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SWUG AUSTRALIA

Reliability Engineering Practises Reduce Operational Costs

6 March 2016

Good Lubrication is vital to ensure the Reliability and Life of Equipment & components.
Lubrication forms part of equipment's design

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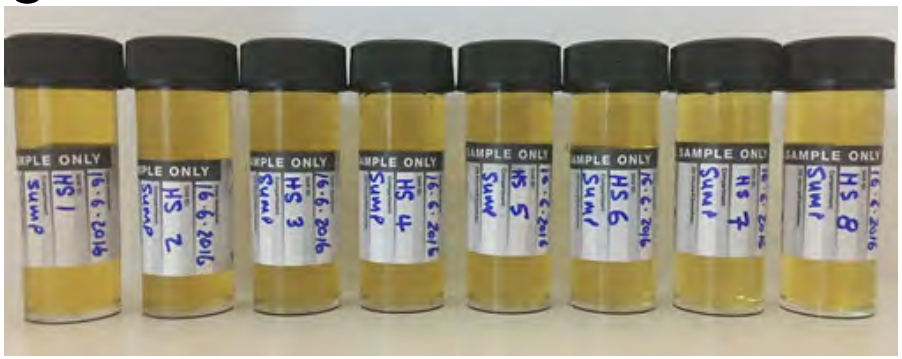
- Printer are in Business to Make a Profit
- 6 R's Of Lubrication
- A Case Study – Saving Money with 6 R's
- Monitoring & Cleanliness of Oils
- Impact of Cleaner Oil Impact
- Life Extension Factors
- Summary



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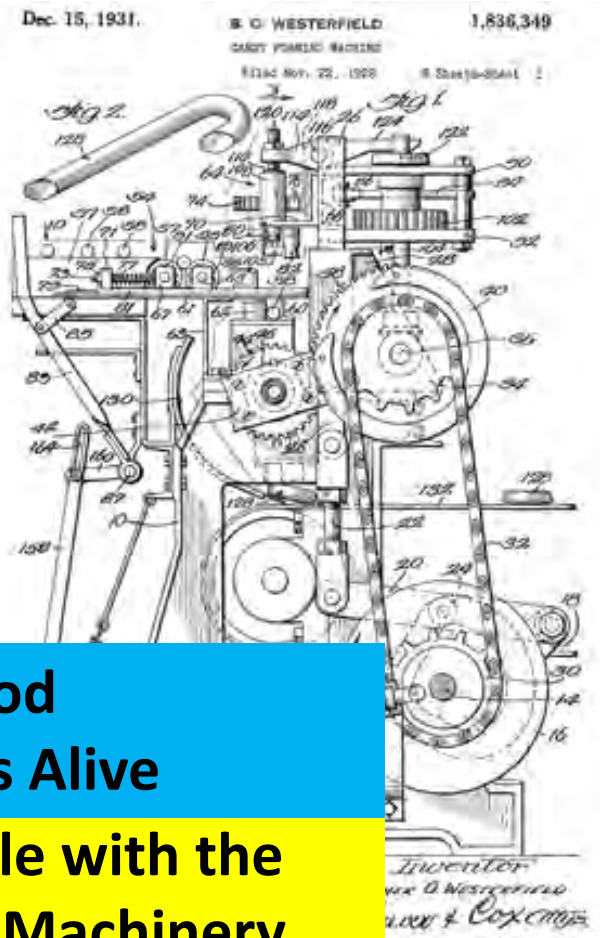
The basics of Machine Maintenance



Oil is Like Blood
It keeps Machines Alive

We continue to struggle with the basic maintenance of Machinery

Principles

If the 1st Principle of Business is to
"Make a Profit"
Then the Underlying Principle for Maintenance, must be to;
"Increase efficiency, maximise asset productivity & reliability and eliminate waste."

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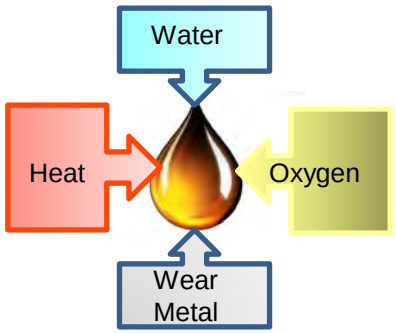
Maintenance Reliability In Print

Reliability is about “Consistency and Stability”

- Control and Reduce Heat & Wear - Correct lubrication
- Extend Equipment Life through Best Practise - prevent breakdowns
- Reduce Fluid Contamination - Elimination of



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- Increase Productivity through Consistency & Stability
- Reduce Waste and Extend fluid life.
- Predicative and Reliability Maintenance Culture

Reliability – 6 R's

Lubrication is about getting the basics right

- Right Application - Know where it goes
- Right Product - Use the right lubricant

- Right Quantity - over/under results in cost
- Right Time - Frequency
- Right Quality - Best Practise
- Right People - Sustainability / Results

Easy Way – Get 6 R's Right

- Lubrication Survey – What/Where/When/Qty/Qly.
- Storage & Handling – Dirty Lubes break things
- Labelling and Identification – Idiot Proof Lube Apps
- Oil Condition Monitoring - Condition of Oil & Equip
- Filtration – Air and Oil – Reduce Wear/Tear/Failure
- Best Practise – Motivate right people

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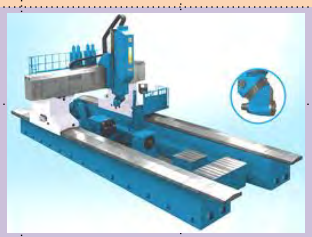
Key Industrial Oil Specifications

Key Industrial Oils0					
Type	**Purpose**		**Specification**		
Gear Oils	**Circulating Gearbox Oil**	**AGMA 9005 EO-2**	**C**	**CL**	**CLP**
		L7 /	**1**	**2**	**3**
CLP 			Additive Free Lube oil Raffinate. Constant Circulation & Immersion Lubricant required for modest lubrication applications	Gear oil with age resistant and anti-corrosion properties. Enhanced by addition of R & O additives for mainly constant circulation systems	Most commonly used gear oils for enclosed gearboxes. Recommended for constant circulation and immersion systems. Besides R & O properties it also has good anti-wear properties achieved by addition of EP additives.
Hydraulic Oils	**Circulating Power Transfer Fluids**		**HL**	**HLP**	**HVLP**
			1	**2**	**3**
HVLP 			ontain additives protecting om corrosion and oxidation >80-100, ressure >100bar ney are recommended for use in low pressure internal hydraulic systems.	Contain additives from corrosion, oxidation and wearing VI >80-100, Pressure >100bar They are intended for universal application and they are recommended for use in internal hydraulic systems.	Contain additives that protect from corrosion, oxidation and wear, plus additives increasing their viscosity index VI >140, Pressure >100 bar They are intended for universal application, however the biggest advantage is provided when used in external hydraulic systems.
Chain and Slideway Oils	**Tackified Oils with EP**				**CGLP**
CGLP					recommend when there is a need for constant sliding, demulsifying characteristic prevents mixing with water and water miscible oils coolants. Active additives include R&O, Wear reducing (EP) and good sliding characteristics (G)

Your OEM Manual uses these Specifications

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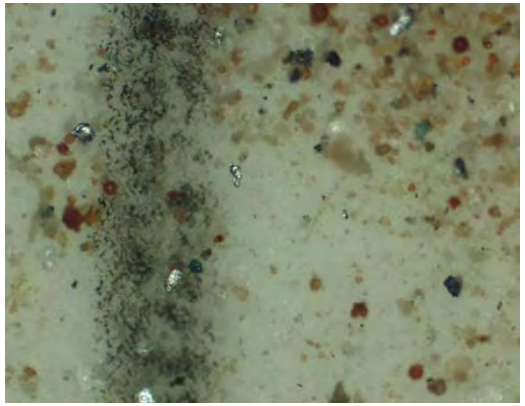
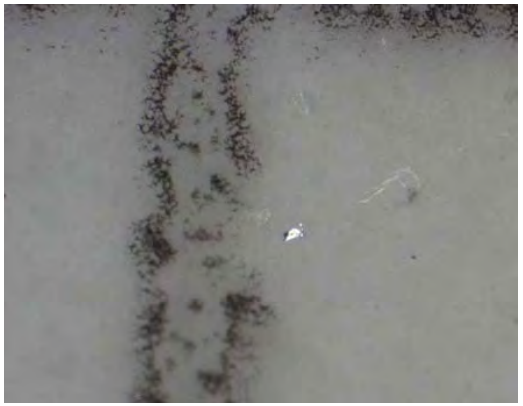
Impact of Cleaner Oils

SAMPLE 1			
Size	**Per ml**	**Code Range**	**Code**
4µ(c)	151773	80000~ 160000	24
6µ(c)	38363	20000~ 40000	22
10µ(c)	8229		
14µ(c)	3339	2500~ 5000	19
21µ(c)	1048		
38µ(c)	112		



SAMPLE 2			
Size	**Per ml**	**Code Range**	**Code**
4µ(c)	492	320~ 640	16
6µ(c)	149	80~ 160	14
10µ(c)	41		
14µ(c)	15	10~ 20	11
21µ(c)	5		
38µ(c)	1		



CLEAN OILs REDUCE WEAR IN MACHINERY – REDUCING FAILURES

AT LEAST ONE MAJOR PRESS OEM SPECIFIES A CLEANLINESS OF 16/14/11

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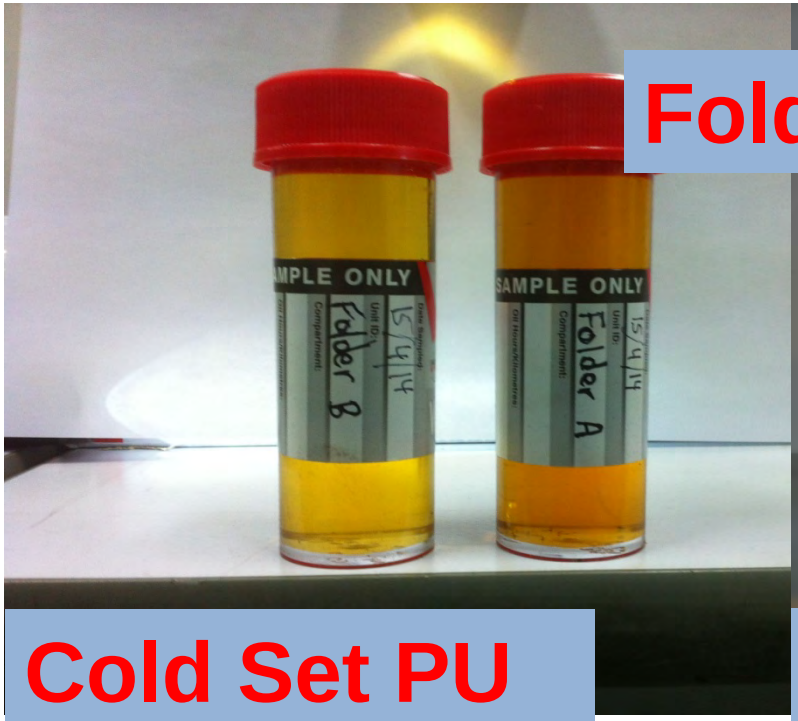
OIL PRINT CENTRE – COMPARRISON



Folders

Cold Set PU
4 Years Old

Cold Set PU
7 Years Old

- **Unfiltered Oil – Now Filtered**
- **Clean Oil – 2 Micron Filtration**

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GEAR OILS – PRINT CENTRES

Printing Presses at both Sites is Sound Condition

16 Years Old	7 Years Old
▪Oil FILTRATION	▪Oil FILTRATION
▪6 Monthly OCM	▪6 Monthly OCM
▪6 Monthly Lubricants reviews	▪6 Monthly Lubricants reviews

Both Site focus on Oil and its Cleanliness

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PRINT CENTRE NR – OIL CONDITION

- **Clean Oil**
- **Runs Cool**
- **Minimal Moisture**
- **Regular OCM**
- **Filtered to 2 µm**

Folders

Heat Set PU
7 Years Old Oil
22000 hours

- **Saved >$ 80000.00 on Oil**
- **Saved on Labour Hours**
- **Increase Productivity**
- **Filtered Cart - $ 7200.00**
- **Know oil and equipment in good condition**

Extending the Life of Equipment

1/ Hydraulic Systems

Life Extension Factor (LEF)

Initial ISO	2x	3x	4x	5x	6x	7x	8x	9x	10x
23/20	20/17	19/16	18/15	17/14	17/13	16/13	16/12	15/12	15/11
22/19	19/16	18/15	17/14	16/13	16/12	15/12	14/11	14/11	14/10
21/18	18/15	17/14	16/13	15/12	15/11	14/11	14/10	13/10	13/10
20/17	17/14	16/13	15/12	14/11	13/11	13/10	13/9	12/9	12/8
19/16	16/13	15/12	14/11	13/10	13/9	12/9	12/8	11/8	11/8
18/15	15/12	14/11	13/10	12/9	12/8	11/8	-	-	-
17/14	14/11	13/10	12/9	12/8	11/8	-	-	-	-
16/13	13/10	12/9	11/8	-	-	-	-	-	-
15/12	12/9	11/8	-	-	-	-	-	-	-
14/11	11/8	-	-	-	-	-	-	-	-
13/10	11/8	-	-	-	-	-	-	-	-
12/9	11/8	-	-	-					

By reducing the particulate levels from an ISO 21/18 to an ISO 15/12, component life is increased by a factor of 5.

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Greasing

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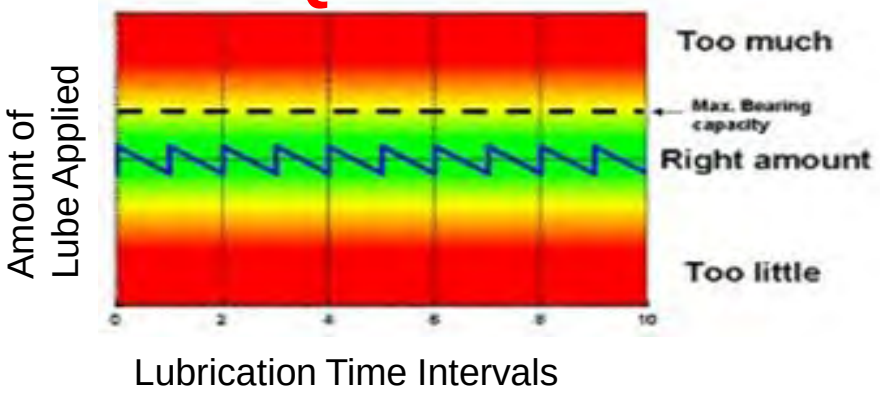
Lubrication Failure

QUANTITY



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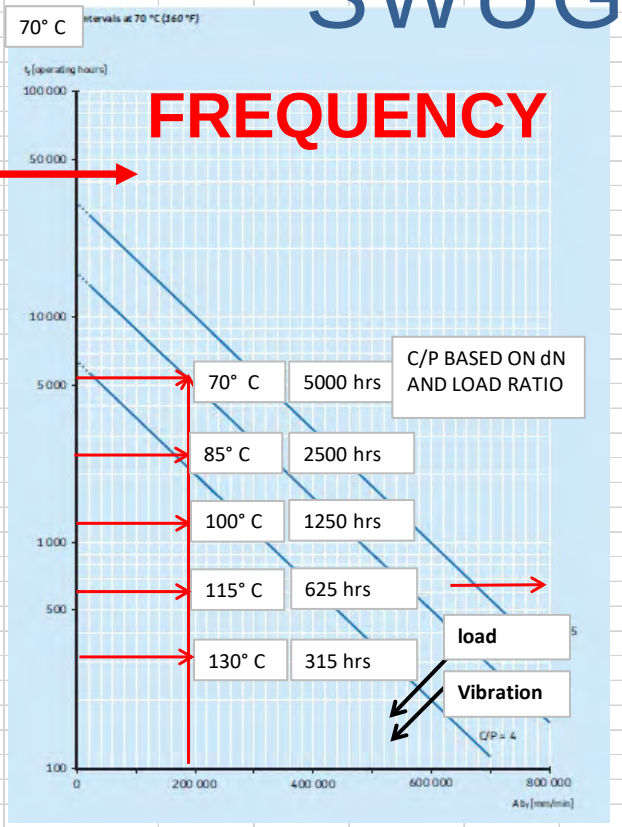

Extreme Over / Under Lubrication

Over / Under Lubrication

Optimum Lubrication Amt.

Max Bearing Capacity

APPLY OEM RECOMMENDATION

Extending Equipment Life

- AIM - Increase efficiency, maximise asset productivity, reliability and eliminate waste.
- Reliability – 6 R's
- Base Line Lubrication Needs
- An Oil Cleanliness Programme
- Oil Condition Monitoring Programme
- Grease is about Quality / Quantity / Frequency
- Reliability is "Consistency and Stability"

Don't PAY for RELIABILITY
with the
Consequence of UNRELIABILITY