

HYDRODYNAMIC FLUID FILM BEARING

SOLUTION

FOR

ROTODYNAMIC MACHINES

(BABBITT /WHITE METAL
BEARING)



- NEW SUPPLY
- REFURBISHMENT
- CUSTOMIZATION

Do you want beneficial technologies being shaped by your requirements?

Whether in the areas of Heavy Industry, Process Plant, Customized Machinery Components or Reverse Engineering you will have the chance to fulfil your proper requirements with proper satisfaction and a hand hold support.

Welcome to SUNTECH ENGINEERING CORPORATION.

SUNTECH ENGINEERING CORPORATION is dealing with wide range of BABBITT METAL /WHITE METAL (FLUID FILM) BEARING with Identical Reverse Engineering and Customized developments.

PRODUCTS

- Babbitt / White Metal Journal Bearing (Vertical & Horizontal) R
- Thrust Bearings
- Thrust and Guide Pads
- Tilting Pads for Journal and Thrust Bearings
- Bearing Accessories

SCOPE OF WORK

- Analysis , Design & Manufacturing of Babbitt/White Metal Bearings
- Manufacturing of Babbitt Coated Bearings as per Customer Drawings, Design & Sample.
- Reverse Engineering , Re-Design and Customization
- Refurbishment of Babbitt Bearings and Engineering Support.
- Solution On DIN. Standard Bearings.

OIL FILM INSTABILITY

In a condition of low load and high surface speed in a cylindrical bearing, there can set in a self-sustaining motion of shaft centre around the bearing centre at approximately half the synchronous speed. In this condition, an instability of shaft motion sets in causing first of all break in oil film, surface to surface contact and severe shaft vibration leading to the destruction of the bearing.

Fig. 2 gives a preliminary guide to prediction of instability. While the subject is discussed here to draw the attention of the machine designer at the time of selecting the bearing, to this aspect, it is best to leave the final decision to the bearing designers EDP calculation and recommendations.

OIL FILM LIMIT

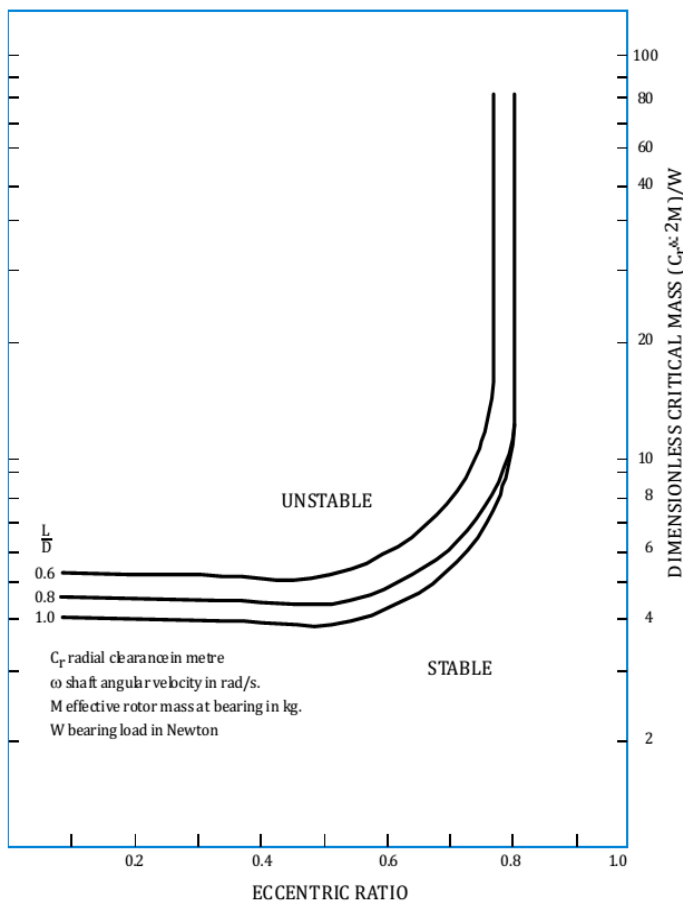


Fig. 2: Oil Whirl Instability of Cylindrical Bore Journal Bearings-Limiting Dimensionless Mass

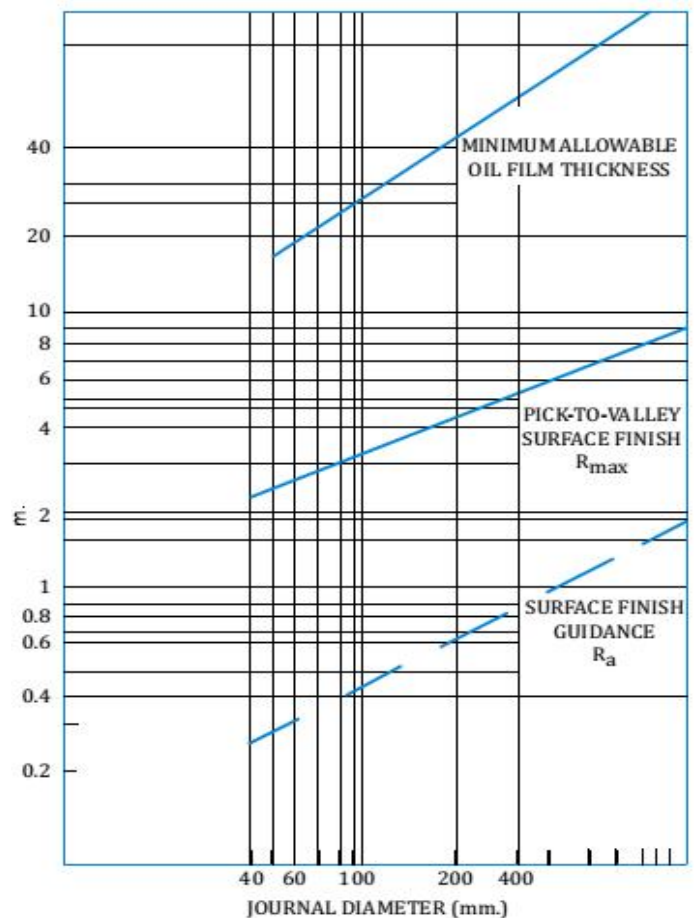


Fig. 1: Recommended Minimum Allowable Oil Film Thickness

In a hydrodynamic bearing, the shaft and the bearing white metal are always separated by a minimum layer of oil which prevents a severe wear, overheating and ultimately destruction of the bearing. The minimum oil film thickness is important in this respect. Fig. 1 indicates an appropriate relationship between the surface roughness of the shaft and minimum oil film thickness to prevent a metallic contact. It is assumed that the surface finish of the bearing white metal is of same order after running in. Please see Fig. 1.

Minimum admissible oil film thickness in μ mm.			
Shaft \varnothing (mm.)	Sliding Velocity (m / s)		
	≤ 3 to 10	<10 to 30	< 30
20 to 65	15	19	22
65 to 165	18	22	29
165 to 400	22	28	36
400 to 1000	28	34	48

General guide to the selection of viscosity for lubricant oil						
Specific load (N / mm ²)	Surface Speed (m / s)					ISO VG
	≤ 3	< 3 to 10	< 10 to 25	< 25 to 50	< 50	
≤ 1.25	68	46	46	32	32	
> 1.25 to 2.5	100	68	46	46	32	
> 2.5	150	100	68	46	46	

GUIDE TO DESIGN AND SELECTION OF SLIDE BEARINGS FOR TURBINES AND OTHER ROTATING EQUIPMENTS

BEARING CLEARANCE

The bearing bores are made according to the basic bore system specified in DIN 7161 with tolerance field H7. The shaft tolerance combined with bore tolerance make up the maximum or, minimum clearance of the bearing. The shaft tolerances for 5 different relative bearing clearances ψ m are shown below as extract

From DIN 31 698.

Peripheral speed (m / s)	ψ m [‰] cylindrical. bearing \varnothing D [mm]		
	≤ 100	< 100 to 250	< 250
≤ 3	1.32	1.12	1.12
< 3 to 10	1.6	1.32	1.12
< 10 to 25	1.9	1.6	1.32
< 25 to 50	2.24	1.9	1.6

For normal operating conditions, the following recommendation applies for the choice of mean bearing clearance ψ m in relation to peripheral velocity v:

This table does not take into account any extraordinary factors, such as, for example:

O High shaft temperature within the bearing in case of heat transfer through the shaft, for example: hot gas fan drive.

O loading of the bearing beyond safe value

O very high or low viscosity lubricants

Nominal Shaft range (mm)		Permissible deviations of the shaft in μm for ψm [‰]				
over	up to	1.12	1.32	1.6	1.9	2.24
70	80	-60 -79	-75 -94	-96 -115	-118 -137	-144 -163
80	90	-67 -89	-84 -106	-108 -130	-133 -155	-162 -184
90	100	-78 -100	-97 -119	-124 -148	-152 -174	-184 -206
100	110	-89 -111	-110 -132	-140 -162	-171 -193	-207 -229
110	120	-100 -122	-122 -145	-156 -178	-190 -212	-229 -251
120	140	-113 -138	-139 -164	-176 -201	-215 -240	-259 -284
140	160	-136 -161	-166 -191	-208 -233	-253 -278	-304 -329
160	180	-158 -183	-192 -217	-240 -265	-291 -316	-348 -373
180	200	-175 -204	-213 -242	-267 -296	-324 -353	-388 -417
200	225	-201 -230	-243 -272	-303 -332	-366 -395	-439 -468
225	250	-229 -258	-276 -305	-343 -372	-414 -443	-495 -524
250	280	-255 -287	-308 -340	-382 -414	-462 -494	-552 -584
280	315	-291 -323	-351 -383	-434 -466	-523 -555	-624 -656

TILTING PAD THRUST BEARINGS & RD PADS.

- Able to safely carry the highest axial loads at high speeds in turbomachinery
- Best able to accommodate misalignment or deflection in supporting structure
- Able to include special features, materials and instrumentation

MATERIALS

Standard pads are steel backed and lined with tin-based White Metal or Babbitt Metal to specification IS25 Gr.90 , ASTM B23 Grade 2 etc. In fact, “SUNTECH Engineering Corporation” controls the lead content to a lower level than required by these specifications in order to achieve improved performance of thermal cycling.

INTERCHANGEABILITY

This modular range is designed for optimum compactness and flexibility. As such, it can match or improve upon the space envelope required for any similar bearing product. It can therefore retrofit or be made completely interchangeable with other equalized bearing types. It can also be customised in terms of external dimensions.

ANTI-ROTATION

The Thrust Bearings will normally supplied with the standard anti-rotation pin position which is optimal from the bearing design point of view. In case the machine casing cannot accommodate the corresponding slot in this position, an alternative anti-rotation pin position will be provide.

LUBRICATION

These thrust bearings will normally be supplied with the ' Directed Lubrication ' system of lubrication since, even at relatively low sliding speeds, benefits such as the avoidance of shaft oil seals make this an obvious preference. However, there may be occasions when flooded lubrication is more appropriate, and this option is available. For a proper explanation of the differences between flooded and 'Directed Lubrication' it is requested to contact with “SUNTECH Engineering Corporation”

ALTERNATIVE MATERIALS

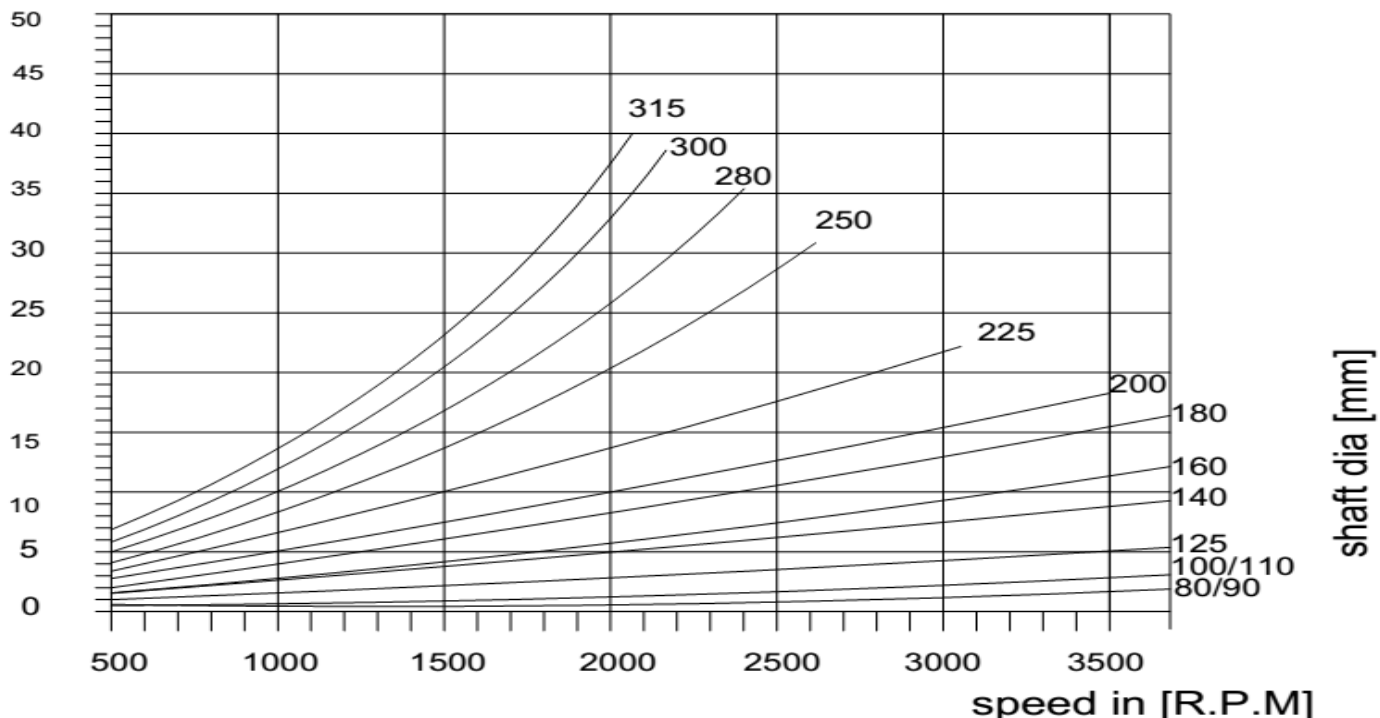
A common alternative to steel backed pads is a Copper Chrome (Cu/Cr) backing to reduce surface temperatures and increase load capacity at higher speeds. Lining materials such as lead bronzes are also available to meet special requirements.

** For detailed Catalogue of Thrust Bearings and accessories please contact to “SUNTECH Engineering Corporation” sales team.



OIL THROUGHPUT

Oil throughput V_R for cyl. journal bearing and plain white-metal lined shoulder eventually
 $V_R[1/ \text{min}]$ $V_{\text{TOTAL}} = V_R$



Additional oil throughput v_A for shoulder with integral taper land faces

$V_A[1/ \text{min}]$

$$V_{\text{TOTAL}} = V_A + V_R$$

