# Engine Offset Calculations

Following requests for these formulas I decided first to refine the whole thing so it’s more self explanatory.

There are two formulas.  In a typical engine installation with both right and down thrust, each formula would be used twice.

The first formula calculates how far off center to mount the engine to keep the prop on the center or thrust line.  The second formula determines the thickness of the shim or spacer under one side that you’ll need to provide the angle of thrust desired with the given engine and mount.

All references of left, right, up and down are the aircrafts (model) left, right, up and down.  You will also need a scientific calculator.

# OFFSET FROM CENTER LINE

The formula for measuring the engine offset is:
Engine Offset = (engine length) * sin(thrust angle)

Here is an example for my OS 320. Measure the length of the engine and mount from the back of the mounting plate (face of the firewall) to the face of the propeller thrust washer/back of propeller (or Spinner).

For the OS 320 it’s 7".

If I want to have 2 degrees of thrust built in then: Offset = 7" * sin(2) = 0.244". This is approximately ¼”. So to have 2 degrees of right thrust I will need to move the center-line of the engine ¼” to the Aircraft's LEFT.  This places the center of the prop on the center/thrust line of the aircraft.

For Down Thrust, again the length of the engine from the back of the mounting plate or face of the firewall to the back of the spinner is 7".

If I want to have 1 degree of thrust built in then: Offset = 7" * sin(1) = 0.1222". This is approximately 1/8”. Which means that to have 1 degree of down thrust, you will need to move the center-line of the engine UP 1/8” to keep the prop on the center/thrust line of the aircraft.

## SHIM/SPACER THICKNESS

So how thick a spacer goes behind the engine mount to provide the offset desired? The equation to do this is: Shim/spacer thickness = (distance between mounting holes) * tan(thrust angle)

Example: The distance between the mounting holes on the OS 320 is 3.125" top to bottom. If you want a 2.5 degree down thrust angle, then:

Extra Length = 3.125" * tan(2.5) = 0.1364".

The top side of the engine will need to be shimmed 0.1364" (8.7/64) farther than the bottom to have a thrust angle of 2.5 degrees.

Alternatively for right thrust, the side to side distance between the mounting holes on the OS 320 is 2.6875". If you want a 2.5 degree right thrust angle, then:

Extra Length = 2.6875" * tan(2.5) = 0.1173". The left side of the engine will need to be extended 0.1173" (7.5/64) farther than the right to have a thrust angle of 2.5 degrees.

To angle the firewall for the right thrust the side to side measurement are the points where the firewall joins the fuselage sides or structure. In the case of a fuselage that is 10 inches wide at the firewall the formula would read:

Extra Length = 10" * tan(2.5) = 0.4366".

So for typical fuselage construction the left side would be almost **½ inch** LONGER than the right side. Or lengthen the left and shorten the right sides by half the distance. This would keep the center of the firewall at the designed fuselage length.

That's all there is to it. Easier to do than to explain. Any questions, feel free to PM me through RCSB (Appowner).

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