THE CASTROL® OPTIGEAR® SYNTHETIC PD ES RANGE

ADVANCED LUBRICATING OIL FOR LONG-LASTING GEAR PROTECTION

IT'S MORE THAN JUST OIL. IT'S LIQUID ENGINEERING.®

Castrol OPTIGEAR®

THE RISE OF SYNTHETIC GEAR OILS

Industrial gears are now expected to run faster at higher loads and temperatures, with smaller oil reservoirs. So, it's no surprise that 30% of US industrial companies surveyed said they experienced a lubricant-related gearbox failure within a year.[1] Today, demand for industrial synthetic gear oils has increased, with the market growing by 6.8%. At the same time, the mineral-gear-oil market has reduced.

INDUSTRY-LEADING GEAR OILS

The Castrol® Optigear® Synthetic PD ES range is an advanced range of solid-free, high-performance, Flender-approved gear oils, which provide long-term lubrication for industrial gears that work with heavy loads and in extreme temperatures.

Whether for spur, bevel, planetary or heavy-loaded gears, the Castrol Optigear Synthetic PD ES range helps equalize surface roughness and minimize abrasion – improving the surface profile of contacting gears.

BENEFITS OF THE CASTROL® OPTIGEAR® PD ES RANGE

30% **30% less frictional torque and superior surface protection**

Enhanced temperature resistance

Improved seal and paint compatibility

ACTIVE PROTECTION WITH MFT-PD TECHNOLOGY

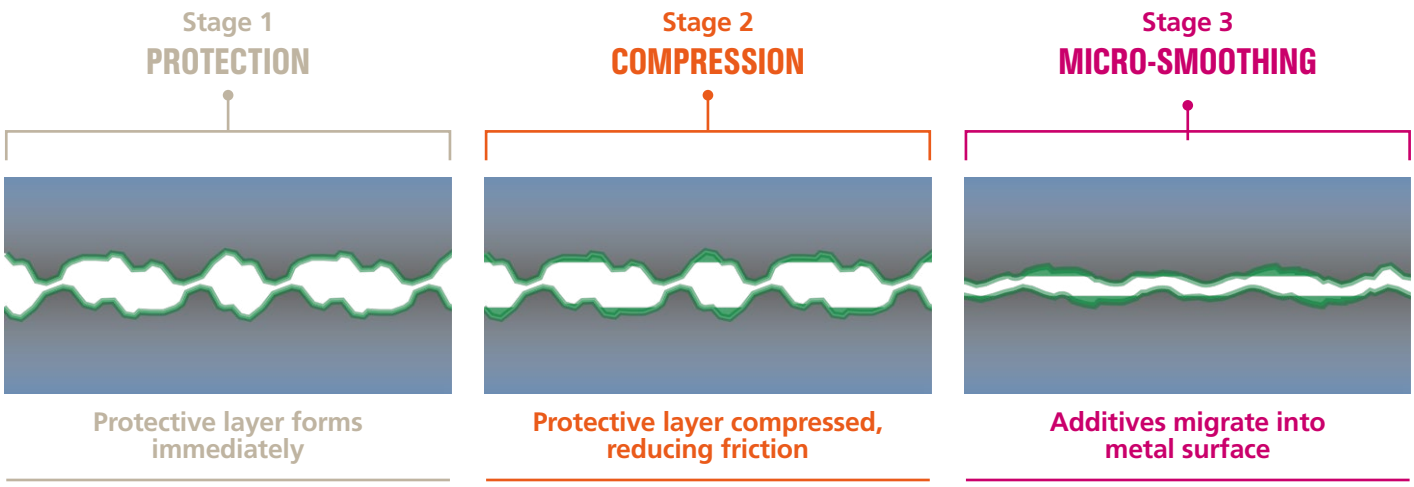
Conventional lubricants use sacrificial additives that get used up and need to be replenished. So even though they protect equipment, there's still wear – and breakdowns still happen.

Castrol's high-performance industrial gear oils, the Castrol Optigear Synthetic PD ES range, uses MicrofluxTrans Plastic Deformation technology (MFT PD) to actively smooth surfaces, without depositing or removing material – lowering pressure, removing friction and creating less wear.

Because MFT PD is non-sacrificial and needs replacing less frequently, re-lubrication intervals can be longer. This is also supported by 30% less frictional torque and superior surface protection.

SURFACE ENGINEERING

The Castrol Optigear Synthetic PD ES range provides extreme-pressure resistance and reduces friction through a three-stage micro-smoothing effect of plastic deformation.



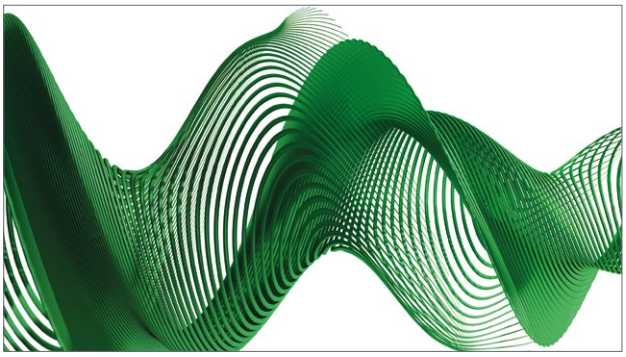
[1] http://www.gearsolutions.com/article/detail/5490/motion-impossible--without-the-right-lube.

THE CASTROL® OPTIGEAR® PD ES RANGE PERFORMANCE PROFILE

- Reduced coefficient of friction and temperature
- Improved smoothness of surface quality
- Excellent thermal and oxidation
- Extended operating period for high loads and speed
- Reliable corrosion protection
- Longer service life of gears
- Lower energy, maintenance and disposal costs

Castrol OPTIGEAR®

High Performance Synthetic Gear Oil



THE CASTROL® OPTIGEAR® SYNTHETIC PD ES RANGE TEST RESULTS

PROPERTY	TEST DESCRIPTION	METHOD	PARAMETER	OPTIGEAR SYNTHETIC PD 150 ES	OPTIGEAR SYNTHETIC PD 320 ES	GOOD •••	MEDIUM ••	POOR •
OXIDATION TEST	13 days at 121°C 10 l/h air	ISO 4263-4	KV100 increase	0.9%	1.1%	< 2%	2–6%	> 6%
SCUFFING PROTECTION	FZG scuffing test	ISO 14635-1	Load stage	> 12	> 14	> 14 (ISO 320) > 12 (ISO 150)	>12 (ISO 320)	12
RUST PROTECTION	Rust test	ISO 7120 ASTM D665	Pass/fail	Pass synthetic sea water	Pass synthetic sea water	Pass synthetic sea water	Pass distilled water	Fail
FE8 BEARING TEST STANDARD CONDITIONS	Slow speed/ High load	FE8 D-7.5/80-80 DIN 51819 -3	Roller wear mw_{50}	3 mg	-	< 10 mg	10–30 mg	> 30 mg
FE8 BEARING TEST FAG – STEP 1	Slow speed/ High load	FE8 D-7.5/100-80 (80 h)	Roller wear mw_{50}	-	2 mg	< 10 mg	10–30 mg	> 30 mg
FE8 BEARING TEST FAG – STEP 2	Medium speed/ High load	FE8 D-75/90-70 (800 h)	Roller wear mw_{50}, pittings/surface damage	2 mg No pitting	2 mg No pitting	< 10 mg No pitting	10–30 mg No pitting	> 30 mg and/ or pittings, surface damage
FE8 BEARING TEST FAG – STEP 4	Mixed film lubrication	FE8 D-750/60 with water added (600 h)	Roller wear $mw_{50,}$ pittings, sludge	-	2.5 mg no pitting low sludge	< 10 mg low sludge	10–30 mg moderate sludge	> 30 mg pitting failure, high sludge
MICROPITTING RESISTANCE	FZG micro-pitting tests	FVA 54/7 C/8.3/*	Load stage	*90°C > 10	*60°C > 10	> 10	10	9
		FVA 54/7	Micro-pitting rating	High	High	High	-	Medium
		E DIN 3990-16 (draft, Oct. 2017)	Micro-pitting rating	Very high	Very high	Very high	High	Medium
FOAMING BEHAVIOUR	Flender Foam test	ISO 12152	Volume increase after 1 min	-	6%	< 10%	10–15%	> 15%
FLENDER SEAL COMPATIBILITY	Static and dynamic seal tests (NBR and FKM)	OEM	Pass/fail	Pass	-	Pass	-	Fail
FLENDER PAINT COMPATIBILITY	Gear box paint tests	OEM	Pass/fail	Pass	-	Pass	-	Fail

THE CASTROL® OPTIGEAR® SYNTHETIC PD ES RANGE TEST RESULTS

PROPERTY ISO VG 320 GRADES	TEST DESCRIPTION	OPTIGEAR SYNTHETIC PD 320 ES	COMPETITOR 1	COMPETITOR 2	COMPETITOR 2.2	COMPETITOR 3	COMPETITOR 4.1
OXIDATION TEST	Viscosity increase KV100	●●●	●●	●●	●●	●●	●●●
	Viscosity increase KV40	●●●	●●	●●	●●	●●	●●
	Residues on glassware	●●●	●●	●●●	●●	●●	●
FE8 BEARING TEST FAG – STEP 1	Roller weight loss mw_{50}	●●●	●●●	●●●	●●●	●	●●
	Cage wear mk_{50}	●●●	●	●	●	●	●
	Average steady-state friction torque	●●●	●●●	●●	●●	●●●	●●

KEY		
GOOD ●●●	MEDIUM ●●	POOR ●

Contact us today at 888-CASTROL

www.castrol.com/industrial-us