Checklist for the purchase of an airplane

.. Things to check before buying a plane / engine.

The question of what to look out for when buying a used airplane or engine comes up again and again.

Unfortunately, I can't give any specific tips regarding the airframe as I don't know enough about it.

The Rotax engine looks a little better….

in advance

you should find out more about the plane on the Internet.

- Are there any special features to consider?
- Are there any changes to the model to be viewed?
- How do other pilots describe their experiences with the glider?
- How is the service described by the national sales partner?
- What experiences have been made with the supply of spare parts?

Here you can already sound out whether you will have to adjust to costs and downtimes over time.

Another aspect is the previous accommodation of the aircraft. Rust infestation plays a major role here. If the aircraft has been standing outside by the sea, the corrosion looks rather bad.

the "paperwork"

- Is an engine logbook available?
- Are the maintenance checks entered?
- Are any SBs that have been carried out entered?
- Is a logbook available?
- Is it completely filled out?
- When and which maintenance is due next?
- How many operating hours can I fly before the next TBO?
- When is the next annual inspection due?

A new Rotax engine is always delivered with a Rotax engine logbook.
This should be handed over to the customer by the aircraft manufacturer or the installer of a new engine. The logbook contains important data from Rotax, such as the current modification status and SB's carried out up to the delivery of the engine from the distributor to the customer.

Based on the documents provided, you can get an overview of how the engine and the aircraft have been maintained. Are expenses to be expected here due to a maintenance backlog, or can you fly with peace of mind until the next prescribed inspection?

Unfortunately, you often hear that you don't need to carry papers for an UL, because it's not an airplane, but an air sports device.

I clearly disagree here, because an UL is now a fully-fledged aircraft.
The exact legal situation regarding the maintenance prescribed by the manufacturer should be clarified with the association that certified the aircraft.

In any case, the seller who has his papers complete and in order is more trustworthy. This will also be reflected in the price.

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the external impression

After removing the cowling, the first impression is revealed.
What I would consider extremely suspicious is a beautifully cleaned engine without a speck of dust.
Any dust present immediately indicates a leak. Dust that is conspicuous by its absence hides possible defects.

the visual inspection

If you want to be on the safe side, you are welcome to download the current maintenance checklist and consult it.
The following checks are commented excerpts.

Carry out a general visual inspection of the engine for damage or abnormalities.

Check for chafing on hoses and cables.

Check the cooling air feed and cooling fins of the cylinders for blockages (obstructions), cracks, wear and condition.

Check for temperature-related changes.

Ensure that the sensor connection cables are firmly attached.

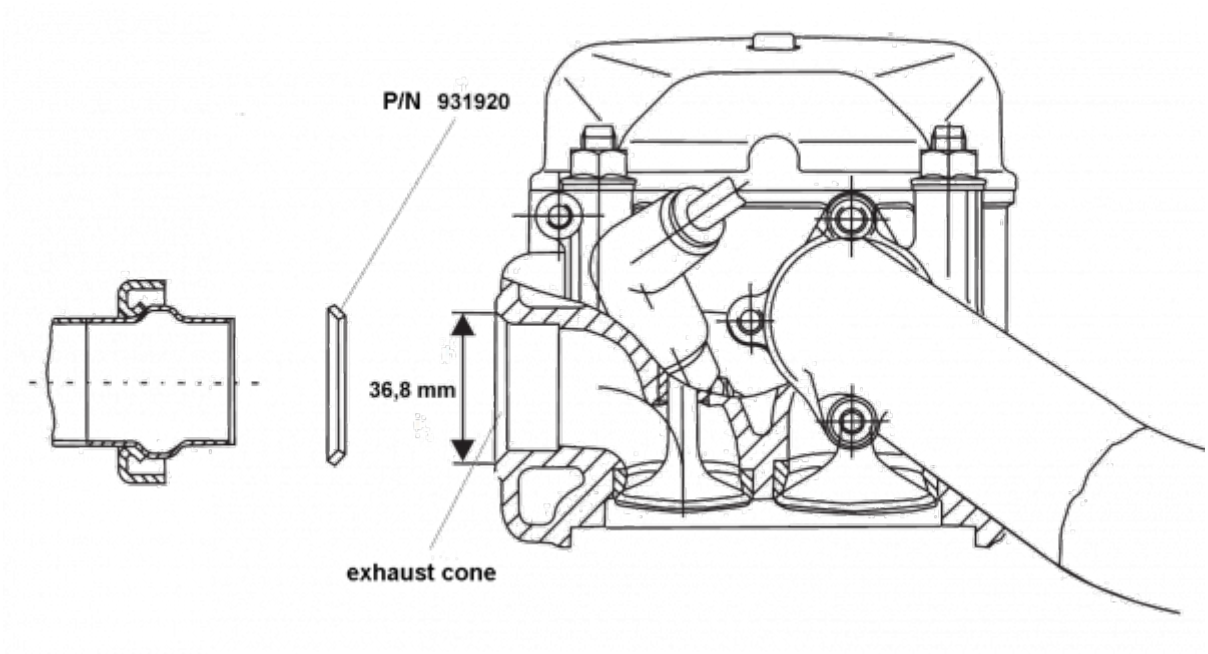
Check sensors for damage due to heat.
Note: If the insulator of a sensor has melted out, the motor must be repaired due to overheating.
The costs here are enormous, as you will probably have to replace at least the cylinder heads.

Visual inspection of the leakage hole on the underside of the water pump for signs of leakage.
Note: If there is a leak, the igniter housing must be dismantled and repaired.

Visual inspection of the hoses and rubber parts.
Note: A retaining tab on the rubber pad under the expansion vessel often tears off.
This can cause it to shift and wear through, resulting in a loss of coolant.

When were the rubber parts replaced (5-year check)?

Visual inspection of the exhaust system and the connections on the cylinder heads.



Note: If the connections on the headers are heavily sooted, this indicates loose nuts or a heavily tensioned assembly.
In most cases, the cone in the cylinder head is damaged if the manifold was loose. The cone may be reworked to a maximum of 36.8 mm with a milling cutter if the copper gasket is then used.

Pressure loss test of the cylinders
Remove the lower spark plugs and check the pressure loss of the individual cylinders using a pressure loss tester. Test pressure: 6 bar (87 psi).
The lower spark plugs are removed because when the upper plugs are removed, oil carbon flakes off at their edge in the combustion chamber and possibly settles between the valve plate and valve seat when the valve is open. This means a considerable pressure loss here, which is not actually present.

Check the compression by the differential pressure method.
Test pressure_____hPa (psi) **every 200 hr.**

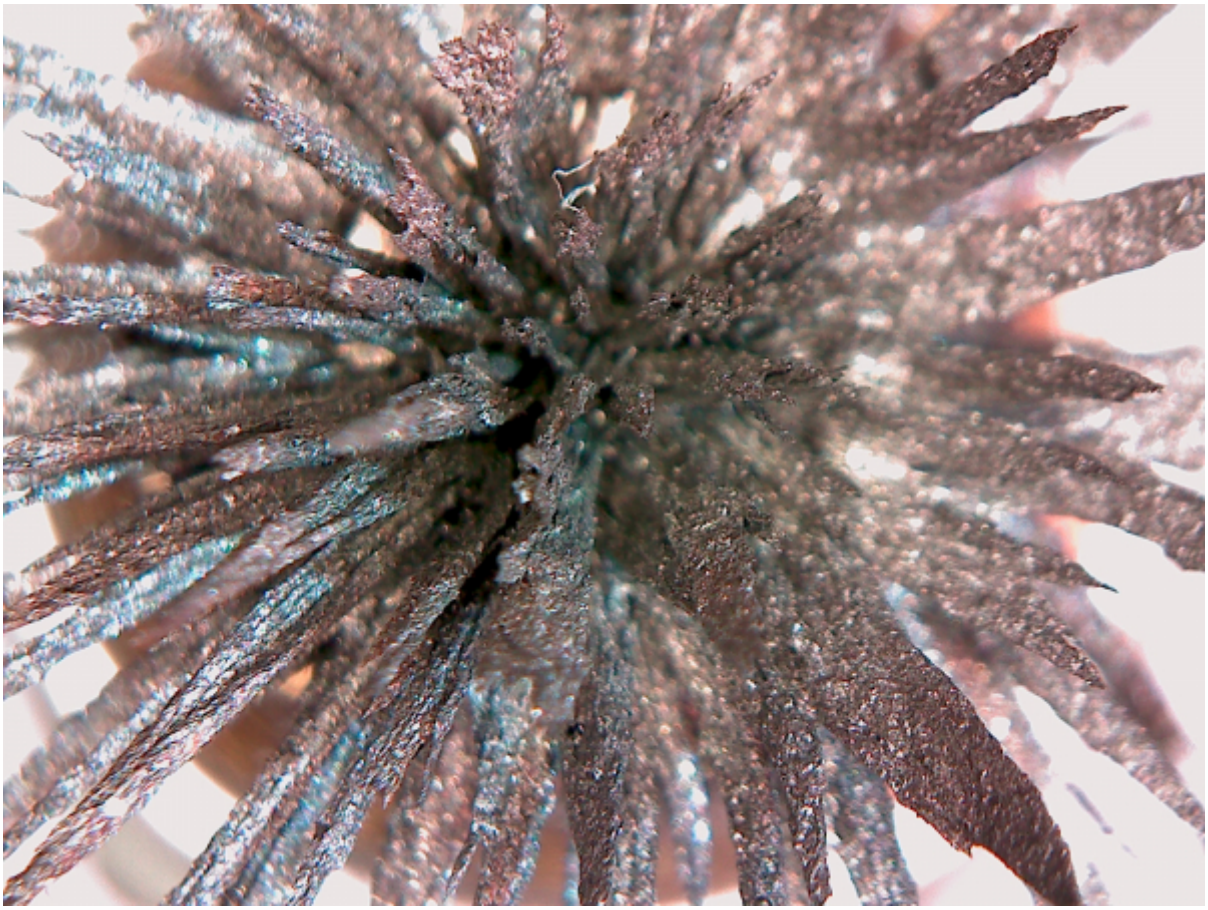
Pressure drop (% or fraction)				
Cyl #	**1**	**2**	**3**	**4**
bar/psi				

Here you should be aware that if a pressure loss of more than 10% is detected, there is a need for action.
Rotax specifies a maximum value of 25%, but this is the upper limit at which serious damage can occur. When new, we have a value of approx. 4% - 6% pressure loss. Anything above this indicates oval valve seats, which can be a result of high operating temperatures. Engines that are operated at the highest operating limit unfortunately tend to do this. With a pressure loss of less than 10%, it is often possible to grind in the valves.

Check the breakaway torque of the crankshaft
I have already described this in detail hier and this is not a pointless check.

The magnetic screw

…. Now it's getting funny…
If you can convince the seller to check the magnetic screw, you're in the clear.
If it is nice and clean and there are no swarf, that doesn't say much.
It could have been cleaned beforehand. Normally, the magnetic screw is never completely free of chips. Small crumbs are actually always present, even after 25 hours.
…. but it really shouldn't look like this….



Motor test run with magnet check

... it is best to carry out a workshop flight and observe the engine instruments closely.

Required tools

The tools listed below are definitely required for proper engine maintenance.
I recommend having the tools available or even buying them before you buy an airplane/engine.
Compared to a purchased Cuckoo's Egg, the investment is the least loss.
When buying the plane, however, I consider it a necessity if you want to assess the engine on site and carry out the maintenance yourself later.

- pressure loss tester
- flexible adapter hose for the pressure loss tester (P/N 10032 from Franz Aircraft)
- Spring balance
- locking pin for crankshaft
- Flashlight

Additionally for 914s:

- Laptop
- RS232 / USB adapter

I clearly recommend using the old, 16 bit DOS version TLR 4.6 on the laptop.

Please note that not every RS232 / USB adapter can be used.
The use of the program I have described it here.

If you are unlucky, you will see read-out data as in this example.