

LUBE

TECHNI-GRAM



FROM:

LEWIS FOX
DIRECTOR OF TECHNOLOGY

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SUMMARY OF TYPES & CAUSES OF GEAR FAILURES

The December 1999 Techni-gram titled *Trends in Industrial Gear Oils*, addressed the increasing demands placed on industrial gear oils due to 1) end users demand for longer lubricant life in order to reduce costs and 2) design changes to improve gearbox efficiency i.e. smaller gearboxes operating at higher speeds and loads with smaller oil capacities. A recent statement in an industry publication further confirms the need for industrial customers to seek out “Next Generation” EP Gear oils:

*“Because of the uses to which gears are subjected, it is easy to see why **fully 50% of gear failures are caused by improper lubrication or incorrect loading.**” (***)see the following summary of gear failures)*

Types of Failure, %

Breakage, total	61.2
Fatigue breakage, teeth	32.8
Fatigue breakage, bore	4.0
Overload breakage, teeth	19.5
Overload breakage, bore	0.6
Chipping, teeth.....	4.3
Surface fatigue total.....	20.3
Spalling.....	6.8
Pitting.....	7.2
Pitting and spalling	6.3
Wear, total.....	13.2
Abrasive wear	10.3
Adhesive wear.....	2.9
Plastic flow, total	5.3

Causes of Failure, %

***Service-related causes, total.....	74.7
Improper assembly.....	11.2



... to keep it running

*Improper lubrication	16.0
*Continual overloading	25.0
*Impact loading	8.9
Bearing failure	10.7
Foreign material	1.4
Operator error	0.3
Abusive handling	1.2
Heat treatment, total.....	16.2
Excessive core hardness.....	0.5
Insufficient core hardness	2.0
Excessive case depth.....	1.8
Insufficient case depth	4.8
Improper hardening.....	5.9
Improper tempering	1.0
Distortion	0.2
Design-related causes, total	6.9
Improper design	2.8
Improper material selection	1.6
Specification of unsuitable heat treatment	2.5
Manufacturing-related causes, total.....	1.4
Grinding burns	0.7
Tool marks or notches.....	0.7
Material-related causes, total	0.8
Forging defects	0.1
Steel defects	0.5
Mixed steel, wrong composition.....	0.2

As pointed out in the December '99 Techni-gram, an increasing number of industrial customers are finding lubrication solutions in the more thermal and oxidation stable, EP gear oils developed for today's more severe automotive and heavy equipment drivelines/manual gearbox applications. "Next Generation" EP gear oils (such as SWEPCO 200 Series Gear Oils) are proving to be the answer for providing superior performance and protection in even the most severe industrial gearbox applications subjected to continual overloading and/or impact loading. Typically, industrial EP gear oils have a lower quantity of EP additive and should **never** be used in an automotive/heavy equipment application. Gear oils with proven non-aggressive EP additive chemistry, and API MT-1 yellow metal compatibility can be used in both automotive/heavy equipment and industrial gear lubricant applications. This results in additional economic savings through consolidation and reduction of inventory.