

# VUD Reduces Oil Consumption

Prevents Unnecessary Downtime and Reduces Maintenance & Fluid Costs

## The Problem

An Australian aluminum refinery was consistently performing premature gearbox lube oil changes on 7 base drive units due to oil and particulate contamination. With an average operating ISO code of 20/18/16 and average water levels of 4742ppm, the 360 liters / 90 gallons of ISO VG320 gear oil was being changed far too often. Cost per gearbox oil change (excluding crane, lost production, labor) is \$17,962.60 which adds up to \$125,738.20 for all 7 units.



## The Solution

Conditioning gearbox lube oil is a huge opportunity for savings. By removing dirt and water the lube oil can be used until another characteristic of the oil fails (i.e. viscosity or additive) which can result in exponentially longer fluid life and prevent gearbox failure. To remove the particulate and water from the oil a Hy-Pro V5 vacuum dehydrator was selected to remove all phases of water (free, dissolved, emulsified) and remove particulate with an oversized 3M ( $\beta_{5[c]} > 1000$ ) filter element. The V5 was rotated between the 7 top drives on a 2-day service interval rapidly purifying the oil by turning the sump volume 75 times daily.

## The Results

On each unit, water was rapidly reduced an average of 98% from 4742ppm to 96ppm. Particulate contamination size  $4\mu[c]$  and larger decreased by 95% as average ISO code decreased from 20/18/16 to 15/13/8. The refinery increased reliability and profitability while reducing the environmental impact of premature oil disposal. Oil life has been extended reducing the need for oil changes. Gearbox life should also extend by 2.5x under these conditions, leading to even more substantial savings.



[www.hyprofiltration.com](http://www.hyprofiltration.com)

## Amount of Dirt Passing Through System Components Annually

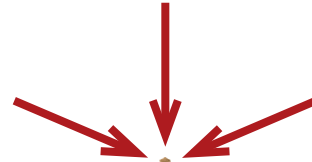
### Before VUD Installation

20/18/16

198 lbs<sup>1</sup>

### After VUD Installation

15/13/8

0.8 lbs<sup>1</sup>

Based on the Bearing Life Extension table below, the user should expect a **2.5x gearbox life extension**.

### Roller Contact Bearing Life Extension

Current ISO Code	New ISO Code 2 x Life	New ISO Code 3 x Life	New ISO Code 4 x Life	New ISO Code 5 x Life
28/26/23	25/23/19	22/20/17	20/18/15	19/17/14
27/25/22	23/21/18	21/19/16	19/17/14	18/16/13
26/24/21	22/20/17	20/18/15	18/16/13	17/15/12
25/23/20	21/19/16	19/17/14	17/15/12	16/14/11
24/22/19	20/18/15	18/16/13	16/14/11	15/13/10
23/21/18	19/17/14	17/15/12	15/13/10	14/12/9
22/20/17	18/16/13	16/14/11	14/12/9	13/11/8
21/19/16	17/15/12	15/13/10	13/11/8	
20/18/15	16/14/11	14/12/9		
19/17/14	15/13/10	13/11/8		
18/16/13	14/12/9			
17/15/12	13/11/8			
16/14/11	13/11/8			
15/13/10	13/11/8			
14/12/9	13/11/8			



<sup>1</sup>Calculations based on 10gpm flow rate & 24/7 operation. Graphical representations scaled proportionately.

# Component Life Extension Through Removal of Water Contamination

New Moisture Level PPM

Current Moisture Level PPM	1000 (0.1%)		500 (0.05%)		250 (0.025%)		100 (0.01%)		50 (0.005%)	
	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing	Rolling Element	Journal Bearing
5000	2.3	1.6	3.3	1.9	4.8	2.3	4.8	2.9	11.2	3.5
2500	1.6	1.3	2.3	1.6	3.3	1.9	5.4	2.4	7.8	2.9
1000			1.4	1.2	2.0	1.5	3.3	1.9	4.8	2.3
500					1.4	1.2	2.3	1.6	3.3	1.9
250							1.5	1.3	2.3	1.6
100									1.4	1.2

\*Courtesy of Noria

## The Harmful Effects of Water in Oil

Water is one of the most common and most damaging contaminants found in a lube or hydraulic system. According to Noria, free and emulsified water are the most harmful phases of water contamination.<sup>2</sup> Free and emulsified water exists when water content is above the lube oil's saturation point. Continuous or periodic high water levels can result in damage such as:

- Metal Etching (Corrosion)
- Abrasive Wear in Hydraulic Components
- Dielectric Strength Loss
- Fluid Breakdown
- Additive Precipitation and Oil Oxidation
- Reduction in Lubricating Properties

## Free and Emulsified Water Passing Through System Components Annually

### Before VUD Installation

4342 ppm Free and Emulsified<sup>3</sup>



22,822 Gallons Free and Emulsified<sup>3</sup>

### After VUD Installation

0 ppm Free and Emulsified<sup>3</sup>

0 Gallons Free and Emulsified<sup>3</sup>



<sup>2</sup>Water In Oil Contamination - <http://www.machinerylubrication.com/Read/192/water-contaminant-oil>

<sup>3</sup>Calculations based on 10gpm flow rate, 24/7 operation and lube oil saturation point of 400 ppm.