Carbon deposit in an engine. How to minimize its sedimentation?

Warsaw, 24.10.2019 - There is no denying that carbon deposit is an undesired phenomenon from the perspective of engine work, however its complete elimination is impossible. This happens due to composition of contemporary fuel, character of physicochemical processes taking place in the combustion process but this is not all. The cylinder-piston system is a place particularly exposed to sedimentation of carbon deposit. What are the reasons for formation of carbon deposit, can this phenomenon be minimized in any way?

The problem of carbon deposit refers less or more to each type of an engines and its formation is a consequence of non-ideal combustion of a fuel and air mixture. The fact that an engine oil is mixed with a fuel is the direct reason. Carbon sediment precipitates in the combustion chamber, which is a product of engine oil sintering and “coking” as well as semi-solid substances, originating from fuel. For gasoline engines also chemical compounds contribute to formation of carbon deposit, which are present in fuel and are aimed at reducing the phenomenon of knocking combustion.

"In the context of engine deposits, the driving style is important. No extremes are good - driving at low or only high speed and traveling only at short distances increases the risk of carbon buildup in the engine. The latter also affects spark plugs that do not reach the self-cleaning temperature for a long time (approx. 450° C). Turbochargers, which enable efficient driving in the range of 1200-1500 rpm, encourage you to drive at low speeds, and this, unfortunately, promotes carbon deposits. This effect can be minimized by changing the driving style and using the highest quality oils. An example of this can be Total oils with ART technology, which according to ACEA research increases engine protection by up to 74%", says Andrzej Husiatyński, a manager of Total Polska technical department.

Another technical reason is the lack of software updates in the main computer, which is responsible for determining the correct proportions of the air-fuel mixture. In this context, it is also worth mentioning the unprofessional tuning, i.e., for example, changing the "fuel map", which can lead to distorted proportions, and thus the occurrence of a too rich mixture of fuel.
and air. An important role is also played by the lambda probe, which measures the amount of oxygen in the exhaust gas. The probe communicates directly with the ECU, which adjusts the amount of gasoline injected according to the air consumption. Its malfunction may distort measurement of the measured exhaust gas parameters. Defective ignition system components (coils, candles) and e.g. timing chain are also responsible for carbon deposits. If it is stretched, the timing phases may be shifted, which in turn will interfere with the combustion process. There can be many technical reasons, therefore, the engine must be regularly serviced. Even for new cars, it can't be limited to just oil changes and filters. Only a comprehensive and regular service can minimize the risk of carbon deposits and subsequent defects.

Places which are particularly exposed to sedimentation of carbon deposit are as follows: engine valves, intake and exhaust collector, variable geometry turbocharger system (co-called "steering wheels"), swirl flaps in Diesel engines, piston bottoms, cylinder bushes of an engine, catalyst, DPF filter, EGR valve and piston rings. Gasoline engines with a direct fuel injection are particularly at risk. Supply of fuel directly to the combustion chamber causes that fuel does not wash the intake valves, increasing the risk of carbon sediments on them. In the long term, this can lead to disturbance of the fuel-air mixture ratio, because the correct amount of air will not be supplied to the combustion chamber. The computer can take this into account by controlling the fuel-air ratio to ensure the correct combustion process, but only to a certain extent.

As it was mentioned, also fuel is needed for formation of carbon deposit in an engine. Apart from a change in the driving style into a better one i.e. periodic use of high engine rotations, regular replacement of oil and solicitude for the broadly understood technical condition of an engine to minimize the risk of carbon deposit sedimentation, it is necessary to use fuels of proven manufacturers. The market offers a lot of possibilities in this respect.

"Good quality fuel allows cleaning of the intake system deposits, injectors and the piston-cylinder system. Thanks to this, it will be better atomized and mixed with air. An example of a fuel containing cleaning additives is TOTAL EXCELLIUM Diesel, recommended for all diesel engines. It is worth remembering, however, that the driving style of the driver is equally important, which should avoid extremes. Then the combustion process will be more effective and "healthier" for the engine" - Andrzej Husiatyński sums up.

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