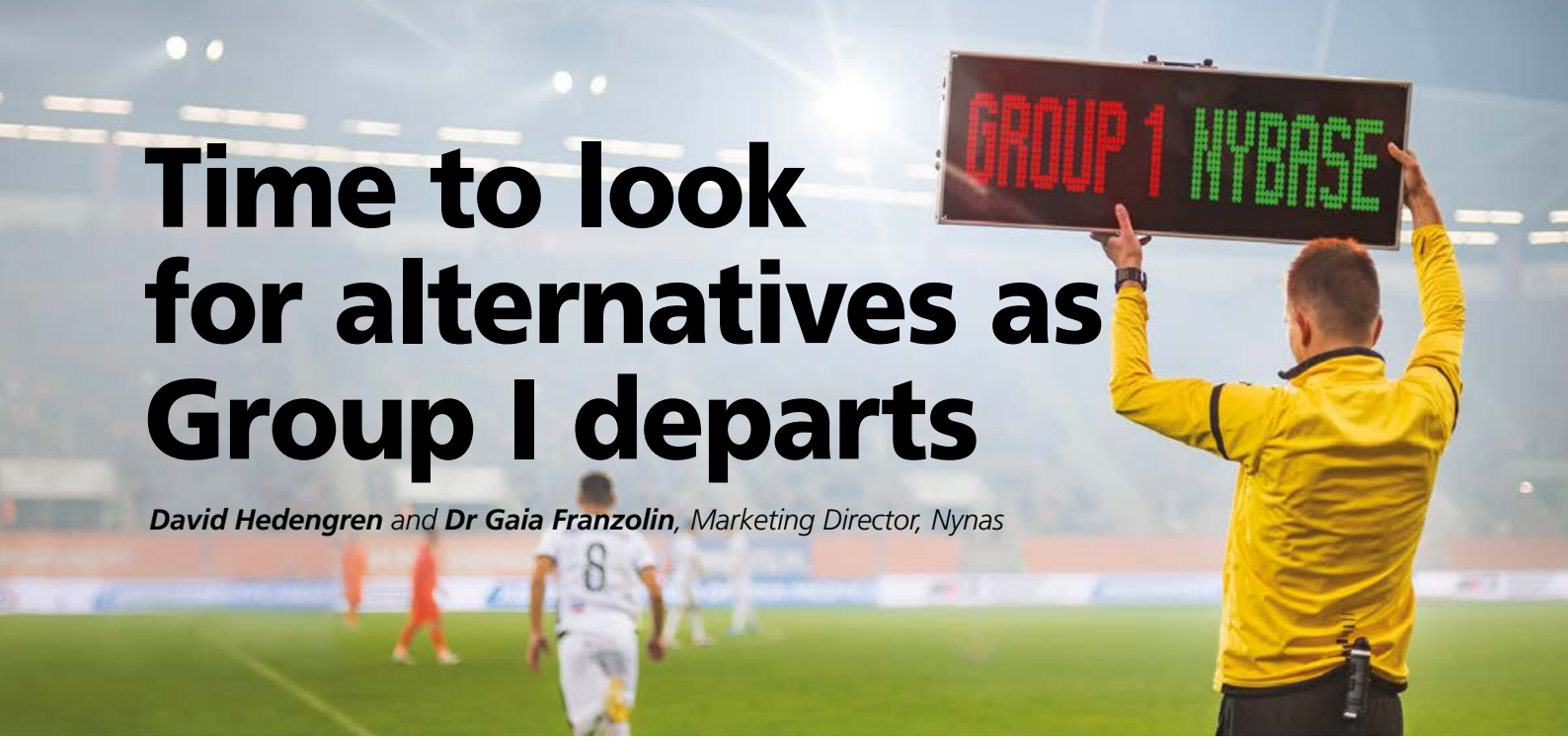

Time to look for alternatives as Group I departs

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In view of an accelerating trend of reduced supplies of Group I oils, formulators should now consider Group I replacements for applications such as industrial lubricants, metalworking fluids and process oil.

When the world's economies shut down for the first lockdown, the coronavirus significantly suppressed demand not only for fuel, but also for automotive and industrial lubricants.

During the past year, several paraffinic base oil plants around the world have seen their utilisation rates falling to unsustainable levels, reaching lows of 55%-60%, where the general limit to make economic viability is 70%.

As a result, the pandemic has accelerated an ongoing restructuring trend in the refinery industry, with Group I plants being gradually rationalised. In 2011, Group I represented about 57% of base oil production capacity, a figure that had fallen to 37% in 2019. The fundamental reasons behind this shift are primarily refinery economics, new capacity investments in Group II and III refineries, as well as stricter performance demands from the automotive industry.

Mineral base oils differ in terms of the production process and properties, which in turn means different production costs and yields. Traditional Group I plants manufacturing solvent neutrals have higher operating costs compared to modern hydro treatment methods employed in the manufacturing of Group II and III base oils. Group I solvent extraction units are more costly to run, they have limited choice of crude feedstocks, lower yields and lower value by-products.

Furthermore, as the automotive industry changed oil specifications to achieve improved fuel economy, there was a switch from heavy to light viscosity base oils. As a result, Group I base oils are no longer included in modern engine oil formulations since Group II oils makes higher performance engine lubricants.

The Group I capacity reduction is also driven further by the International Maritime Ooganisation's (IMO) new regulation, which lowered the global upper limit on the sulphur content of ships' fuel from 3.5% to 0.5%. As a result, some refineries have changed their feedstock to sweet crudes, which have a lower yield and more disadvantaged economics but produce compliant marine fuel. This further aggravates the economics of Group I manufacture.

We are seeing direct changes in marine lubricants, where formulators are turning away from Group I to use Group II base oils in combination with high viscosity naphthenic base oils and carefully selected specialty additives.

Recently, a number of permanent shutdowns have been announced that will cut global Group I base oil

capacity by up to 770,000 tonnes/year by the end of 2022.

Combined with temporary refinery closures due to the pandemic and extended refinery maintenance programmes that will continue during the first half of 2021, this will bring significant challenges. On a daily basis, we hear of Group I base oil supplies being tight and very expensive. This is creating some serious headaches for both formulators in industrial applications and buyers alike.

What does the tighter Group I supply situation mean for formulators?

The growing Group I deficit is not readily substituted by highly refined paraffinic Group II and III oils, due to limitations in viscosity range and differences in chemical composition, which affect their solvency properties. A lack of solvency has a detrimental effect in core segments of industrial lubricants, metalworking fluids and process oils.

Compared to Group I oils, the viscosity range offered by Group II and III is very limited. The viscosity of Group I heavy solvent neutrals (SN) ranges from 100-500 cSt, while the highest available viscosity in Group II is around 100 cSt (SN 600) and 50 cSt in Group III (SN 300).* This means that formulators are faced with the challenge to search for suitable Group I base oil replacements across a wide viscosity range.

It is evident that the solution to the Group I shortage in most industrial applications is not to be found by switching to Group II or III base oils, as the differences are simply too large. However, an oil very similar to Group I may be readily re-created by carefully engineered blends of naphthenic and paraffinic base oils.

To meet the current and expected shortage of Group I oils, industrial lubricant formulators must choose between converting to either Group II or III, using naphthenics (API Group V), or selecting engineered blends of the first two options.

Is there no future for Group I oils?

There are mixed opinions in the industry, some are hanging onto the hope that Group I products will become available again, while others are coming to terms with the fact that these oils are fading out for good. A number of Group I producers could remain as niche players, offering oils at a premium. Potentially for applications where there is a technical need for high viscosity and solvency provided by Group I aromatics.

However, in the not-so-long term, Group I supply will not be able to satisfy demand in mainstream markets such as marine, metalworking fluids and other large industrial applications. Gaia Franzolin expects closures to accelerate and viable replacement solutions to be implemented, most notably a combination of Group II and naphthenic base oils and additives.

Ultimately, the industry will adapt and genuine collaborations between base oil suppliers, specialty additive producers, formulators and end users will make it possible.

LINKS
www.nynas.com

** All viscosities are KV@40 °C.*