LUBRICATION SCIENTIFICS

GUIDE TO AUTOMATED SYSTEM DESIGN & LUBRICATION REQUIREMENTS

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LUBRICATION SCIENTIFICS:
RECOMMENDED PROCEDURAL CHECK LIST

1. Determine Operational Model

- System Description
- Number of Lubrication Points
- Lubrication Frequency
- System Budget

2. Determine Power Availability

- Air Source (Pneumatic)
- Electrical/Mechanical
- Hydraulic Source

- If using an electric power source, determine and note power supply characteristics

3. Determine How to Control the System

- Visual/Manual
- Timer Switch
- Count Control
- Programable Logic Controller (PLC)

4. Determine Bearing Requirements *FOR CALCULATION REQUIREMENTS, USE WORKSHEETS ON PAGES 4-6

- Notate Bearing Types
- Calculate bearing Requirements
- Group Bearings
- Determine Mount Preferences

5. Design System

- Design Secondary Divider Valve Assemblies, determine volume ratios
- Design Master Valve Assemblies, determine volume ratios for secondary valves

6. Determine Pumping Requirements

- Power Source
- Lubrication Type
- Pressure Requirements
- Capacity & Required Volume Output

7. Determine Additional Control Features

- Timers
- PLC
- Count Monitors
- Alarms

LUBRICATION SCIENTIFICS:

CUSTOMER REQUIREMENTS QUESTIONNAIRE

1. SYSTEM DESCRIPTION:			
MANUAL OR AUTOMATIC	**NUMBER OF LUBE POINTS:**	**FREQUENCY:**	**BUDGET:**
2. POWER AVAILABILITY :	**PNEUMATIC**	**HYDRAULIC**	**ELECTRICAL / MECHANICAL**
POWER SUPPLY CHARACTERISTICS:			
3. SYSTEM CONTROL :	**VISUAL/MANUAL**	**TIMER/COUNT CONTROL**	**PLC**
CONTROL DESCRIPTION:			
4. BEARING DESCRIPTION			
BEARING TYPES:		**MOUNT PREFERENCES:**	
5. GENERIC DESIGN INFORMATION			
IS THIS A FULL OR PARTIAL SYSTEM DESIGN?			
HARDWARE:			
PARALLEL INJECTION	**SERIES PROGRESSIVE**	**DUAL LINE**	**DUAL SERIES/HYBRID DESIGN**
6. PUMPING REQUIREMENTS:			
LUBRICATION TYPE	**POWER SOURCE**	**PRESSURE REQUIREMENTS**	**CAPACITY**

GUIDE TO LUBRICATION SYSTEM DESIGN
FORMULAS & REQUIREMENTS

REQUIRED VOLUME FORMULA

V = A x T x S

Where:

A = Equivalent Area

T = Film Thickness

S = Service Factor

FILM THICKNESS (T)		
LUBRICATION DESCRIPTION	**THICKNESS**	**APPLICATION FREQUENCY**
GREASE—TERMINATING MANUAL SYSTEM	0.002	8 HOURS
OIL—TERMINATING AUTOMATIC SYSTEM	0.001	1 HOUR PERIOD
GREASE—TERMINATING AUTOMATIC SYSTEM	0.001	4 HOURS
OIL—CIRCULATING AUTOMATIC SYSTEM`	0.001	1 MINUTE

SERVICE FACTOR (S)	
CONDITION DESCRIPTION	**SERVICE FACTOR**
PLANT STANDARD	1.0
HIGH RPM	0.5—1.0
SHOCK LOADING	1.3—3.0
HIGH TEMPERATURE RANGES	1.3—3.0
DIRT & WATER	1.3—8.0
PROCESS CONTAMINATION	.75—.25

*All units are in inches

GUIDE TO LUBRICATION SYSTEM DESIGN
CALCULATING EQUIVALENT AREA (A)

ROLLER/BALL BEARINGS

$A=D^2R$

D = SHAFT DIAMETER

R = NUMBER OF ROWS

NEEDLE & LONG ROLLER TYPES COUNT AS 2 ROWS

BUSHINGS

$A=\pi DL$

π = 3.14

D = SHAFT DIAMETER

L = LENGTH OF BEARING

SLIDES, GIBS, & WAYS

A=LW

L = LENGTH OF CONTACT SURFACE

W = WIDTH OF CONTACT SURFACE

GEARS

$A=\pi PW$

π = 3.14

P = PITCH DIAMETER OF GEAR

W = WIDTH OF GEAR

LARGE GEARS, BULL TYPE

$A=2\pi PW$

π = 3.14

P = PITCH DIAMETER OF PINION GEAR

W = WIDTH OF PINION GEAR

WORM GEARS

$A=\pi(P_1 + P_2)W$

π = 3.14

P_1 = PITCH DIAMETER OF WORM

P_2 = PITCH DIAMETER OF WORM GEAR

W = WIDTH OF WORM GEAR

LABYRINTH SEALS

$A=3\pi DL$

π = 3.14

D = SHAFT DIAMETER

L = TOTAL LENGTH OF SEALING SURFACE

BALL SCREW

$A=\pi P$(Rows + Length of Travel)

π = 3.14

P = PITCH DIAMETER OF BALL RACE

ROWS = NUMBER OF 1” ROWS ENGAGED WITH SHAFT

CHAIN

A=3DW+0.1LW

D = SPROCKET DIAMETER

W = CHAIN WIDTH

L = CHAIN LENGTH

LINEAR GUIDE BEARINGS

$A=3D^2$

D = SHAFT DIAMETER

*All units are in inches

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BEARING LIST

CUSTOMER_____ FILE NO. _____

DISTRIBUTOR_____SALESMAN_____ DATE _____

MACHINE OR EQUIPMENT_____ PAGE _____ OF _____

SYSTEM REQUIRED: MANUAL☐ AUTOMATIC☐ SERIES ☐ LDL/MDL☐ REF. DWG _____

INJECTORS ☐ ORFL ☐ OTHER_____ LUBE USED: OIL☐ GREASE☐

TYPE _____ VISCOSITY _____

REF NO.	LOCATION OR NAME OF BEARING	NO. BEAR-INGS	BEARING			TAP SIZE	TAPS PER BRG	F-M-R (C)	TOTAL NO. POINTS	BEARING REQUIRE-MENTS (CU.N.)	FEEDER SIZE	FEEDER	FEEDER ADJUST-MENT
			SIZE (A)	TYPE (B)	SPEED								

(A) GIVE LENGTH & WIDTH OF CYL BEARINGS - LENGTH &WIDTH OF SLIDES - ID OF ANTI-FRICTION BEARINGS & NUMBER OF ROWS

(B) GIVE TYPE OF BEARING SURFACE - SLIDING, PLAIN OR TYPE OF ANTI-FRICTION BEARING.

(C) INDICATE NUMBER OF INLETS TO EACH BEARING & TAP CONDITION - FIXED(F), MOVABLE(M), FLEX OR ROTATING(R) OR SWIVEL CONNECTION.

NOTE: THIS BEARING LIST SHOULD ACCOMPANY ANY ASSEMBLY DRAWINGS OR SKETCHES REFERRING THE POINTS TO BE LUBRICATED AND SHOULD AGREE WITH ABOVE BEARING REFERENCE NUMBERS

BY_____