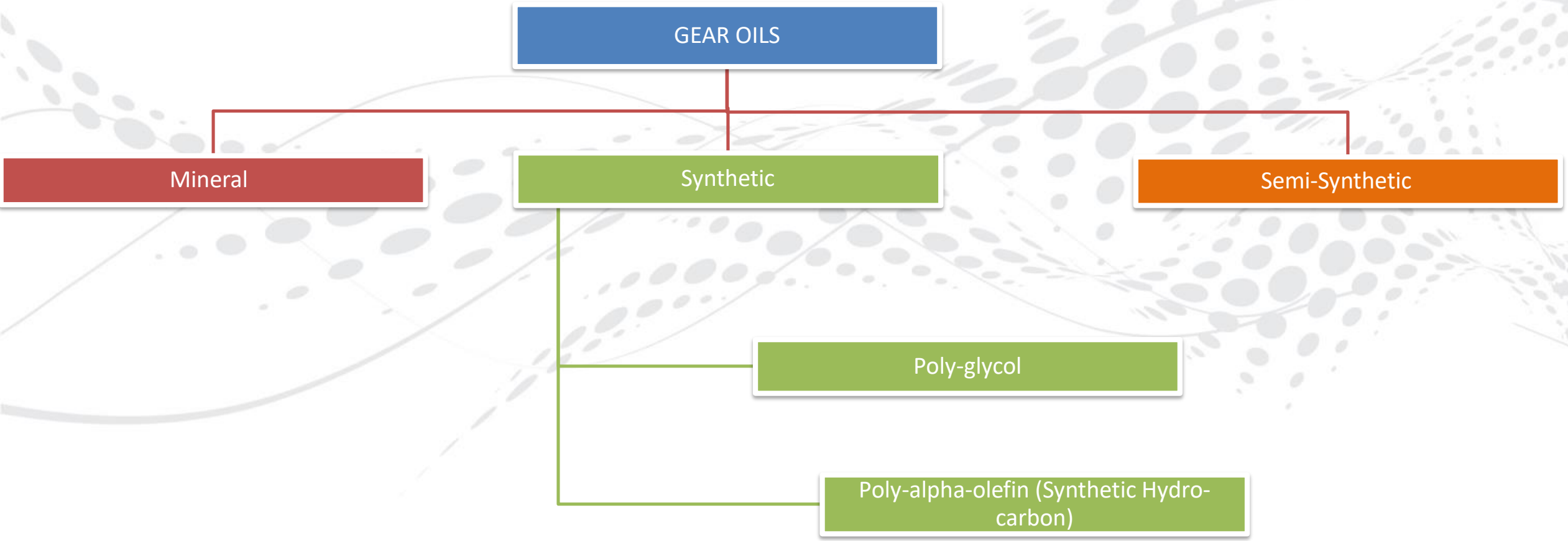
Why use Gear Oils?

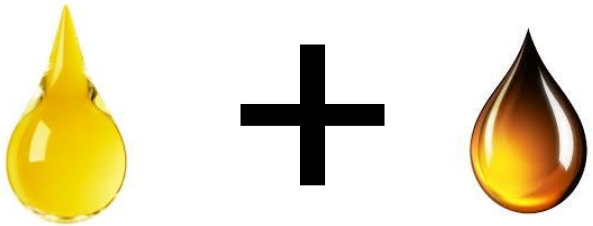
Gear oil is a fluid lubricant used in gearboxes and bearings for reduction of friction and wear. It reduces the heat which is generated by the operating conditions and also helps in protecting corrosion.



Types of Gear Oils.



Types of Gear Oil

Mineral Oil Series	Synthetic Gear Oils	Semi-Synthetic Gear Oils
Mineral oils are naturally occurring oil generally derived from crude. Mineral oil in a gear box basically protects the gears from corrosion and friction. 	**Synthetic oil** is a lubricant consisting of chemical compounds that are artificially made. Synthetic lubricants can be manufactured using chemically modified petroleum components rather than whole crude oil. The most commonly used synthetic oils for gear are PAO & PG 	Semi-synthetic oils (also called "synthetic blends") are a mixture of mineral oil and synthetic oil, with no more than 30% synthetic oil, which are engineered to have many of the benefits of full synthetic oil without the cost. 

LUBRILOG RANGE

Lubrilog's range of gear oils are as follows:

PRODUCT	BASE OIL	VISCOSITY(40°C)	Temperature Range
L CC SERIES	Mineral	100 cSt to 1000 cSt	0 to 120 °C
LY PAO AW SERIES	PAO (SHC)	100 cSt to 1000 cSt	-40 to 160 °C
PG OIL SERIES	Poly-Glycol	100 cSt to 1000 cSt	-30 to 180 °C

The L CC range of mineral oil also contains LCC 1200,1500,2200,3200. With higher viscosities as per customers requirement.

Comparision between Mineral Oil & Synthetic Oil

ADVANTAGES OF SYNTHETIC OIL OVER MINERAL OIL

- Higher Viscosity Index of PAO based oil compare to Mineral oil is well suited for applications where high and low temperature conditions are encountered. Also, the Pour Point of PAO synthetic oils are lower resulting in improved usability for a broader range of applications and increased overall performance.
- 4 to 5 times higher service life of the oil, Long oil change interval.
- Power Savings up to 3% due to reduction of friction i.e. oil sump temperature.
- Enhanced protection of Gear Boxes due to enriched additive package like Anti wear, De-foamer and Extreme pressure, in case of Micro-pitting/Scuffing marks
- Lesser Disposal – Environment Friendly.
- More Availability of the machine.
- Overall Savings in Labour, Energy & Spares

Comparision between Mineral Oil & Synthetic Oil

Technical Comparision between Mineral Oil & Synthetic Oil(Base oil Viscosity 320 cSt)

TECHNICAL COMPARISON (Gear Boxes – ISO VG 320)		
Parameters	Conventional Gear Oil	LUBRILOG LY PAO 320 AW
Base Oil	Mineral Oil	PAO (Poly Alpha Olefin)
Base Oil Viscosity (at 40C)	320	320
Base Oil Viscosity (at 100C)	25.4	52
Viscosity Index (VI)	95	>150
Flash Point (C)	225	>225
Pour Point (C)	-15 C	-45 C
Service Temp. Range (C)	-15 to 90 degree C	-45 to 150 degree C
FZG gear test rig, A/8.3/90, DIN 51354-2, scuffing load Stage	12	> 12
Copper corrosion	1B	1A (as per ASTM D130, 24 hrs @ 121º C)

COST BENEFIT ANALYSIS

Synthetic Oil Over Mineral Oil

Cost-benefit Analysis (Tangible)		
Parameters	Conventional Gear Oil	Lubrilog LY PAO 320 AW
First-fill Quantity (liters)	2000	2000
Oil changeover interval (hours)	5000 (approx. 1 year)	20000 (min.) to 25000 (max) (approx. 4 to 5 times than conventional)
Top-up Quantity for 25000 hours (approx. 5 years)	200*5 = 1000 liters (One drum per year)	200 liters (negligible evaporation loss, less leakage due to high viscosity index)
Quantity required for 25000 hours (approx. 5 years)	2000*5 + 1000 = 11000 liters	2000 + 200 = 2200 liters
Price/liter (Rs.)	140	600
Total Operating cost (Rs.)	15,40,000/-	13,20,000
Overall Savings (Rs.)	2,20,000/-	
Overall Savings (%)	16 %	

LUBRILOG Vs COMPETITOR

Synthetic Gear Oil of Base Oil Viscosity 320 cSt

TECHNICAL COMPARISON: POLY-GLYCOL OIL	APPLICATION: CABLE CAR GEAR BOX		OEM: DAVID BROWN
PROPERTIES	KLUBERSYNTH GH 6 – 320	LUBRILOG PG OIL 320	REMARKS
BASE OIL	PAG	PAG	COMPARABLE
KINEMATIC VISCOSITY, cSt **@ 40 deg C** **@ 100 deg C**	 320 54	 320 56	COMPARABLE. Better Viscosity Index indicates that the oil will remain stable and its viscosity will not change much over the operating temperature range. This allows for consistent equipment performance within the normal working conditions. It also ensures proper lubricating film over a longer life of the oil, which means that the oil with the lower VI will deteriorate faster in its properties leading to lesser protection and more frequent changing / top-up of the oil.
VISCOSITY INDEX (VI)	≥ 220	240	
FLASH POINT, deg C	≥ 250	240	COMPARABLE, though KLUBERSYNTH GH 6 – 320 exhibits slightly higher flash point.
POUR POINT, deg C	≤ - 25	- 30	COMPARABLE, though LUBRILOG PG OIL 320 exhibits slightly better low temperature characteristic.

LUBRILOG Vs COMPETITOR

Synthetic Gear Oil of Base Oil Viscosity 320 cSt

TECHNICAL COMPARISON: POLY-GLYCOL OIL	APPLICATION: CABLE CAR GEAR BOX	OEM: DAVID BROWN
PROPERTIES	KLUBERSYNTH GH 6 – 320	LUBRILOG PG OIL 320	REMARKS
TAN (Total Acid Number), mgKOH/gm	–	< 1	The total acid number (TAN) is a measurement of acidity that is determined by the amount of potassium hydroxide in milligrams that is needed to neutralize the acids in one gram of oil. It is an important quality measurement of the oil indicating its oxidation during use and hence deterioration. Any new oil will also have a TAN due to the additives it contains as well as the type of oil used to manufacture the product. Mineral oils are naphthenic or paraffinic based. Naphthenic based oils are generally of more acidic nature and hence tend to be corrosive on the component surfaces. PAGs are however synthesized oils and hence, the fresh oil will only show a TAN indicative of the type of additives used. Lubrilog uses new age additives in its PG Oils to induce the properties needed for extreme performance without compromising on the TAN for their fresh oils. Thus, even over time and extended usage, Lubrilog PG Oils will not tend to oxidise, giving longer oil life besides of course better lubricity ⇨ reduced coefficient of friction ⇨ reduced operating temperature ⇨ longer service life of the internal parts of gear box like bearing.

LUBRILOG Vs COMPETITOR

Synthetic Gear Oil of Base Oil Viscosity 320 cSt

PROPERTIES	KLUBERSYNTH GH 6 – 320	LUBRILOG PG OIL 320	REMARKS
COPPER CORROSION ISO 2160, 24h/100°C	1 – 100 Corrosion Degree	1a	Lubrilog PG Oil conforms to the lowest possible corrosion degree '1a' as set by ISO 2160.
STEEL CORROSION ISO 7120, Method A, 24h/60°C	No Rust	No Rust	COMPARABLE
FOAM TEST, ml **Sequence I/24°C** **Sequence II/93.5°C** **Sequence III/24°C**	 ≤ 100/10 ≤ 100/10 ≤ 100/10	 30/0 0/0 10/0	Klubersynth GH 6 Oils are tested under DIN 51517-Part 3 and Lubrilog PG Oils are tested under ASTM D892. Both are industrial standards for testing Gear Oils for their foaming characteristics. Under the given standards, both the oils give COMPARABLE results.
FZG Scuffing load test (A / 8.3-16.6 / 90 deg C)	>14	>14	Scuffing Load test set by FZG Institute is one of the main criteria for Oil will be used for lubrication of heavily loaded Gear Boxes. Both Klubersynth GH 6 and Lubrilog PG Oil show same rating but load carrying capacity of LUBRILOG PG OIL is extremely high which indicates the oil film will remain unbreakable or stable for a much longer time, even in shock load conditions, thus improving equipment life.
Four Balls Weld Load test	--	4000 N	

LUBRILOG Vs COMPETITOR

Synthetic Gear Oil of Base Oil Viscosity 320 cSt

PROPERTIES	KLUBERSYNTH GH 6 – 320	LUBRILOG PG OIL 320	REMARKS
FAG FE8 Rolling Bearing Test, DIN 51819-3, D7.5/80-80, wear of rolling elements	< 30 mg and < 200 mg	< 01 mg and < 18 mg	This is another very IMPORTANT CRITERIA as the Oil will lubricate the rolling bearings also inside the gear box. LUBRILOG PG Oils provide excellent performance against the criterion set by industry standard FAG FE8. Whereas the standards for an oil confirming to the test requirements are declared at < 30mg for rolling elements and < 200mg for cage, LUBRILOG PG Oils surpasses these FAG FE8 requirements to achieve extremely low wear behaviour, thus improving the bearing life.
Service Temperature Range, deg C	-25 to 160^{O}C	Up to 180^{O}C	Lubrilog PG Oils have a slight advantage with their better stability at higher operating temperature.

Other Advantages:

- Our PG Oil range contains very high level of EP and AW additive and also Friction Improver to provide outstanding performance on the long-term basis. Reducing friction between the rolling elements and the cage will lead to advantages in the operating temperature of the bearing, thus reducing the fatigue on the bearings. Improvement in operating temperature will also give us the advantage of less oxidation tendency of the oil and hence longer service life.
- LUBRILOG will provide time-to-time USED OIL ANALYSIS from any third party laboratory in India or if required, even from our R&D Laboratory at our manufacturing facility at Romans-Sur-Isére, France to assess the oil performance.
- We confirm that our Lubrilog PG Oils are compatible with any other Poly-Glycol based Oils and will not pose any problem to the components being lubricated.

LUBRILOG

Merci..

LUBRICATION ENGINEERING