■Centralized lubrication system planning

(1) System planning sequence

Objective of lubrication : Decrease friction, cooling and extend bearing life.

- **Locate all wear surfaces that need to be lubricated :** bearings, slides, cams, gears, chains etc. Take into consideration RPM, load, ambient temperature and nearby hazard.
- **Selecting lubricant :** Determine frequency required (min. -hrs. -days). Select lubricant oil or grease, and note viscosity
- **Selecting Desired Delivery Method :** Automatic or manual. Intermittent or continuous. Single Line Resistance, Positive Displacement Injector, Series Progressive.
- **Calculate Lubricant Requirements :** For each lubrication point, calculate the necessary requirement of lubricant in cubic centimeters per hour. Then multiply or divide by desired frequency to determine necessary requirement per interval cycle. Add all the requirements together to get the total system requirement.
- **Select Distributor :** Based on the desired delivery method, choose the correct distributor for that method that will deliver the amount of lubricant required per interval period.
- **Select Pump and Tank :** Based on the desired delivery method and the system total requirements, choose a pump that meets those requirements. Take into consideration it is not recommended to use more than 80% of the pump output. Choose a tank that will meet the desired refilling interval.
- **Select any Protection and Monitoring Device :** Based on the type of system there are different monitoring devices that could be used if desired, flow sensor, pressure switch, cycle switch, low level switch or visual indication.
- **Select Controlling Method :** Determine if an external system controller will be required and select controls that will not only meet the system requirements, but also the chosen monitoring device if necessary.
- **System Layout :** Arrange nearby lubrication points into groups if desired. Based on the particular distributor chosen, arrange the distributors into same groups. Based on the system delivery method and necessary main and branch tubing, engineer the tubing layout and distributor locations.
- **Select Necessary Tubing Parts :** After system layout is complete, choose the correct amount of desired fittings, adapters, compression hardware, tubing etc. that will be required to plumb the system.

(2) Calculating oil requirements

The amount of oil that is required for lubrication point is calculated by the following formulas and are based on experience and actual testing.

The necessary requirement is calculated in cubic centimeters per hour. These formulas are based on an average of of 120 RPM. In general, the requirement should be doubled for every ten fold speed increase. There have been many calculating formulas published before that use surface smoothness, different operating conditions, RPM, load, ambient temperature, oil type, hazardous conditions, sealing conditions etc. Thus, the formulas below for calculating the oil requirements are not absolute. They are rather a benchmark, and based on the actual operating conditions should be adjusted for each particular application.

● Oil requirements calculation formulas

AF. Anti-friction bearing (Ball bearing, roller bearing, needle bearing) Oil volume Q(cc/h) =0.04×diameter×rows	BW. Ball bearing way Oil volume Q(cc/h)=0.012×length×rows
P. Plain bearing Oil volume Q(cc/h)=0.023×shaft diameter×bearing length	CA. Cam Oil volume Q(cc/h)=0.0017×Contacting circumference ×width
FW. Flat slide a. Oil volume Q(cc/h)=0.0017×length×width(horizontal slide) b. Oil volume Q(cc/h)=0.006×length ×width(vertical slide)	G. Gear Oil volume Q(cc/h)=0.013×pitch circle diameter×width of gear
CW. Cylinder slide Oil volume Q(cc/h)=0.023×diameter×length	CH. Chain Oil volume Q(cc/h)=0.008×length

● The relationship between rpm and multiplier