



# Calculating Lube Requirements

## VOLUME REQUIRED

$V = A \times T \times \text{Service Factor}$

A = Equivalent Area

T = Film Thickness

## SERVICE FACTORS AFFECTING VOLUME

<u>Service Conditions</u>	<u>Service Factor Severity</u>
Standard in Plant	1.0
Shock Loading	1.3 — 3.0
Extreme Heat	1.3 — 3.0
High Speed	1.0 — 0.5
Dirt & Water Environment	1.3 — 8.0
Process Contamination	.75 — .25

## FILM THICKNESS, REPLACEMENT

Manual System — Terminating

Grease — .002 Film Thickness per Application (8 hours)

Automatic System — Terminating

Oil — .001 Film Thickness every 1 hour period

Grease — .001 Film Thickness every 4 hour period

Automatic System — Circulating

Oil — .001 Film Thickness every 1 minute period

## EQUIVALENT AREA

### Rolling Element Bearings

$A = D^2 R$

D = Shaft Diameter

R = Number of Rows

(Consider needle & long roller types as two rows)

### Plain Bearings

$A = \pi D L$

$\pi = 3.14$

D = Shaft Diameter

L = Length of Bearing

### Slides, Gibs, and/or Ways

$A = L \times W$

L = Length of Surface

W = Width of Surface

(Area of Largest Contact Surface)

### Gears - Calculate Each Gear in Train

$A = \pi P.D. \times W$

$\pi = 3.14$

P.D. = Pitch Diameter of Gear

W = Width of Gear

### Large Bull Gears

$A = 2 \pi P.D. \times W$

$\pi = 3.14$

P.D. = Pitch Diameter of Pinion

W = Width of Pinion Gear

### Worm Gears

$A = \pi (P.D._1 + P.D._2) W$

$\pi = 3.14$

P.D. = Pitch Diameter of Worm

P.D.<sub>2</sub> = Pitch Diameter of Worm Gear

W = Width of Worm Gear

### Labyrinth Seals

$A = \pi D L \times 3$

$\pi = 3.14$

D = Shaft Diameter

L = Total Length of Sealing Surfaces

### Ball Screw

$A = \pi P.D. \times (\text{Rows} + \text{Length of Travel})$

$\pi = 3.14$

P.D. = Pitch Diameter of Ball Race

Rows = No. of Rows in Engagement with Shaft  
(Consider each row 1")

### Chain

$A = 3DW + .1LW$

D = Sprocket Diameter

W = Chain Width

L = Chain Length

### Linear Guide Bearings

$A = D^2 \times 3$

D = Shaft Diameter

### Notes:

1. All units are in inches
2. These general guidelines for calculating lubricant replacement volumes will normally provide adequate levels of lubrication. However, since every operating condition on each different type of equipment is beyond the scope of a single set of guidelines, it is the equipment builder's and/or equipment user's responsibility to insure that the lube points on his, or her equipment receive adequate lubrication under the actual operating conditions encountered.

