height 0.12 mm.



c3-valve-springs-optional.stl

☐ Support everywhere.



c4-valve-rockers.stl

☐ Support on build plate. Use one M6 x 16 mm allen bolt.



d1-camshaft.stl

☐ Support on build plate. Use one M6 x 16 mm allen bolt.



d2-camshaft-gears-case-optional.stl



d3-camshaft-gears.stl

☐ Support on build plate. Glue Gears to Hubs. Use three M6x16 mm allen bolts.



d4-push-rods.stl

☐ Print with brim.



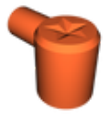
e1-carburetor.stl

☐ Support on build plate. (revision retaining ring 9-oct-2023)



e2-exhaust.stl

☐ Support on build plate. Print with brim. (revision retaining ring 9-oct-2023)



e3-spark-plug-cap.stl

☐ Support on build plate.



e4-stand.stl

☐ Click to Crankcase B1 & B2.



engine-bolts-and-nuts.stl

☐ Optional. Support on build plate.



GEARBOX

14 files



f1-main-shaft.stl

☐ Print with brim.



f2-sliding-dog-clutch-and-selector.stl

☐ Support on build plate. Glue the Dog Clutch parts.



f3-main-shaft-gears.stl



g1-counter-shaft.stl

☐ Print with brim and support on build plate.



g2-counter-shaft-gears.stl



h1-housing-primary-side.stl

☐ Support everywhere.



h2-housing-reverse-gear-side.stl

☐ Support everywhere.



h3-reverse-idle-gear.stl

☐ Use one M6 x 16 mm allen bolt.



i1-bearings-main-shaft.stl



i2-bearings-counter-shaft.stl



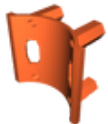
i3-pointer-main-shaft-primary-side.stl

☐ Support on build plate. Use one M6 x 16 mm allen bolt.



i4-pointers-camshaft-side.stl

☐ Support on build plate. Use two M6 x 16 mm allen bolts.



j1-stand.stl

☐ Support everywhere.



gearbox-bolts-and-nuts.stl

☐ Optional. Support on build plate,



PRIMARY DRIVE (CHAIN OR GEARS)

9 files



k1-chain-pin-links.stl



k2-chain-roller-link-plates.stl



k3-chain-rollers.stl



k4-chain-pin-link-plates.stl



k5-chain-sprockets.stl

☐ Support on build plate. Use two M6 x 16 mm allen bolts.



l1-gears-in-stead-of-chain.stl

☐ Support on build plate. Use two M6 x 16 mm allen bolts.



m1-sledge.stl

☐ Support on build plate. Use eight M6 x 16 mm allen bolts.



m2-cranked-handle.stl

☐ Support on build plate. Use one M6 x 16 mm allen bolt.



sledge-bolts.stl

☐ Optional. Support on build plate.

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