DIESELING
IT'S NOT JUST FOR 18 WHEELER'S ANYMORE !!

When the word Diesel is used, most people think of 18 wheeled trucks, Fuel sold in truck stops that is always cheaper then gasoline or of the European vehicle a crazy old guy down the street bought that sounds like a series of nuts and bolts stuck in a pop-corn machine. To a certain extent, the images that diesel brings to mind are accurate. So what does that have to do with an air rifle?

Merriam Webster defines a diesel engine as follows: **diesel engine,** (*n),***:** an internal combustion engine in which air is compressed to a temperature sufficiently high to ignite fuel injected into the cylinder where the combustion and expansion actuate a piston.

So it is an "engine" that compresses air such that when a "fuel" is introduced or injected, ignites and the expansion is sufficient to actuate another movable device. In the case of the truck or car, that movable device is a piston attached to a crank shaft that will cycle around using a series of valves and cam shaft, exhaust the gases and then start the compression and explosion process all over again. That is basically how a diesel engine runs.

If you think about your air rifle, it is a machine of course, however, if certain incorrect lubricants are used, your machine can also be turned into an engine just like the one the crazy old guy down the street owned.

If you look at Figure 1, You will see the approximate volume of uncompressed air that the cylinder holds. It is about 1 inch in diameter and about 5 inches long. When you actuate the lever on this particular rifle, a plunger will advance and squeeze that amount of air into a very tiny space where it is held until the trigger is released and the valve on the other end of the small space opens and discharges the air-into the barrel which propels a pellet downrange.

Figure 1

Lets take a look at some components. The air rifle Piston (Figure 2) is a plastic disk that has some thickness to it. Remember that when the air rifle is 'cocked' it has to be rigid enough to hold back 200 bar (about 2900 pounds per square inch) of pressure, but flexible enough to still seal the compression tube. Not an easy job!

The seal in Figure 2 is pretty and new. It is smooth, flexible but very durable and capable of taking tens of thousands of compressions without issue. However, if you happen to use a hydrocarbon containing lubricant and it finds its way into the compression chamber, then stuff will change in a hurry and none of them for the better.

Figure 2

Remember how a diesel engine works. Air is compressed, fuel is introduced and an explosion results. Same thing in your air rifle, only on a smaller scale.

The Diesel Truck engine uses cast iron or forged iron pistons so the explosion that results is not detrimental to the piston. However, your plastic 'piston' is not designed for the same event. That is why the OEM gun manufacturers warn about NOT using hydrocarbon based lubricants on your air rifle.

The space the mass of air is squeezed into is very small. The theory is simple. Take a large volume of air, compress it into a smaller volume. Using the Ideal Gas Law (you all remember that from High School Chemistry right???) PV=nRT we can see what happens.

The Ideal gas law equation always needs to be in balance, ALWAYS. The variable n (number of gas molecules) and R (a constant) do not change during compression. So we disregard them and we are left with PV=T. So if temperature stays constant, and we reduce volume, what happens to pressure in order for the equation to balance? Right, it goes up. That is how the compression part of you air rifle works . By the way, it is the same in any internal combustion engine.
The only difference is with your air rifle, you want to avoid the addition of 'fuel' during compression.

Figure 3

As you look at Figure 3, you can see the valve (on the left) and the compression chamber (in the center). Not a big volume of air is it? That is the point, PV=nRT. As volume V goes down, Pressure P goes up. If the V goes down a lot then the P has to go up a lot, in kind. That is how you get very high and consistent pressures in a handheld device able to

project 8 grains of lead many meters, at 550-600 feet per second, every time. See, isn't Chemistry and Physics fun? Mrs. Snyder would be proud.

So check out Figure 4. Pretty? Pretty disgusting is maybe a better description. Notice that it looks like someone took a blow torch to it. Well in essence someone did, the owner that saved some money one Saturday afternoon while picking up some socks.

Figure 4

This person probably spent more time deciding on the color, style and price of socks than they did on their lubricant. Of course replacing this seal can be done, but hang onto your socks boys and girls; $50/hour in the shop, plus parts and tax and forget about the time that it took to express mail the rifle to the shop and have it done by a factory certified repair organization, lost shooting time, etc. Those socks aren't looking so cheap after all!

The last point is that besides pitting, burning and in general destroying your plunger seal, it does something else. The pits will continue to enlarge. The space the air is being compressed into is effectively getting larger.

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Figure 5

Lets go back to the Ideal Gas law PV=nRT. From the factory (or a qualified repair shop) the Volume is tiny and precisely calculated to deliver the proper pressure to insure a certain muzzle velocity.

If dieseling occurs, the plastic is degraded and the surface of the plastic is destroyed and the chamber volume now extends past the face of the metal (Figure 5), into the plunger face. So, as Volume V increases, what happens to Pressure P? Correct , it drops. Less pressure is lower muzzle velocity and if it diesels on every shot, the volume changes on every shot incrementally and eventually you are left wondering what you did to your position to make your shooting so poor all of a sudden.

There are many Lubricants sold that claim they are suitable for use with precision and sporter air rifles. They all claim to work, but, they don't all work the same. There are a very few on the market that work, and even fewer that work very well.

Let's look at some unfortunate that saved a few dimes on grease from their local discount warehouse superstore. Most likely it was hydrocarbon based. It may say "contains Teflon®" on the label, but unless it says "contains no hydrocarbons", set it down and move on. Also, just because it is from a high performance well recognized gun shop does not insure it is hydrocarbon free either. Make sure you ask the question.

Gun Snot ™ is 100% hydrocarbon free, Teflon® and PTFE based lubricant that is **Guaranteed** not to contain any, Zero, NADA, hydrocarbons. Never did, never will. Figure 6 is NOT what your rifle seals are going to look like if you use **Gun Snot ™**.

Figure 6

With technology borrowed from the Space program, **Gun Snot ™** conforms to MIL-PRF-83261B requirements. The outstanding qualities of **Gun Snot ™** include its wide operating temperature range (-100°F to +450°F), extreme pressure potential (800 Kg load), antiwear characteristics, non- migratory nature, and its superb compatibility with plastic and elastomeric seals. Shelf life exceeds 10 years. **Gun Snot ™** is based upon technology that has been tested and used by the USAF for missiles and found to be one of the best performing lubricants on the market today.

You can buy the other stuff and think you are saving a few pennies.
Or you can use Gun Snot ™ and save yourself a lot down the road.

Gun Snot ™

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