Compression Ratio/Check

What does it take to turn this…

into this!

Well, actually it takes a number of things.

We've already learned about one, this being…

Displacement

(which is basically the physical size of the engine's cylinder)

But in order to maximize power it takes more than just displacement.

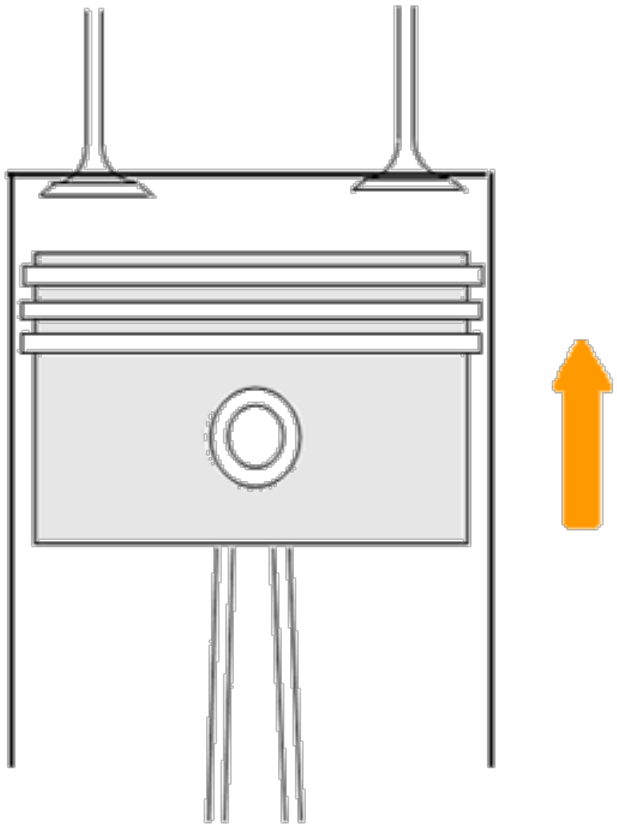
As you've probably guessed by the title of this lesson…

Compression

is also key to power production

Remember this…

Compression



Sequence of Events:

1. Intake valve closes
2. Piston moves upwards.
3. Mixture is squeezed into smaller space.

Result:

a) Increase in temperature
b) Spring effect to start next stroke

Why is it so important to increase the air/fuel mixtures temperature through compression?

To heat it to where it is near the temperature of ignition so that when a spark is introduced, the mixture will burn easily and completely through.

A complete burn is the most efficient burn and releases the **most power**!

In short…

More compression = More Power!

And equally true…

Less compression = Less Power

Too Much of a Good Thing

Remember what we are compressing? What do you think would happen if we compress too much?

It's called "pre-ignition". The mixture would fire before it is supposed to due to the heat that the act of compression generates.

This would cause an unpredictable and often violent combustion and is simply bad for the engine.

Car Engine vs Diesel…

So How Much Compression is Good?

Before we can discuss what is normal or good compression we need to understand how the idea is expressed, or talked about.

An engine's ability to compress is talked about as a ratio.

Simply put, a ratio is a comparison between two things.

Example:

A 2 stroke engine requires gas mixed with oil. Many times the ratio is 50:1, meaning 50 parts gas to 1 part oil.

Compression Ratio

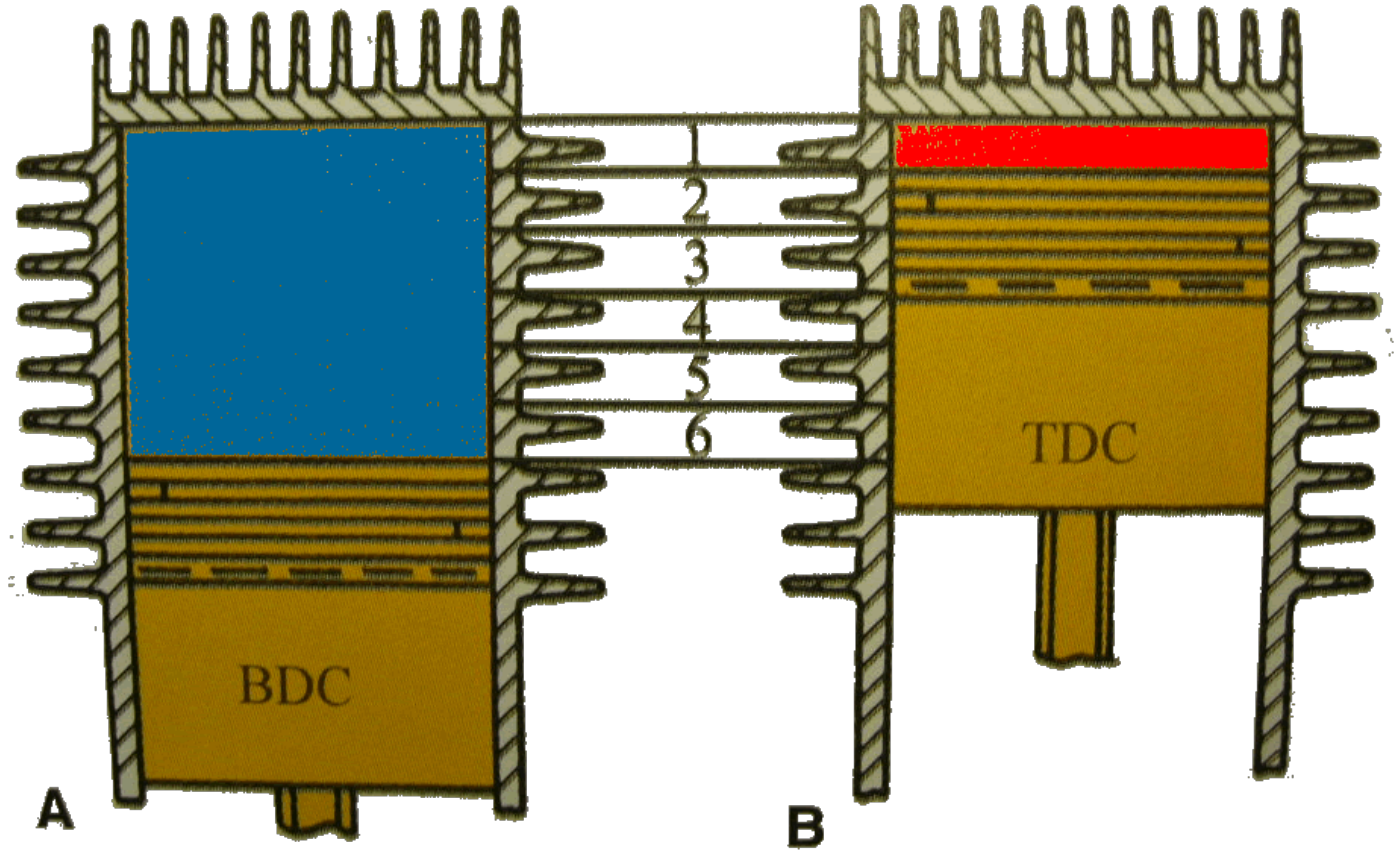
Definition:

Compression Ratio is the …

Total Volume of a cylinder compared to the Final Volume

(the volume that remains when the piston is at the top of its stroke)

Compression Ratio



What would be the Compression Ratio of this engine?

6.1

Determining Compression Ratio

Things to keep in mind:

Compression ratios are usually rounded to the nearest half or whole number:

Example: 10.325 : 1 would be 10.5 : 1

Most gasoline engines in cars compress around 10:1.

Diesel Engines are 14:1 – 22:1

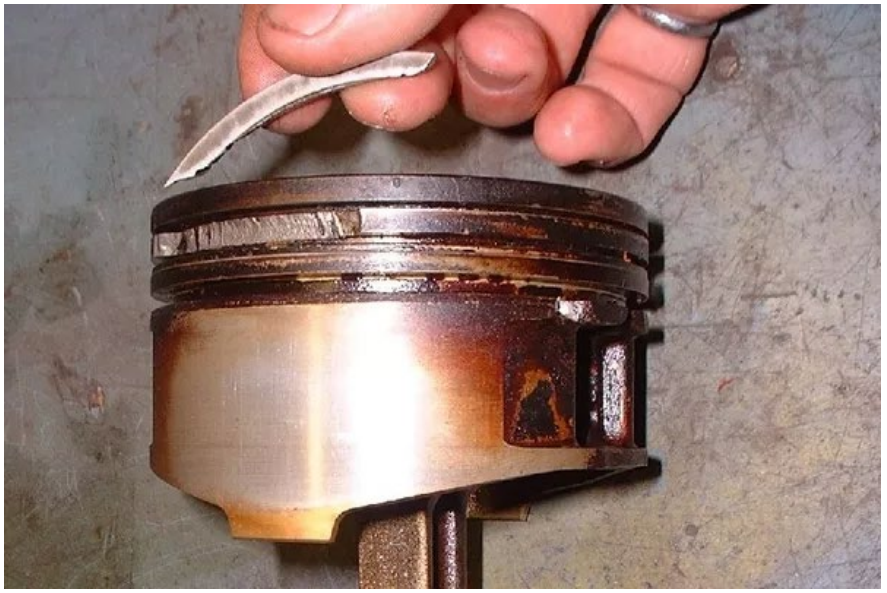
Our small engines have a compression ratio of 7:1.

Can you guess why small engines are less?

Poor Compression

Poor compression can be caused by worn/broken piston rings, bad valves, worn or warped cylinders, leakage through the head gasket, or leakage around the spark plug.

Poor compression is a common problem, especially with older engines, but sometimes it can just require a new head gasket or tightening bolts/sparkplug that are not torqued correctly.



Checking Compression

If an engine starts with difficulty, or lacks power and is sluggish, a troubleshooter might suspect poor compression as the possible cause. Checking the engine's compression is a part of most tune-up procedures.

For engines of this type, readings between 40 and 60 psi "generally" indicate good compression.

Simple Compression Check – Bounce Back

A simple **Compression Check can be achieved** by turning the flywheel by hand and just before the TDC it will get harder. DO NOT turn past TDC otherwise the air will escape and you need to start over.
Release the flywheel, it should bounce back. If it dos not, you are losing compression