



$X_1$  = #1 Pad Arc Length  
 $\theta_{p2}$  = #2 Pad Leading Edge to Min. Clearance Angle  
 $\theta_2$  = #2 Pad Groove CL Location from + X Axis  
 $\phi_2$  = #2 Pad Groove Arc Length  
 $\theta_R$  = W Resultant Angle from + X Axis

$C_b = 2(R_b - R_s)$   
 $C_p = 2(R_p - R_s)$   
 $C_p = \text{Diametral Clearance}$   
 $\text{Lobe Preload} = 1 - \frac{C_b}{C_p}$   
 $\text{Lobe Offset} = \frac{\theta_p}{X}$

ELLIPTICAL BEARING



### Description:

The elliptical bearing is a multi lobe bearing with 2 pads, 50% offset and with both pads containing the same preload. An elliptical bearing is essentially a 2 axial groove bearing with a slightly tighter vertical clearance and a more open horizontal clearance.

### Application:

This type of bearing is very popular in Europe and is the standard sleeve bearing design of at least 1 major European compressor manufacturer. It is also used in the United States with at least 1 large domestic motor-generator manufacturer utilizing this design. Elliptizing a pressure dam bearing for improved stability characteristics is also possible.

### Perspective:

A popular field fix for an unstable sleeve bearing is to elliptize a circular bore by placing a 1.0, 2.0

or even a 3.0 mil shim at top-dead-center between the bearing insert and housing. This has the effect of reducing the vertical bearing clearance (i.e., elliptizing the circular bearing) and increasing the bearings instability threshold speed.

### Modeling:

The machined-in pad diametral clearance must be placed in the *Bearing Clearance* cell.

### References:

1. Mehta, N. P., Singh, A., Gupta, B. K., "Stability of Finite Elliptical Pressure Dam Bearings with Rotor Flexibility Effects", ASLE Transactions, 24 (2), pp. 269-275 (April 1981)