



## ***Parsing Pennzane®***

**by Bill Galary Technical Products Manager**

Our field engineers sometimes say that it's easier to understand Pennzane® chemistry than Nye's system for naming our Pennzane-based oils and greases. Frankly, I have to agree. Pennzane Synthesized Hydrocarbon Fluid, a.k.a. SHF-X-2000, is Pennzoil-Quaker State's trade name for its multiplyalkylated cyclopentane (MAC), which was a chemical breakthrough for aerospace lubrication when Pennzoil's Cliff Venier and fellow scientists invented it in the 1980s. MACs offer low vapor pressure, long life, and good lubricity — effectively combining the best traits of perfluoropolyethers and synthetic hydrocarbons. Nye began formulating MAC-based lubricants soon after the molecule was invented, and the product line grew quickly, primarily due to requests by NASA and other aerospace customers for specific formulations. Hence, the names for these products were created, well, on the fly. Nonetheless, there are some nomenclature rules — and a reference table below — for our MAC products that do add meaning to what may seem like an incoherent jumble of alphanumeric characters.

First, MAC products at Nye are known as the 1000, 2000 and 3000 series of oils and greases. (These series numbers correspond to the three viscosity grades of Pennzane fluids X1000, X2000 and X3000.) If the series number ends with "1" for example, Nye Synthetic Oil 2001, the product is an oil. MAC grease product numbers typically end in zero and carry our "Rheolube" brand name, e.g. Rheolube 2000.

We have unfortified and fortified MAC oils. Our unfortified oil, NSO 2001A, is neat Pennzane filtered to MIL-STD-1246 (Level 100) and then tested to certify viscosity, FT-IR, and cleanliness standards. Our fortified oils, like NSO 2001, typically have a blend of amine and phenolic antioxidants and alkylated triphenyl phosphate antiwear additives. Some formulas use other antiwear additives, such as lead naphthenate, denoted by the suffix "PbNp." For example, NSO 2001-3PbNp contains 3% lead naphthenate, while NSO 2001-7PbNp contains 7%. Other antiwear additives include tricresyl phosphate (NSO 2001T) and trixylenyl phosphate (NSO 2001X).

We have unfortified and fortified MAC oils. Our unfortified oil, Nye Synthetic Oil 2001A, is neat Pennzane X2000 filtered to MIL-STD-1246 (level 100). Fortified oils, like 2001, typically have a blend of amine and phenolic antioxidants and an

alkylated triphenyl phosphate antiwear additive. Some formulas use lead naphthenate as the antiwear additive, denoted by the suffix "PbNp". For example 2001-3PbNp contains 3% lead naphthenate. Other antiwear additives available include triaryl phosphate (NSO 2001B), tricresyl phosphate (NSO 2001T) and trixylenyl phosphate (NSO 2001X).

Our MAC oils often have a companion grease. For example, the same antioxidant and antiwear additives used in NSO 2001 are used in Rheolube 2000 grease. The additive package used in NSO 2001B is also used in Rheolube 2000B. And the additives in NSO 2001T are in Rheolube 2000T. Nye's MAC greases are typically NLGI Grade 2, though we can make softer and stiffer greases to meet customer requests. Our MAC greases, all of which are ultrafiltered, are thickened with sodium soap or PTFE. In the future, we plan to offer lithium complex MAC greases, and we are willing to explore with our customers any viable thickeners and additives.

These nomenclature guidelines should add some meaning to Nye's MAC product names. Of course, for questions, clarifications, custom formulations, and the occasional non sequitur, don't hesitate to contact us at [pennzane@nyelubricants.com](mailto:pennzane@nyelubricants.com)