ACRO Sales & Engineering, Inc.
METALS-CHEMICALS
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BABBITTING MANUAL

The Most Economical Bearing is the

Long-Lasting, Trouble-Free Bearing.

INDEX

EQUIPMENT REQUIRED FOR RE-BABBITTING BEARINGS

Re-Babbitting of bearings is easy. However, care must be exercised to follow instructions in detail.
The usual equipment required is as follows:

Melting Pots
Plunger Cup
Ladle
Skimmer
Thermometer or Automatic Temperature Controls
Jigs
Mandrels
Blow Torch
Acetylene Torch
Good grade of damming material.
Grooving and Trimming Tools, such as
Chisels, Files and Scrapers
Tempil Sticks

VARIOUS GRADES OF BABBITT METALS

The correct grade of (lead-base), or (tin-base), must first be selected. Which grade to use is determined by the work the bearing must do. Listed below are the five Babbitt metals that are most popular and more generally used in industry.

C.H.--(Copper Hardened). The finest lead-base Babbitt metal for heave-duty service. It is especially good for overcoming the effects of friction hear that is generated by heavy running loads.

#5 C.H--(Copper Hardened). A heat resistant lead-base Babbitt for shafts that run hot. It is hard, dense, close-grained . . . tough.

G.P.—(General Purpose). A lead-base Babbitt metal that runs cool, is long wearing and resists scoring. It adapts itself to misaligned shafts, withstands bear and abrasion.

IDEAL—The most serviceable, low cost lead-base Babbitt metal for general utility uses where abrasion is encountered.

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NICKELITE -- (Tin-Base). An achievement of engineers. It strongly resists crushing, creeping, chipping and cracking and has remarkable durability wherever bearing are exposed to abrasive wear and subjected to severe shock.

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If there is any question which grade of Babbitt metal to use, call Acro Sales. (877) 765-3377

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PREPARING THE SHELL

The babbitt liner must be firmly attached to the shell if satisfactory bearing life is to be assured. If the liner should become loose, lubricant may work its way between the babbitt and shell, thus acting as an insulator and retarding the dissipation of heat, eventually causing bearing failure.

Consequently, the bearing shell must first be thoroughly cleaned of all old babbitt metal to provide a strong hold. This old babbitt can be melted away by dipping the shell in a pot of old molten babbitt, sandblasting, chipping out, or melting away with a blowtorch. If the bearing has anchors, these also must be cleaned to make certain the new metal will flow in and provide strong anchorage.

Many old type shells have anchors that are too shallow and spaced too far apart. If the shell has flat areas greater than two inches across, it can be improved by drilling ½-inch diameter holes 5/8-inch deep on an angle of 45 degrees. This “dovetailing” provides a greater surface of contact with which to dissipate the heat created when the bearing is in operation. Dovetail anchorage should not be less than 5/16-inch deep; 3/8-inch is better.

When preparing bronze shells for re-babbitting remove all old babbitt by any of the methods described above and then file or sandpaper the surface to be babbitted to assure a clean metallic contact.

Grease, dirt, rust and scale should be removed. Use any oil solvent to remove grease. The remaining oil can be completely removed with a strong solution of caustic soda and sodium-silicate (equal parts). Other good compounds such as Oakite are satisfactory.

PREPARING THE MANDREL

Although a bearing can be babbitted by pouring the metal while the shaft is in place, use of a hollow mandrel (slotted for easy removal) is more desirable.

The mandrel should be slightly smaller than the shaft if the bearing is to be machined to size. If no machining is required the mandrel must allow for shaft clearance.

Generally the use of a “Riser” is good practice when pouring a Babbitt bearing. This is a form that adds height to the opening into which the Babbitt metal is poured. It serves as a reservoir for an oversupply of molten metal which will feed into the liner as it shrinks. A short Riser one or two inches in height is usually sufficient for most bearings.

Remember that a thick babbitt tends to store up heat. A thin liner will operate at a lower temperature under the same operating conditions.

If a hollow mandrel is used, both it and the shell should be uniformly heated to approximately 200°F. If a solid mandrel is used, do not heat it much above room temperature; however, the shell should be heated to 200°F.

The mandrel should be covered with three or more layers of wrapping paper, smoke coated with an acetylene torch or given a chalk coating to prevent the Babbitt from adhering to the mandrel.

FLUXING AND TINNING

The shell should be pickled with 7% sulfuric acid and washed in clean hot water to make certain that acid does not adhere to the surface.

After pickling and washing, the shell must be immediately fluxed and tinned. This is especially important in regard to iron and steel shells to avoid oxide film that quickly forms on these metals when exposed to the air.

A good flux is made by mixing eleven parts of commercial grades of zinc chloride and one part of ammonium chloride (sal-ammoniac) and then boiling water stirred into this mixture until it is dissolved. (This will take about one gallon of water to six pounds of mixture and will make about 1-1/3 gallons of flux.

After the shell has been fluxed and before it becomes dry dip it into the tinning agent at such a temperature that permits the tin to bond with it.

For economical, easier and quicker tinning use our Acro Tin Tinning Compound. This product has been especially compounded by Acro Sales chemists. It is available in one-pound cans. It contains no acid, and cleans as it tins.

POURING TEMPERATURE OF BABBITT

The use of a thermometer with armor protection is the best method for determining the temperature of the babbitt when automatic controls are not a part of the equipment. Otherwise a pine stick can be used.

If a pine stick is used, immerse it in the babbitt for five seconds (count 10). A brown color with no black char indicates approximately the temperature for pouring Tin-base metal.

If a thermometer is used, 700°F. is sufficient for large bearings when using Tin-base metal. As much as 800°F. maybe necessary for small bearings. Lead-base Babbitt metals require approximately 100°F. more heat than Tin-base metal.

Because of the variance in size of bearings, some deviation from the above recommended temperatures is necessary. If the babbitter will experiment, he can find how cool be can pour the babbitt successfully. The cooler the babbitt can be poured, the firmer and closer-grained will be the bearing.

POURING THE BABBITT METAL

It is desirable to keep the pot covered with charcoal or sawdust to keep oxygen away from the Babbitt to reduce formation of dross. Thus, the babbitt can be poured cooler because it is oxygen free.

Just before pouring, the metal should be stirred thoroughly but gentle and the dross skimmed from the top of the molten babbitt, unless a bottom-pour ladle is used.

Porosity in babbitt bearing must be avoided. Porosity is cause by air, stem or oil vapor being trapped in the mold. To avoid porosity, start pouring slowly then increase the rate of pour, moving the pouring spout around the bearing opening to prevent excessive heat at one point and also to force the air up and out. Do not have any wood in contact with the molten babbitt unless the wood is covered with wrapping paper.

Pour the babbitt metal while the tined surface is fresh, warm, tacky, and at a temperature that does not wash the tin off, but hot enough to unite with it. Tin-based and Lead-based metal will easily unite with the tinned surface because they are free of oxygen.

Keep cool drafts from coming in contact with the operations. Do not move, touch, or jar the jig while the metal is in the process of setting, as this may cause cracks and small checks to form in the finished bearing. "Puddling" is also a bad practice as this may cause checks which are not generally visible to the eye in the finished bearing.

Where convenient, cool the newly poured bearing quickly with water. Thus the grain will be finer, and the bearing tougher. Insert a water hose into the mandrel so that water can flow in without splashing. Make sure the end of the hose is submerged, as splashing on sides may cause "sinks", which are due to uneven shrinkage. At the same time, starts dousing the liner on the outside near the bottom and work upward.

LUBRICATION

After the babbitt metal has cooled and the shaft removed, or as in the case of a mandrel, machined to size, an oil way and retainer groves must be cut. These, must be properly chamfered so that they store, spread and feed the oil over the surfaces of the bearing. (See pages 7 and 8 for drawings and dimensions.)

The oilway must be parallel with the shaft, edges well rounded, and not connected with the retainer grooves described below. It should be placed just ahead of the load bearing area so that lubricant is first fed to that area on the bearing where it is most needed.

Retainer grooves should be cut at each end of the bearing to minimize oil leakage. The inner edges of these grooves should be rounded and the outer edges sharp to retain oil pressure. The retainer grooves also prevent dust and abrasives from entering the load area. (See illustration on pages 7 and 8.)

In order to guard against grease seepage between the shell and babbitt, it is desirable to drill and tap the lubricant feed pipe or fitting through the shell and a short distance through the Babbitt. The lubricant pressure will then be supplied directly to the bearing surface. (See illustration on page 8.)

NOTE: It is not good practice to re-use old babbitt metal. Such metals have usually become mixed and have a 100°F. lower melting point. They should be sent in for credit on new babbitt metals.

If you have a babbitting problem that is not covered in this manual, give Acro Sales a call.

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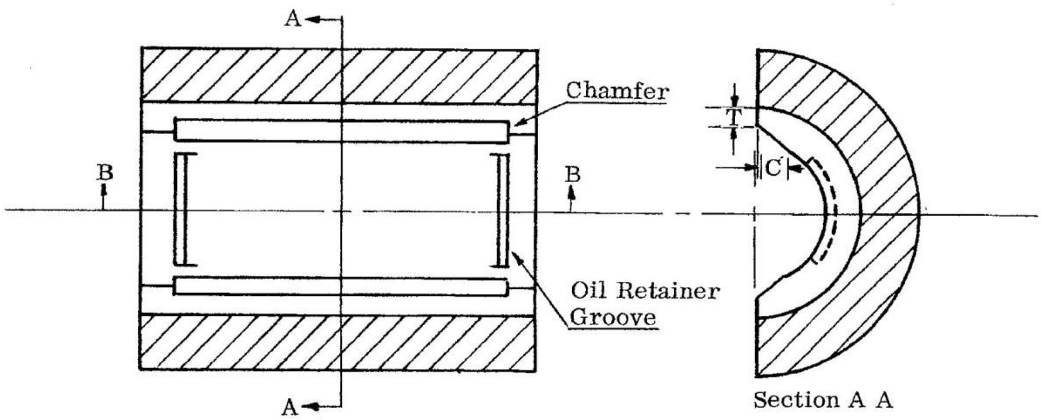
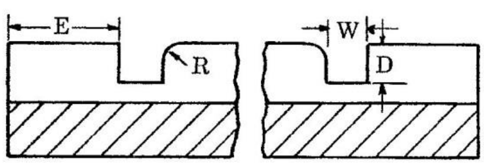
RECONNEDED CHMFERS
AND OIL RETAINER GROOVES



Notes
1-Round edge to the inside, sharp edge to the outside.
2-See page 8 for suggested oilway.



Section B B

RECOMMENDED DIMENSIONS

Brg. Dia.	C Chamfer	D Depth	W Width	R Radius	E Edge	T Chamfer Depth
1"-3"	1/4"	1/16"	1/16"	1/16"	1/4"	1/2 of Babbitt Thickness
4"-8"	1/2"	1/8"	1/8"	1/8"	3/8"	"
9"-17"	1"	3/16"	3/16"	3/16"	1/2"	"
18" up	1"-2"	1/4"	3/16"	3/16"	3/4"	"

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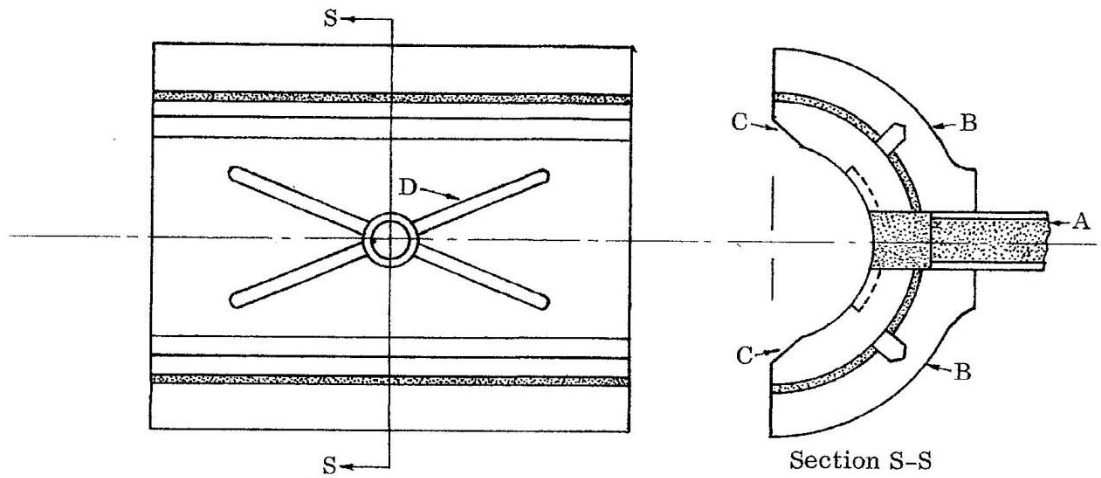
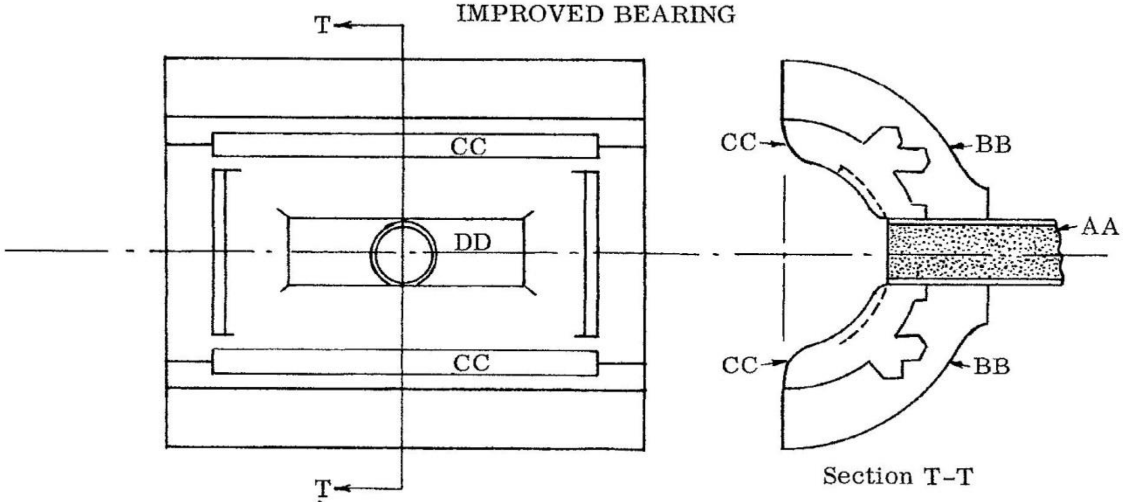
USUAL GREASE BEARING



Section S-S

A-Short threaded pipe permits grease to get between liner & babbitt.
B-Straight anchors do not provide sufficient grip.
C-Sharp edge retards oil flow.
D-Criss-cross grooving is undesirable. It tends to wipe the lubricant off the shaft.

IMPROVED BEARING



Section T-T

AA-Pipe tapped into babbitt prevents grease from seeping between babbitt and shell.
BB-Angled anchors provide increased grip.
CC-Round edge permits oil to flow easily.
DD-One groove improves oil distribution. It should be located just ahead of load bearing area.