

## Valveless Pulse Jet

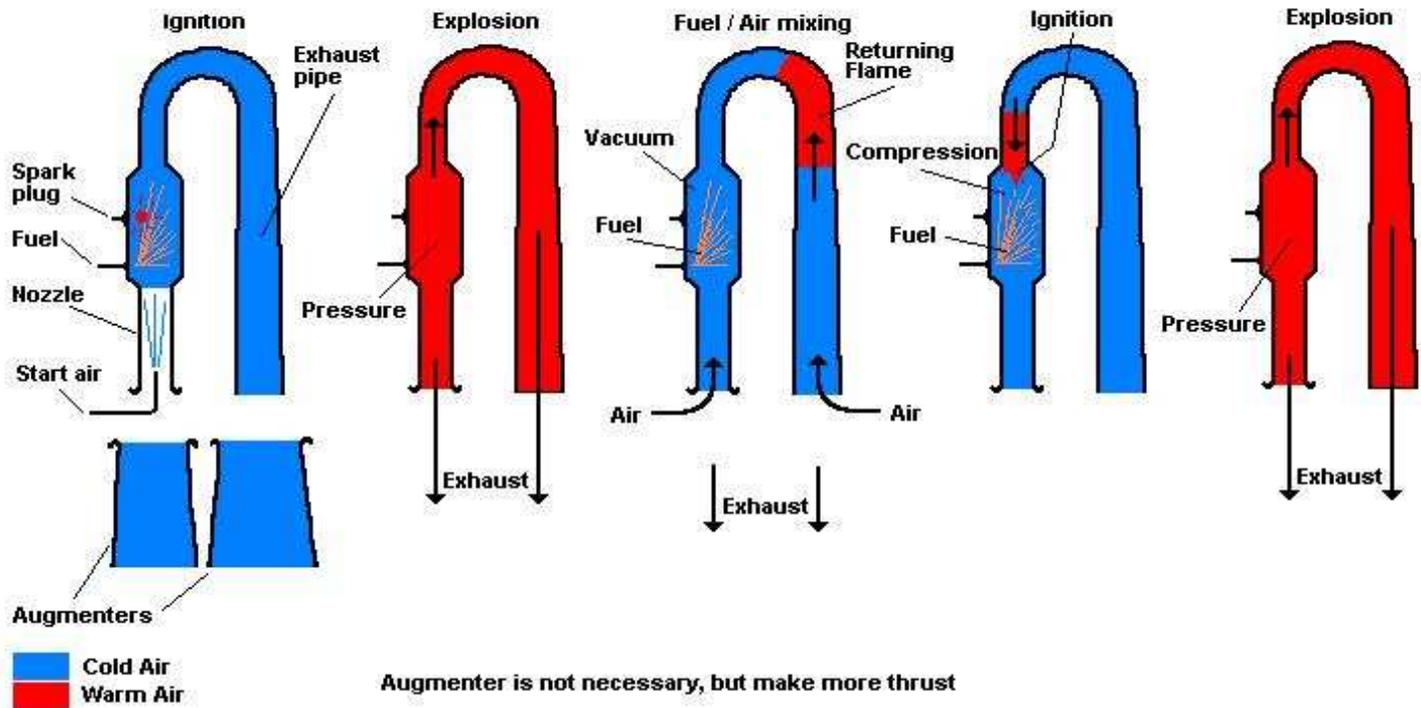


A valveless pulsejet is one of the simplest jet engine in the world. This jet was invented at the sixties, but the development stopped when the turbojet arrived. One of the pulse jet engines was patented by Lockwood/Hiller (US patent no: 3.462.955). The engine can be built in many different sizes, as long as the relationships between the different openings are kept. This engine has no moving parts which means no wear, this is surely a benefit. It's also possible to run this jet with almost any oil product as long as it's valorized before it's entering the engine (the use of a mixture of diesel and gasoline 50/50 is a good mix). The engine is started on gas (easiest). Construction is simple and relatively cheap to build. This is a pulse jet, and a series of explosions is what which make thrust. It is estimated that there are approximately 30 to 50 explosions per second. These series of explosions create an incredible loud and vibrating sound (30Hz to 50Hz).

The engine is started and powdered by propane feed into the combustion chamber through a metal tube. At the end of the tube, it's possible to insert a jet which may atomize liquid fuel. When propane is used, no such jet is required, then propane flow through a 4mm hole at the end of the tube.

During starts, propane is feed into the combustion chamber and ignited by a single spark from the spark plug. The explosion created, make an overpressure which throw out hot air at both ends of the jet at the speed of sound. While this air is exiting the combustion chamber, a vacuum is created inside the engine. This vacuum force the flame which is about to exit the exhaust pipe to return into the combustion chamber. Meanwhile fresh air has been sucked into the combustion chamber through the nozzle after the flame was thrown out. This cycle repeats over and over again until fuel isturned off. This is shown at the figure below.

# Principle of a Valveless pulsejet



From the patent, it's easy to construct a valveless pulsejet engine in every size. Augmenters can be added, which is should amplify thrust, the augmenter will add some drag but if done correctly the augmenter will add more thrust than added drag. According to some, thrust is doubled by using augmenters.

NL = Nozzle Length, lengden på det korteste røret ut fra forbrenningskammeret.

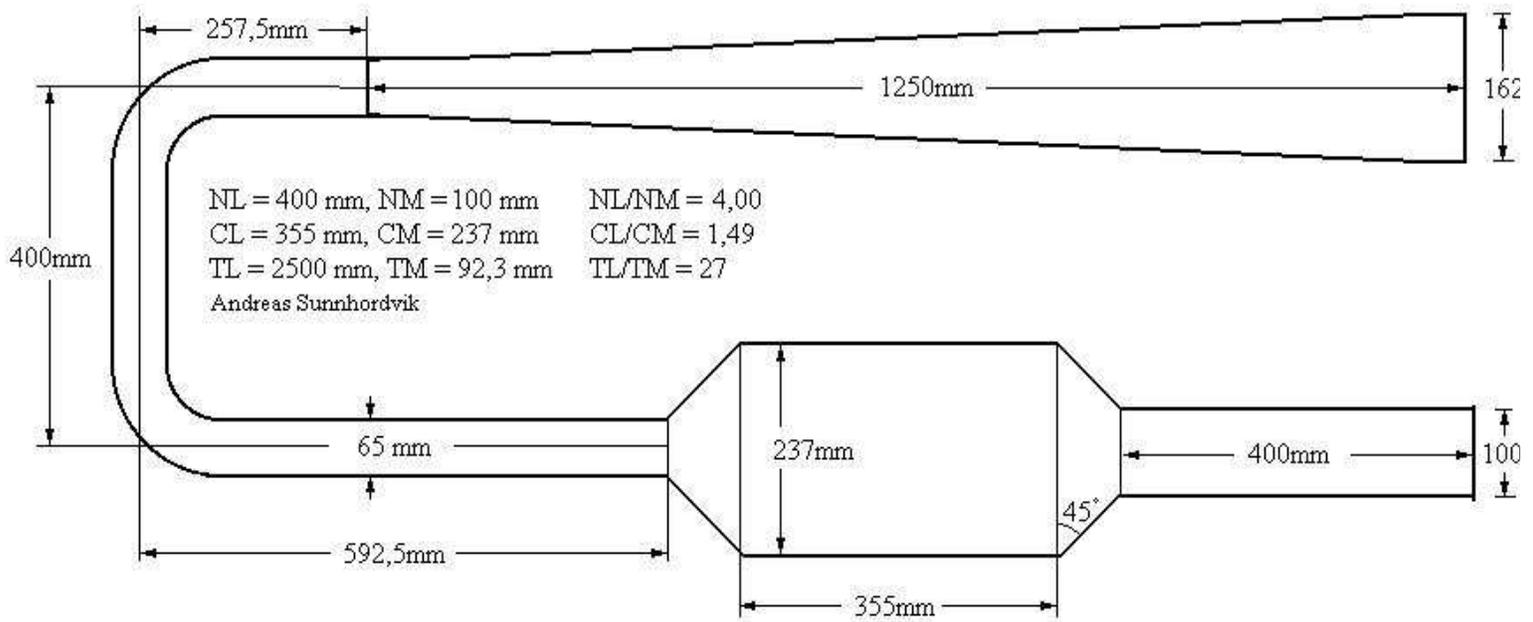
NM = Nozzle Mean diameter, gjennomsnitt diameter.

CL = Combustion chamber Length, lengden til forbrenningskammeret.

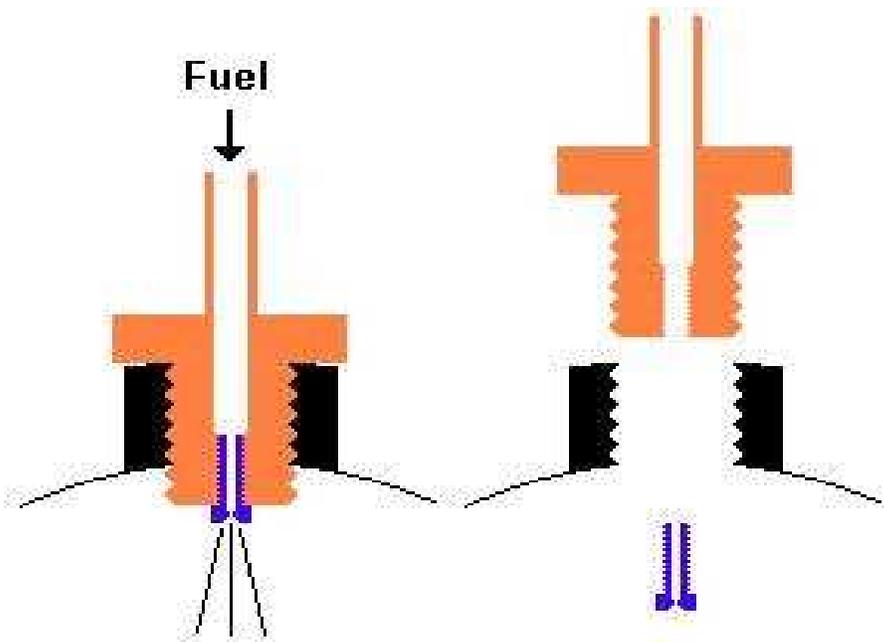
CM = Combustion chamber Mean diameter, gjennomsnittlig diameter til forbrenningskammer.

TL = Tail pipe Length, lengden til rør med bøy.

TM = Tail pipe Mean diameter, gjennomsnittlig diameter til rør med bøy.



If propane is used then no regulator is required, only a needlevalve (meant for oxygen) to control the flow, however a high flow rate is required. The propane is fed directly into the engine through the main valve at the top of the bottle, the needlevalve, a hose and metal tube connected to the combustion chamber. Propane only burns if 0.9% to 2% of the mixture is propane and then rest of the mixture is air, so chances to get a fire back into the bottle is very small. On the pictures below, you can see my bottle and setup. The hose is 10 mm inside.



Fuel Jet

The sparkplug is inserted in a socket which are milled and welded to the combustion chamber. Any sparkplug would

do. An old automobile is just to make a spark. Only one spark is needed to start the engine, and then you stop the coil. The engine is made of 3mm thick 316 L stainless steel.



