

## History of my achievements in the field of aircraft powered by diesel car engines

The Diesel engine industry has undergone significant changes over the past decades, these vast improvements have lead to better performances, reliability and durability.

Safety, reliability, longevity, fuel efficiency, low-end torque were the assets that lead to the idea to mount them on a modern aircraft providing the state of the art in aerodynamics and designed to be easy to build.

Gazaile 2 is the culmination in 10 years of research and development, the outcome is an aircraft that cruises at 220 km/h (138 mph, 120 kt) for only 7.5 l/h (2 gallons/h).

The Gazaile 2 uses the engines that is mounted on Citroën AX and Peugeot 106, it develops 53 hp and allows speed up to 250 km/h (155 mph, 135 kt).

The builder is not limited to the engine only.



The picture below shows the first aircraft built in collaboration with my friend Lucas back in 1998. We achieved our goal in putting in flight a successful operational aircraft using a turbo diesel engine (Opel Corsa) that delivered 68 hp.



I then came out with the very first ultra-light equipped with a diesel engine (a Citroen AX engine mounted on drastically modified Rands COYOTE).

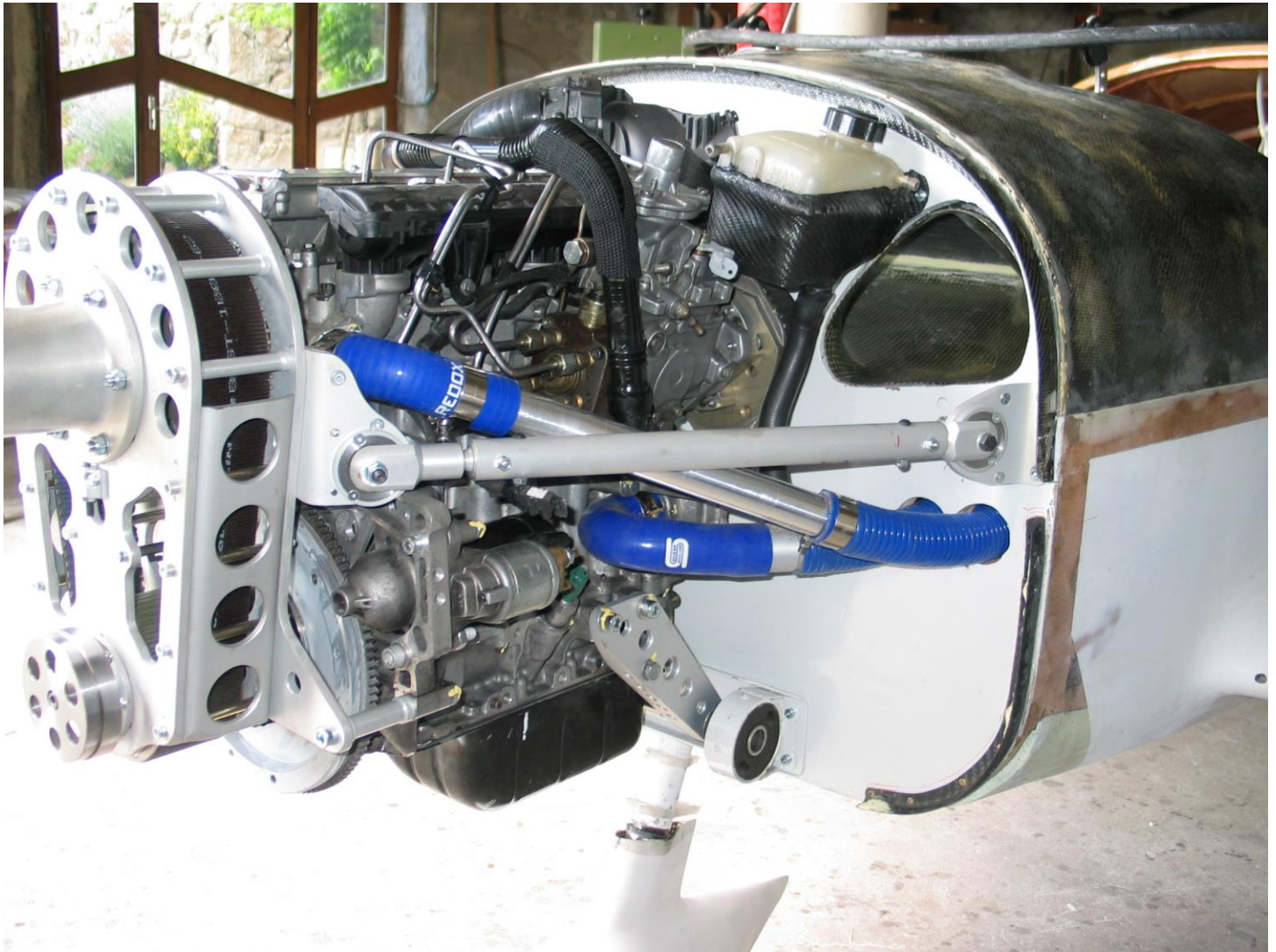


I then improved my first diesel aircraft and I baptized it GAZ' AILE 1; the engine mounted on this enhanced version was an Isuzu turbo diesel developing 85 hp.





Ever since I have worked on more powerful diesel engines. I prefer PSA (Peugeot) engines over other brands since they are easy to find and very reliable. The picture below shows a DV4 developing 80 hp, it is mounted on a Gaz'aille 2.



# BENEFITS

## On the economic front:

**Energy saving:** Diesel is the world's most efficient internal combustion engine. It provides both more power and more fuel efficiency than alternatives such as gasoline, compressed natural gas or liquefied natural gas. Light-duty diesels engines use 25-30% less fuel than similarly sized gasoline engines.

Another interest is that diesel engines can run with kerosene, bio-fuels etc. The cost of such fuel is higher but is offset by a greater fuel efficiency, thus more economical in the end.

**Budget side:** it is very common to find either used engines from \$400 to \$500 or overhauled from \$1500 to \$2000, nothing in comparison to about the \$17000.00 needed for a Rotax engine. The purchase of automotive diesel engine is way cheaper than similarly sized aeronautic engines such as ROTAX. Used automotive engines range from \$400 to \$500 for used engine and from \$1500 to \$2000 for overhauled, nothing in comparison to about the \$17,000.00-\$20,000 needed for a Rotax engine!!!

**Durability:** Diesel engines are more durable than spark ignition engines. Diesels both run more miles before needing rebuilding, and also are more easily rebuilt to original specifications. Light-duty diesel engines generally last between 200,000 and 600,000 miles, compared to 70,000 to 200,000 miles for comparable gasoline engines.

Fuel usage, durability and purchase price are combined asset that lead to a very low operational cost.

An amateur built aircraft “ready to fly” costs less than the price of a Rotax engine alone!

## On the environmental front:

Modern diesel engines are much less noisy than similarly sized gasoline engines due to the exhausts that are released less abruptly.

Thanks to the torque, the propeller also generates less noise. This is because at low rpm the diesel engine delivers much more torque than a gasoline engine. The better torque allows to mounting larger propellers delivering more power at low rpm; this reduces the noise when improving performances at the same time.

In addition it is environmentally friendly since it allows using biofuels (rapeseed, sunflower, bio-diesel). I have used a 50% mix of such fuels with diesel without any modification and I obtained very comparable performances.

## **In terms of performance:**

Because the engine mounted on the Gaz'aile are turbocharged, they keep their power whatever altitude the aircraft is flying. This allow cruising at higher altitude and faster airspeed.

The high torque allows a better setting of the helical pitch resulting in a higher climb rate.

## **In terms of security:**

Diesel engines are less prone to breakdown:

- As seen earlier in this document, diesel engines are more durable than gasoline engines.
- They are compression ignited engines, therefore they need any magnetos nor distributor.
- Easier to maintain.

Diesel is less volatile than gasoline or natural gas – that is, the fuel does not as readily vaporize in the air. In addition, diesel fuel ignites only at a much higher temperature, making Diesel engines safer.

## **The idea is gaining ground:**

Back in 1996 I took the initiative to develop Diesel projects. Ever since it had generated lots of interest among amateur builders.

As of today, there are over 430 GAZAILE plans sold and 36 gaz'ailes are flying.

Diesel is now a recognized technology. Many manufacturers are working on this concept: Renault SMA, Continantal, Lycoming and recently WAM, Dieselair ... and even more!

Some certified aircraft are now equipped with Diesel engines. The popularity of diesel engines is now obvious and subject to monthly articles in specialized press as flying clubs are starting to equip themselves with Diamont, Socata, and Robin diesel powered aircraft.

The diesel motorization interest is now well understood. Ideal combination between reliability, safety, power and unprecedented low operating and purchase costs it allows amateur builders to get their aircraft at the lowest price ever seen.

No other aircraft or land vehicle can come close to the Gazaile when speaking in term of miles per gallons; carrying two persons, it delivers the best ratio between speed and quantity of fuel used.