

# Technical Bulletin

## Neptune Gear Oils with water

Water ingress is an issue when gearboxes are operated in wet environments.

*"Just 1% of water in an industrial gear oil can reduce bearing life by up to 90%, which can have significant cost implications in terms of both component costs and potential unscheduled downtime", explains Joe O'Connor, Product Application Specialist from Shell lubricants companies. "While awareness of the problems that water contamination can cause is strong, operators are often surprised to learn how quickly contamination can escalate and the level of damage that can be caused by just a small amount. . .*

*Even the most vigilant maintenance team may not be aware that there is a serious water contamination problem until, for example, corrosion and fatigue failure has started to occur.*

*Symptoms are often slow to emerge, and by the time pitting and surface wear begin to appear, components may already need urgent replacement, requiring downtime and potentially a disruption in production."*

Demulsibility and water separability are measured to determine the ability of the gear lubricant to expel water. The expelled water moves to the bottom of the gear box and starts the corrosion of metal parts in contact with the free water.

	<b>Demulsibility Free Water mL/90mL</b>	<b>Demulsibility Emulsion mL/90mL</b>	<b>Water Separability Minutes to 3% Emulsion at 82°C</b>	<b>Saturation point</b>
	<b>ASTM D-2711</b>	<b>ASTM D-2711</b>	<b>ASTM D-1401</b>	
Neptune				
150	0 mL	0 mL	Not applicable	Infinite
159	0 mL	0 mL	Not applicable	Infinite
Mineral Oil				
Standard*			30 min	200 ppm
PAO**	85 mL	0.2 mL		200 ppm

Water ingress into mineral oil based gear lubricants in excess of 200 ppm will separate from the gear lubricant and collect in the bottom of the gearbox after 30 minutes of non-operation of the gear-box. Whereas mineral oil gear lubricants pass rust prevention ASTM-D665 where the lubricant is kept agitated and pre-coates the metal. Free water separated from a gear lubricant fails ASTM D-665.

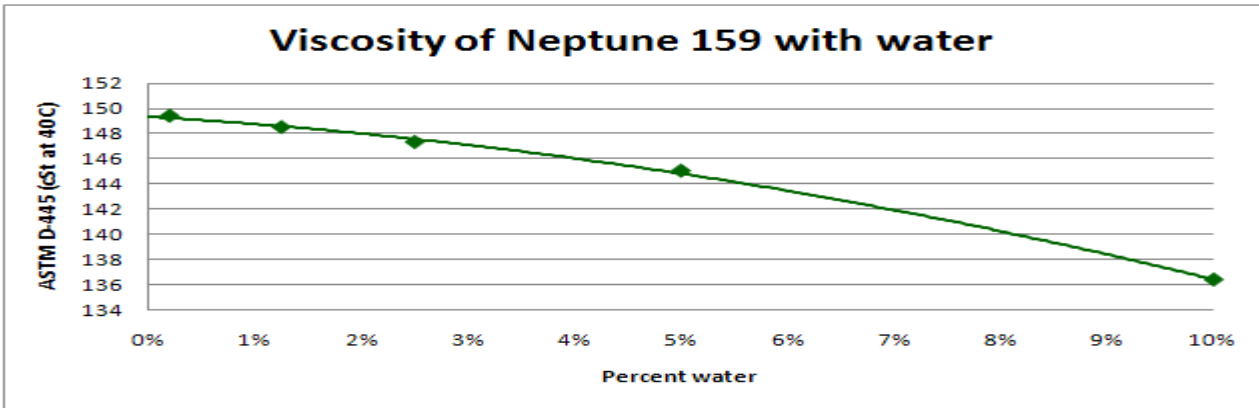
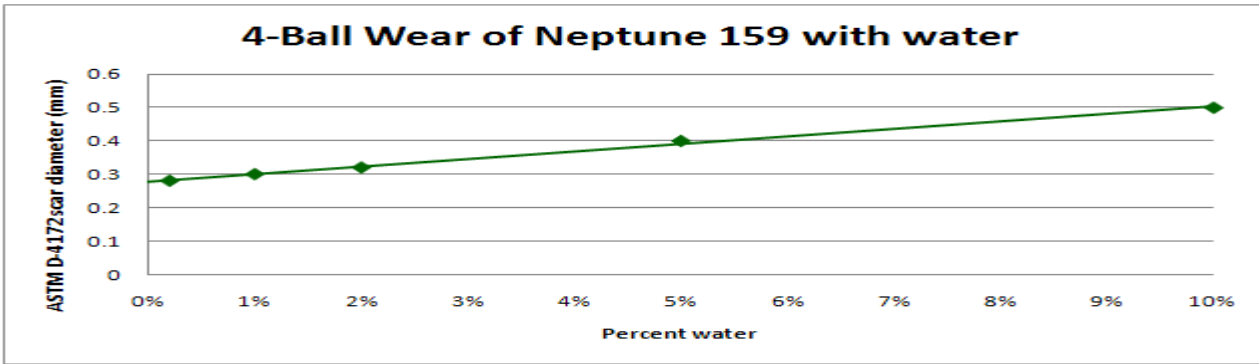
Water is soluble in Neptune Gear oils. There is an infinite saturation point and water separability is not applicable. Therefore, the Neptune Gear lubricants continue to prevent corrosion even after 10% water has been dissolved in the gear lubricant and the gear has been allowed to sit idle for more than 30 minutes.

The lubrication properties of Neptune gear lubricants reduce with increased water amounts but are still in the acceptable range of mineral oil based gear oils.

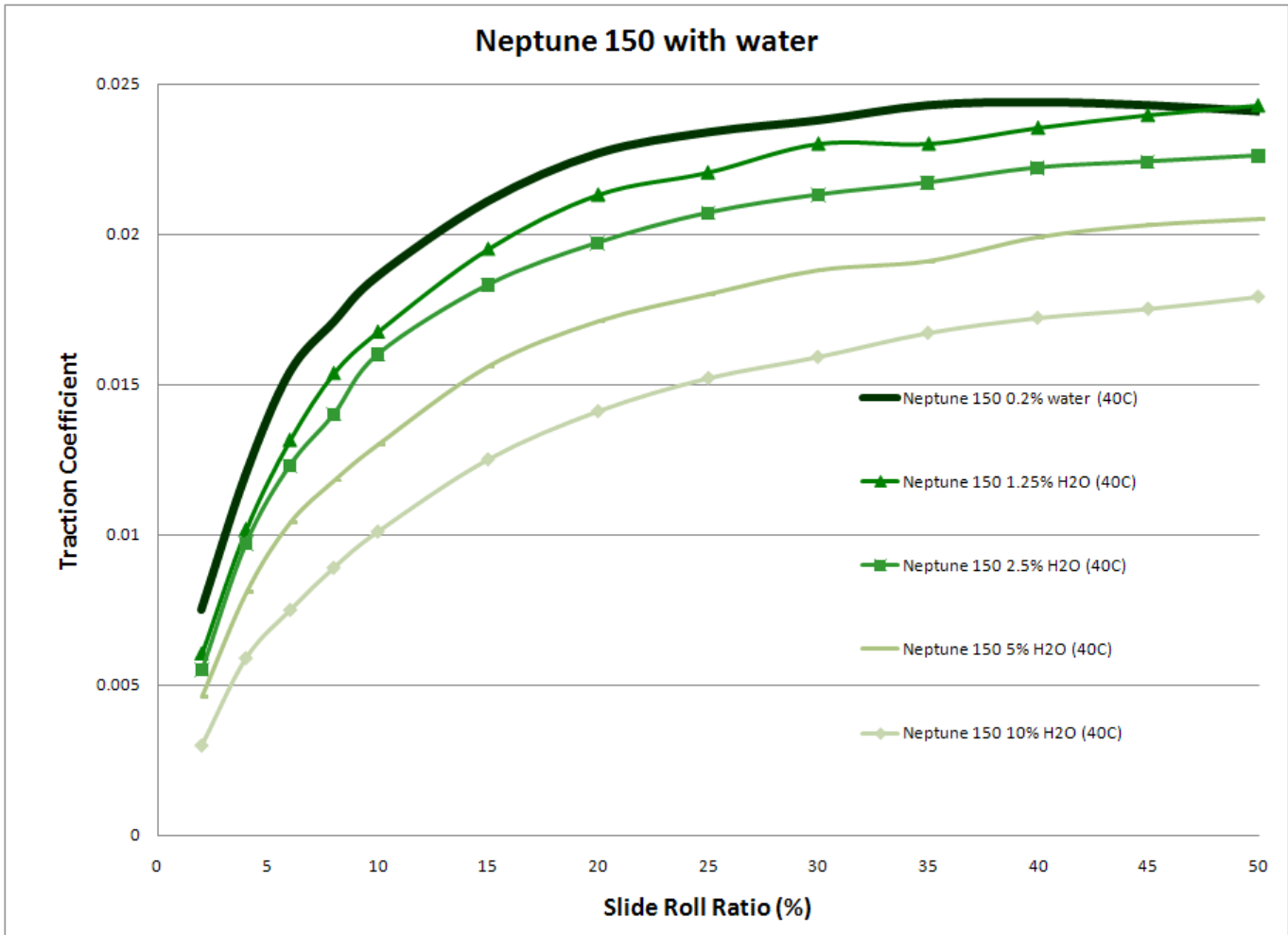
	4-Ball Wear	Timken OK load	4-ball EP	4-ball EP
			Weld Load	Load Wear Index
	ASTM D-4172	ASTM D-2509	ASTM D-2783	ASTM D-2783
Neptune				
159	0.28 mm	70 lbs	200 kg	61.49
159 1.5% water	0.30 mm		160 kg	48.85
Mineral Oil				
Standard*	0.3 mm	65 lbs	200 kg	47.0
PAO**		65 lbs	250 kg	45.0

\*Mobil Spartan EP 150      \*\* Shell Omala® 150

Even excessive amounts of water that would lead to catastrophic failure of a gearbox using a mineral oil type (water insoluble) lubricant shows only a modest decrease in lubricity by ASTM D-4172.



Lubrication testing using the Mini-Traction Machine on Neptune 150 shows that there is a gradual decrease in the lubrication of Neptune gear lubricants. However, even with as much as 2% water, the lubrication is still within range of conventional mineral oil based hydraulic fluids.



**CONCLUSION:**

The conventional wisdom used to condemn petroleum-based gear lubricants does not apply to Neptune gear lubricants. Although effort should be made to maintain the water content below 7500 ppm, Neptune will still continue to protect the gear box from rust and oxidation while providing superior lubrication characteristics far in excess of this amount.