race engine TECHNOLOGY

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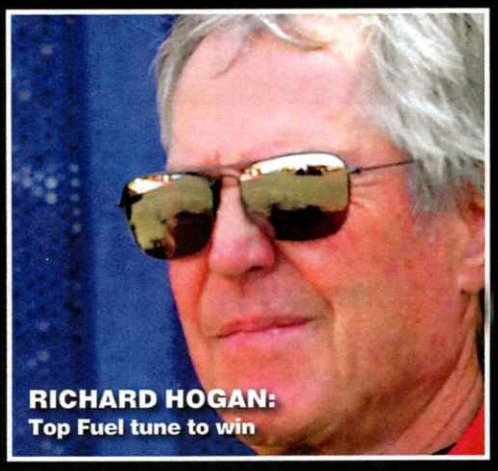

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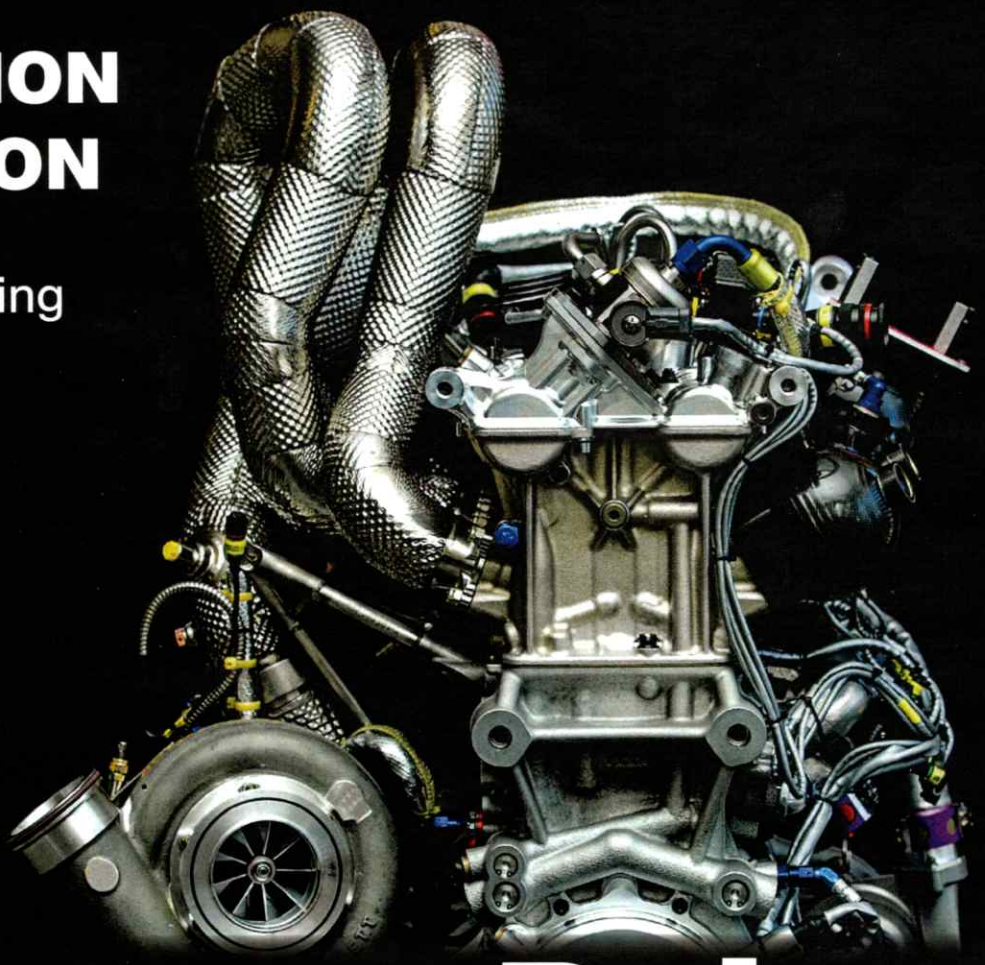

Pressure Points

Matt Grant Considers the issues around maintaining the correct oil pressure in race engines

ENGLISH "RACE ENGINE TECHNOLOGY"

Publication is an engineering issue consumed by engine parts manufacturing and I.Q. Engine Performance Builders! Matt Grant, tech author of the January, 2022, issue features "Pressure Points" oil pump article 30+ wet and dry sump oil pump manufacturers world wide were interviewed for current technology. The article did not credit contributions of technology within the text. The Schumann's tech portions are noted below:

One oil pump. manufacturer who helped with the research for this article explains this by saying, "Remote regulator systems react differently than onboard systems, because of the distance between the outlet port of the pump and the remote regulator.

One oil pump manufacturer observes that the back-pressure in an engine is a result of a huge range of variables, such as bearing clearances, oil viscosity and temperature, flow passage size and roughness, plus more. It is therefore hard to calculate but can be found from measurements taken when the engine is running. The manufacturer also provides three springs with different spring rates to give an even broader range of adjustment.

PRV Reliability

One would think that being constantly flushed with oil, the piston would be free to move up and down the cylindrical bore in the sleeve without any issues. However, one of the biggest problems with spring-loaded piston PRV's is that they can tend to jam. That is especially true if dirt or debris becomes trapped in the gap between the piston and the bore.

The material for the piston and sleeve tends to be as hard as possible, so that any debris doesn't scratch the walls of both parts. Some PRV manufacturers will use tool steel that is heat treated to give a hardness of more that 60 HRC.

One oil pump manufacturer also says that after machining, it is important that the piston and sleeve are demagnetized, otherwise small magnet forces can cause the piston to stick.

A straw poll of the oil pump manufacturers who helped with the article would suggest that returning the oil from the PRV to the oil pump inlet is the more popular option on race engines.

The argument against the first method is that running the oil across a bypass orifice {which is essentially what the PRV is} generates heat and aerates the oil, and it should not be 'hot-lapped' inside the pump.

One oil pump company that helped with this article suggests that the required oil pressure is closely related to the clearance of the crankshaft bearings combined with the viscosity of the oil. It notes that oil pressure can drop if the viscosity is reduced or if the bearing clearance is opened up.

Broadly speaking, oil pressure is proportional to both the effective orifice area and the oil viscosity: the oil pressure rises if either the effective orifice area or the oil viscosity is increased.

As the engine gets hotter, the clearances in the engine begin to open up, and the oil gets thinner. The increase in both the effective orifice area and the oil viscosity will result in a drop in the oil pressure.

Another oil pump manufacturer says it has produced an alternative to the spring-loaded piston PRV that bypasses oil back to the engine. It observes that such PRVs can have a delayed response to pressure demand changes and, as mentioned, are affected by dirt and debris getting stuck between the piston and bore. Its alternative PRV is made from a ball valve, which is less prone to reliability issues from contaminants. The bypass return is fed back into the oil pump inlet, making the pump more efficient.

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Net Result: Schumann's "140 Ball Valve" and "Energy Recovery" performance wet sump systems dominate technology.

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