

POWROLL

Stroker Crank How-To Booklet

Everything you need to know about Powroll stroker cranks, what it is, how to get it and how to install one!

TABLE OF CONTENTS

GENERAL INFORMATION

WHAT IS A STROKER CRANK?	2
DETERMINE THE CC'S OF YOUR ENGINE	3
POWROLL STROKER CRANK DETAILS	4
SPECIAL SERVICES - FINE BALANCE, ETC.	4

GETTING IT DONE

SENDING YOUR CRANK TO POWROLL	4
PACKAGING YOUR PARTS FOR SAFE TRAVEL	5
PACKING LIST	6
PAYING FOR YOUR ORDER	5
RETURN SHIPPING	5

INSTALLATION

INSTALLATION OF YOUR POWROLL STROKER	5
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POWROLL

PO BOX 920 • REDMOND OR 97756

PHONE (541)923-1290 • FAX (541)923-5637

www.powroll.com • mail@powroll.com

WHAT IS A STROKER CRANK?

The term 'Stroker' means that someone has increased the stroke of their engine. Displacement is determined by **BORE** (the size of your piston) and **STROKE** (how far that piston travels up and down). There are two ways to increase displacement: You can increase bore (with a larger piston), and/or you can increase stroke by moving the crank pin (the pin holding the rod to the flyweights) further outwards on the flyweights.



WHY STROKE INSTEAD OF JUST GO BIG BORE?

A stroker gives you more power from the displacement increase, but you've also gained more torque. Why? Because moving that pin location outward on the crank is just like using a longer wrench to remove a stubborn bolt. You've given the engine more leverage. This allows the engine to generate power at lower rpm much more easily.

Another good thing about increasing the stroke is that with any engine that you plan on really going big, it makes more sense to increase bore and stroke, rather than just stick in a whopping large piston. In most cases, keeping the bore and stroke increases relatively equal, you will end up with a powerhouse that's more reliable and delivers power more evenly.

GREAT, WE'VE STROKED THE CRANK, AND THE PISTON'S HITTING THE HEAD, NOW WHAT?

There are a few ways to solve the problem:

- 1.** You can make the cylinder taller using a base plate (spacer). This works very well on 2 strokes, but can create more problems with 4 strokes since you'll have the timing chain to deal with.
- 2.** You can have a piston made that is shorter, or modify a stock piston. On minor stroke increases (totaling 2mm or less), you can sometimes modify the stock piston to fit. More than 2mm would require a special piston - that can get expensive unless you plan on talking 3 of your buddies into doing the same thing.
- 3.** You can have a shorter rod. Here's where the famous Powroll engineering comes into play. Back in the stone age (okay, 1962), Paul Olmstead (founder of Powroll), created an ingenious method of shortening rods. The process uses heat and pressure to create a rod that's the proper length for our stroker cranks and actually increases the strength of the rod.

Powroll doesn't use our patented method for rod shortening on every crank we stroke. Our development team works with each engine design to determine the optimum rod length to stroke ratio. If the stock rod length is the most advantageous, we don't shorten it. We use a piston with a shorter pin-to-deck height to keep things working right.

There are also some engines which have a weak rod design. We replace those stock rods with our own heavy duty rod which is the correct length.

CAN'T I JUST REPLACE THE ROD WITH A LONGER ONE?

Rod length has nothing to do with displacement. Really. Trust us on this one.

Here's the best way to figure out why this is true. You've probably got a glass of your favorite beverage sitting in front of you right now, don't you? Okay, let's say that glass is 1/2 full and has 10 oz of liquid inside. Now, pick up the glass and hold it up in the air.

Is there more liquid in the glass? Nope. Same amount, it's just in a different location. Now, put the glass back down. Same amount of liquid? Of course -- unless you cheated and took a swig on the way down.

The rod does the same thing that your arm just did. It only changes the location, but not the displacement. Changing rod length can change the way an engine produces power, but it will never change the actual displacement.

Okay, take a drink of the stuff in the glass, you deserve it!

WHAT IS DISPLACEMENT?

Displacement is another term for engine size. It means 'how much volume is displaced by the piston travel'.

Figure 1 -

This diagram shows a crank from a single-cylinder engine. The crank is what transfers the power of the 'explosion' of fuel and spark to the wheels.

Every time your engine fires, the piston is forced downward in the cylinder.

The piston is connected to the rod by the piston pin, the rod is connected to the crank by the crank pin. The crank is held in the engine cases by main bearings located at the crank center. This means that all the downward force of the explosion is turned into rotation, and the crank spins.

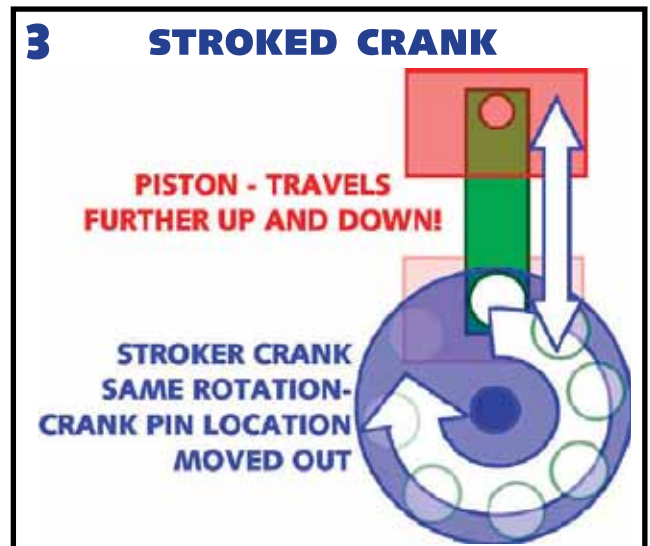
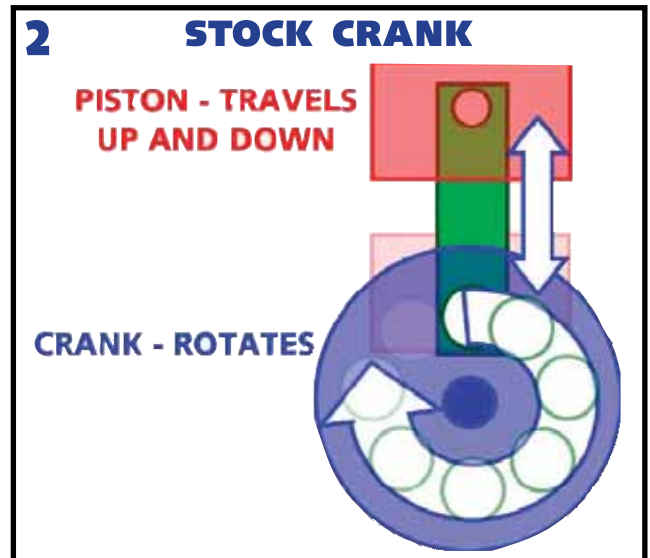
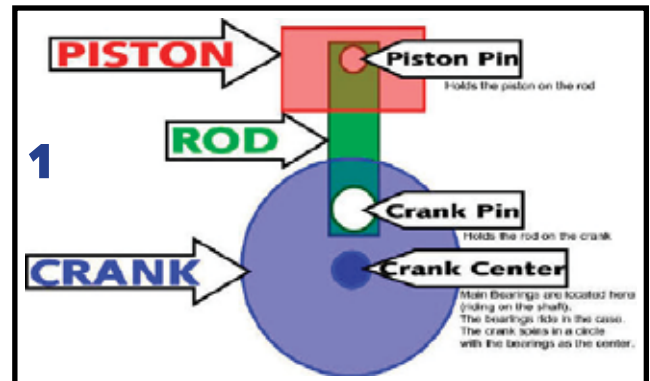
Figure 2 - STOCK CRANK STROKE

Figure 3 - STROKED CRANK STROKE

The piston and cylinder circumference remain the same, but the piston now travels further up and down in that cylinder.

So, if you took the crank shown in Figure 3 and put the piston at BDC and poured fluid in there - you'd be able to fit more fluid, right?

That is how a stroker gives you more displacement.



DETERMINE THE CC'S OF YOUR ENGINE

(WITHOUT FILLING IT FULL OF WATER)

Since most people don't want to go around pouring fluids in their cylinder to determine cc's, there's a formula you can work to figure the displacement of any engine.

$$\text{BORE (in cm)} \times \text{BORE (in cm)} \times \text{STROKE (in cm)} \times .7854 = \text{Cylinder cc's.}$$

Of course, if you have an engine with more than 1 cylinder, you X's the number by the amount of cylinders.

Here's the formula at work:

You've got an engine with a piston size of 47.5mm, and a stroke of 50mm. Converting mm to cm is a cinch - just move the decimal point to the left one spot (heckuva lot easier than fractions, huh??).

$$4.75 \times 4.75 \times 5.0 \times .7854 = 88.60 \text{ cc's}$$

If this happened to be a V-twin engine, then we'd times that number by 2.

$$88.60 \times 2 = 177.20 \text{ cc's}$$

And yes, you can use this formula to determine the volume of any cylinder. Go measure your beer mug or Starbucks thermos - the formula's the same - as long as it's a straight cylinder - tapers are different!

POWROLL STROKER CRANK DETAILS

How it's done:

Powroll does not have crank 'cores' in stock. You will need to send in a crankshaft. Turn around is typically 2 weeks, except during busy times, when process time can increase to 4 weeks or more. Call or email us to find out what current turn-around time is.

What you get:

In our catalog or online, you will see Powroll stroker cranks listed in one of the following ways:

STROKER The price shown is to do the stroke work on your good stock crank assembly. It does not include ANY parts. If your crank needs a new rod or other parts, it will cost extra. If your crank is more than 2 years old, expect to need some replacement parts.

STROKER WITH NEW ROD ASSEMBLY - Powroll Part# will end in 'RA' - This price includes the work on your crank, a new rod, pin, and bearing. If other parts (cam sprocket, main bearings, etc) are needed, that will cost extra.

STROKER WITH HEAVY DUTY ROD - Part# will end in 'R' - This is the stroke work with a stronger rod. Pin, bearing and other parts are not included in this price.

Fine Balance, Crank Pin Welding & other Specialized Services

All Powroll strokers are aligned to very exacting specifications (more stringent than most OEM requirements!). Additional services may be available as time allows. Cost for these additional services is based on time and materials. Please call us for an estimate.

SENDING YOUR CRANK TO POWROLL

1. REMOVE CRANK FROM ENGINE (or have a qualified mechanic do it)
2. REMOVE ANY BOLTED-ON PARTS (Piston, etc.). Leave all pressed-on parts (Rod, main bearings, timing sprocket, etc.) intact.
3. PLACE THE CRANK IN A PLASTIC BAG then FOLLOW PACKING DIRECTIONS ON THE FOLLOWING PAGE.
4. FILL OUT OUR CRANK PACKING LIST (back page of this booklet). KEEP A COPY FOR YOURSELF AND PUT ONE INSIDE THE BOX WITH THE CRANK.

5. SHIP PARTS TO:

BY UPS, FED EX, ETC
POWROLL INC
13840 COMMERCIAL LOOP
CRR OR 97760

BY POST OFFICE
POWROLL INC
PO BOX 920
REDMOND OR 97756

6. DON'T FORGET TO INSURE YOUR PACKAGE FOR REPLACEMENT VALUE.
7. TURN AROUND TIME IS TYPICALLY 2-3 WEEKS. CALL US AT 541-923-1290 FOR CURRENT ESTIMATED TURN-AROUND TIME.

PACKAGING YOUR PARTS FOR SAFE TRAVEL

Shipping companies do not pay insurance claims on damaged items which are poorly packed. It is up to you to ensure your parts arrive here in good condition.

1. CLEAN PARTS: We will charge for any time spent cleaning your parts. Save money by removing gaskets and completely cleaning your parts prior to shipping.



2. BAG PARTS: Place every part in a plastic bag and seal it. Parts which are not bagged are difficult to clean. Our cleaning time costs you money!



3. ENCLOSE A COPY OF THE PACKING LIST (back page of booklet): Be sure to fill out information completely. Also, if you would like an estimate before work is started, be sure to check the appropriate box.

4. WRAP PARTS: Wrap each item separately in bubble wrap, foam, or sheets of newspaper. Take special care with crank assemblies, as they have a tendency to break through boxes.



5. BOX PARTS: Heavy items like engines or crank assemblies require double boxing. Inside box should be at least 1" smaller on each side than the outer box. Fill the void with foam p-nuts, newspaper, etc. Anything you ship should be packed tightly to avoid shifting and box damage. **WOODEN BOXES:** An alternative when shipping very fragile or expensive parts, they cost more to ship, but are very good for protecting items, if built correctly.



RETURN SHIPPING

Powroll ships via UPS and offers Ground, 3 Day, 2 Day and Next Day services. For locations outside the continental US, we ship by USPS Global Express.

PAYING FOR YOUR PARTS

Powroll accepts Visa, Mastercard and American Express. You do not have to prepay for stroke work. We will bill your card when your order ships.

INSTALLATION OF YOUR POWROLL STROKER

Most Powroll stroker cranks install just like stock parts with no additional machining required. On those engines that do require additional machining will include detailed instructions to complete the required work.

Powroll pistons are already set up to work with our strokers. If you are not using a Powroll piston, your piston may need modification to clear the crank flyweights and maybe a balancer or other transmission parts. Powroll can skirt your piston for an additional fee, or you can have it done locally. We recommend starting with a NEW piston.

