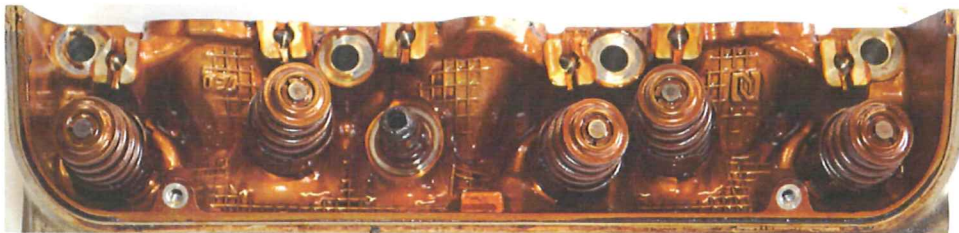


## High-Performance Biosynthetic Motor Oil Now Possible

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Using synthetic base oils to develop high performance engine oils is nothing new. What is new, however, is the introduction of a new class of synthetic base oils known as estolides. Estolides, are environmentally friendly synthetic base oils often referred to as a "biosynthetic," are synthesized from vegetable oil and are biodegradable and nontoxic. Vegetable oils have been used in lubricants for many years but have inherent deficiencies related to longevity in use and cold temperature performance that greatly limit their acceptance and feasibility in the industry. These issues are overcome with the estolide technology as estolides now exhibit superior performance characteristics, allowing environmentally friendly products to be used in a wider range of lubricant applications. Estolides offer unique benefits to lubricant formulations beyond being biobased and biodegradable. With respect to performance, available data indicate that biosynthetic estolides demonstrate exceptional results in the areas of oxidative stability, hydrolytic stability, volatility, biodegradability and renewable carbon content.

Most recently, to validate the performance progress made from estolide technology, PCMO grades 5W20 and 5W30 formulations containing estolides were submitted for API certification review. Biosynthetic estolides have been able to successfully pass all engine tests required and have received API SN certification with one of the highest piston deposit ratings among current synthetic motor oils on the market.



Conventional Motor Oil



Biosynthetic Motor Oil

Achieving API SN certification is a significant milestone for estolide technology and further validates performance capabilities for bio-based, bio-degradable and non-toxic base oils to be used in motor oil formulations.

The use of biosynthetic estolides will now allow lubricant formulators to formulate and market high performing quality products that meet or exceed required performance standards while using more environmentally acceptable ingredients in their formulations.

As more environmental regulations are enacted, lubricant manufacturers and marketers will continue to seek environmentally acceptable alternatives to petroleum based products that also meet the rigorous performance demands of OEM's. The awareness and concern over petroleum based lubricants impact on the environment has many state, federal and international regulatory bodies reviewing current policy, with some agencies beginning to enact new regulations. For example, in July of 2013, the U.S. Government announced that engine crankcase oil with at least 25 percent biobased content will be afforded Federal procurement preference for all agencies and government contractors under the USDA-managed BioPreferred program. The BioPreferred Program was created to increase the purchase and use of biobased products. Under this program, the USDA "...designates categories of biobased products that are required for purchase by Federal agencies and their contractors. The minimum biobased content is specified for each product category. Biobased content is a measurement of renewable carbon as determined under the ASTM D6866 test methodology. In addition to the procurement component, BioPreferred includes a voluntary labeling program, in which "biobased products meeting the BioPreferred program requirements may carry a distinctive label for easier identification by the consumer."<sup>1</sup>

Though this new rule was effective July 11, 2013, Federal agencies and government contractors have until June 11, 2014 to "ensure that their relevant *procurement* specifications require the use of biobased engine crankcase oils"<sup>2</sup> (italics added).

Synthetic base oil technology continues to evolve and will need to, to meet the ever changing, even more rigorous equipment performance demands and industry regulations on lubricant formulations. To meet these impending challenges, Biosynthetic estolide base oils are an example where high performance and sustainability can converge.

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<sup>1</sup> BioPreferred website (<http://www.biopREFERRED.gov/aboutus.aspx>)

<sup>2</sup> Federal Register, Vol. 78, No. 112, Tuesday, June 11, 2013

(<https://www.federalregister.gov/articles/2013/06/11/2013-13763/designation-of-product-categories-for-federal-procurement#sec-3201-102>)