

Yamaha's Yashiro-san

On the new JASO four-stroke motorcycle gasoline engine oil standard



Yoshinobu Yashiro, Yamaha Motor Co. Ltd., Chairman of the JASO Motorcycle Oil Working Group

Takaharu Suzuki, Infineum Industry Liaison Representative, speaks to Yoshinobu Yashiro from Yamaha Motor Co. Ltd., who is Chairman of the JAMA Motorcycle Oil Working Group, about his thoughts on the requirements and impacts of the recently revised JASO four-stroke motorcycle gasoline engine oil standard.

Japan's historical position as a major motorcycle manufacturing country means that the Japanese Standards Organisation (JASO) has spearheaded the development of four-stroke (4T) motorcycle oil (MCO) standards. JASO's 4T lubricant specification, introduced in 1999, has three major requirements: physical properties, engine performance and clutch friction performance. The clutch friction requirements categorise oils as either high friction, JASO MA, or low friction, JASO MB, and are central to

the standard. In 2006 a revision to the standard raised acceptable oil quality levels and introduced additional clutch friction classifications and phosphorus limits. The standard has recently been updated and we were keen to learn from Yashiro-san the key changes that have been made. "We needed to update the JASO 4T specification to introduce new friction plates and reference oils for the clutch friction test because the existing materials were no longer available. However, we wanted to keep a level of

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consistency with the existing 2006 specification in terms of testing severity, test oil performance discrimination and classification ability."

Gear pitting is an important parameter for motorcycle oils – particularly as oil viscosities decrease in order to offer fuel economy (FE) performance. The Japan Automobile Manufacturers Association (JAMA) had hoped that a gear pitting performance requirement would be incorporated into this revision, something they had wanted since the specification's inception.

"Gear pitting is one of the biggest differences between motorcycles and passenger cars. Motorcycle engine oils demand anti-gear pitting performance as they lubricate the engine and the gears. As the viscosity of passenger car motor oils (PCMO) falls we naturally want to set up a criterion for gear pitting performance for motorcycle applications to ensure the oil is fit for purpose."

"Unfortunately the gear pitting test has not been included in this update because we noted that oils are not the sole cause of gear pitting – engines and gears can also influence this phenomenon. That makes it quite difficult to develop a test which can evaluate the gear pitting performance of the oil alone while establishing any correlation with field or engine test performance. On the gear side, a key factor that affects gear pitting performance is the contact area of the gear teeth. There are various grades for gears and raising the grade of gear surface treatment increases production costs, which means getting the right balance between the gear surface grade, its costs and the viscosity of the oil is critical. I hope that the gear pitting test will be included at the next revision in 2016."

With the implementation of emissions regulations driving changes to hardware design and to lubricant specifications it

was a good opportunity to discover Yashiro-san's thoughts on the potential consequences on the chemical composition of motorcycle oils. "I think the phosphorus limit in the JASO 4T specification is not a problem for current emissions regulations in terms of after-treatment system catalyst compatibility. If the durability requirements for in-service motorcycles get longer we may need to reduce the phosphorus limits – but I personally believe the current phosphorus limit may be acceptable for some time to come."

While motorcycle and passenger car engines are very different, motorcycles run hotter at faster revolutions per minute and at higher loads, they also have a number of similarities – for example bearings, lifters and the materials used. Does this mean passenger car oils are suitable for use in motorcycles? "I don't think the needs of passenger cars and motorcycles are diverging. But there are differences in their lubrication requirements. Motorcycle engines need higher viscosity grade oils than those for

four-wheel vehicles – the lowest viscosity grades required by the Japanese motorcycle makers are SAE 10W-40 for Yamaha, Suzuki and Kawasaki, and SAE 10W-30 for Honda. However, there is more to consider than just viscosity. For example, full synthetic SAE 10W-30 oils sometimes provide higher engine oil performance than SAE 20W-40 mineral based oils."

With legislators focused on fuel economy improvements and CO₂ emissions reduction we asked Yashiro-san his views on the impact these drivers will have on the 4T motorcycle specification. "As you know, there are things the industry can handle or should cover, and things that the industry cannot deal with. JAMA Motorcycle Working Group has not yet decided whether the JASO motorcycle engine oil standard should handle fuel economy performance. The next update is scheduled in 2016 and we will be focusing on the development of the gear pitting test or on exploring alternative ways to evaluate gear pitting performance. I think that the current

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