

# SERVICE INFORMATION

# LETTER

ID #: TG931103	DATE: November 3, 1993
REV. #: 0	

#### 1. <u>SUBJECT:</u>

The repair of steam turbine-generator babbitt bearings.

ABB has expanded its capability to install, retrofit and maintain steam turbines and related equipment by appointing Pioneer Motor Bearing Company as its licensee to repair babbitt bearings and seals on our behalf. This improvement will help our customers maintain their turbine-generators and control their operating and maintenance costs by providing for the first time an ABB approved source for high quality, reliable, rapid-response bearing repairs.

# 2. <u>PURPOSE:</u>

This Service Information Letter is to inform our customers of the bearing and seal repair service ABB now offers through its Licensee, Pioneer Motor Bearing.

The topics covered include:

- 1. the need for an ABB approved source for bearing repairs;
- 2. why ABB selected Pioneer as its licensee;
- 3. the advantage to our customers of the ABB/Pioneer License
- 4. the specifications and standards which Pioneer will adhere to in performing repairs;
- 5. information about the repair process;
- 6. where to direct bearing repair inquiries and orders.

# 3. INTRODUCTION:

In the past, ABB has not offered bearing repair services (rebabbitting and machining to final sizes). Customers have experienced mixed results with numerous small repair shops soliciting bearing work. There has been instability in the bearing repair market place, with a number of shops changing ownership and management in recent years.



In response to customer interest, in 1992 we began a wide-ranging engineering investigation of bearing repair procedures and existing vendors. Our goal was to determine the best source for bearing repairs in North America. Our primary consideration was the overall quality of the organization, its repair methods and reputation for reliable deliveries. Rather than limiting our assistance to new replacement parts, we wanted to offer our customers the option of having their existing babbitt bearings and seals repaired by an ABB approved and supported source. This would shorten customers' turbine-generator repair cycles and reduce their costs without the burden of additional risks associated with non-approved repair shops.

This SIL presents the results of our effort to respond to our customers' desire for an ABB approved bearing repair service.

# 4. <u>DISCUSSION:</u>

# 4.1 Background: The need for a reliable, ABB approved source for bearing repairs.

In 1992, ABB surveyed and scrutinized the majority of independent shops in the United States which concentrate primarily on large turbine-generator bearing repairs. Our investigation revealed many bearing repair shops emerged relatively recently, in the 1980's, during the downturn in the new capital equipment market. Moreover, with the decline of the defense industry, some general repair shops, out of necessity, are expanding the scope of their work to include bearings. The industry is highly fragmented and has been plagued by turn-over of personnel, changes in ownership and management, the demise of a number of shops and vastly varying degrees of quality. As a result, a number of our customers desired an ABB approved reliable source for bearing repairs.

Therefore, ABB changed the focus of its attention from bearing repair shops to the established babbitt bearing manufacturers. One of these companies, Pioneer Motor Bearing, has offered a bearing repair service since its inception in 1920.

# 4.2 Background: Pioneer Motor Bearing Company

Pioneer is a 3rd generation family owned and managed company, now in its 73rd year of operation, specializing in the manufacture and repair of babbitt bearings and seals. Pioneer has a broad background in babbitt bearings, having been an active approved supplier to General Electric, Westinghouse and other OEMs for more than 30 years. The company also manufactures its own patented designed tilting pad journal bearing ("Fluid Pivot"®). Pioneer has been the exclusive bearing repair licensee of the Power Generation Business Unit of Westinghouse Electric Corp. since 1989. Pioneer has had extensive experience serving the bearing repair needs of the electric utility, independent power, marine and petro-chemical industries and the U. S. Navy.



#### 4.3 The ABB/Pioneer License:

In 1992-1993, ABB conducted comprehensive audits of Pioneer's quality control program and facilities at its headquarters plant near San Francisco, California, and at its plant outside of Charlotte, North Carolina. Pioneer was immediately included among ABB's listing of unconditionally approved vendors.

In 1993, in cooperation with us, Pioneer developed an engineering specification for the proper tooling and method required to centrifugally cast ABB segmented (tilting pad) journal bearings. ABB European and American turbine engineers closely observed Pioneer's casting operations. They subjected sample castings to a series of destructive and non-destructive tests, including chemical and microscopic examinations and analyses of photomicrographs. During the same period, Pioneer gained additional practical experience working with us by performing repairs on a number of ABB gas, industrial steam and large hydro-electric turbine-generator bearings.

In October, 1993, our efforts resulted in our appointment of Pioneer as our licensee in North America for the repair (rebabbitt and reconditioning) of babbitt bearings and seals designed for use in ABB, BBC and third party OEM ABB/BBC retrofitted turbines and generators 25 MWe or larger, using ABB's drawings.

#### 4.4 The Advantages of the ABB/Pioneer License:

ABB customers now have the ability to obtain bearing repairs from an independent company which:

- has specialized in the manufacture and repair of babbitt bearings and seals since 1920 and is the leading babbitt bearing repair organization in North America; has been approved unconditionally by ABB after thorough investigation;
- has access to ABB's drawings and engineering technical support so that customers can be assured their bearings will be restored to original factory specifications;
- will have the unique ability to notify customers at the time of repair of any ABB drawing revisions or up-graded features designed since purchase of the original part;



- can arrange for the pick-up and return of customers' bearings and has a documented history of on-time deliveries to electric utility plants nation-wide;
- will help customers to shorten the repair cycle by its ability to rapidly respond to customers' bearing service requirements with the highest quality workmanship and methods suitable for the repair of ABB bearings.

#### 4.5 Specifications and Standards:

For repairs on ABB/BBC bearings, Pioneer will adhere to the following proprietary specifications:

- Pioneer Process Specification # 9304: Centrifugal Casting And Machining of ABB PGI Utility Steam Turbine Division's Plain and Tilt Pad Journal Bearing Segments (Approved by ABB; ref. ABB UTGD 400314.)
- ABB UTGD 620 053: Inspection and Test Plan
- ABB HZLM-PA-21-025: Testing Instructions -- Ultrasonic Testing of the Bonding in Metallic Journal Bearings
- ABB HZLM-PA-21-013: Testing Instructions -- Liquid Penetrant Test Inspection

Pioneer also complies with all of the following U. S. Government specifications and standards (in the case of any inconsistencies, such as the acceptability of ultrasonic test results, the more stringent ABB or ABB approved Pioneer specifications will control):

Inspection System Requirement Calibration System Requirement Babbitting of Bearing Shells Bond Testing Non-Destructive Testing MIL-I-45208A-1 MIL-STD-45662A DOD-STD-2188 (SH) DOD-STD-2183 (SH) MIL-STD-271-F



For reference, the following is a listing of Pioneer's Process Controls Procedures, which have been approved by the United States Government and major OEMs:

Calibration System Proc., No. CS 890 Nuclear Defective Part Reporting Proc., No. ND 592 Packaging Proc., No. PP 990 Quality Control Manual No., QCM 890 Quality Control NDE Quality Control Procedure Rebabbitting Process Proc. (Proprietary), No. RP 1174 Ultrasonic Test Proc., No. UT 871 Babbitt Welding Repair Proc. Manual, No. BW 692 Dye Penetrant Inspection Manual, No. DP 790

#### 4.6 Outline of Pioneer's Basic Repair Procedures:

A complete description of Pioneer's repair procedures is beyond the scope of this SIL. The following is a brief general summary of the repair process:

**A) Receiving Inspection:** The used bearing shell will be inspected to the latest revisions of the appropriate ABB drawings, assuming they are already on hand or will be obtained from ABB on a timely basis. Any conditions that do not conform to specifications will be reported. (If drawings are not available, Pioneer will measure the used bearing shell and provide a working sketch recording such features as the width, outer diameter, location and depth of oil grooving and thermocouple holes. If, in the opinion of Pioneer, work in addition to standard rebabbitting and machining is required or recommended in order to restore the bearing to "as manufactured" condition or to up-grade the bearing to the latest drawing revision, Pioneer will notify the customer with a Used Bearing Condition Report. (*For a description of the types and causes of damage to journal and tilting pad thrust bearings, refer to Pioneer's "Bearing Damage" report, which includes recommended corrective action.*)

**B) Preparation:** Old babbitt metal and all traces of the existing intermetalics will be removed and replaced with all new metal, documented by traceable certificates as conforming with Federal or ASTM specifications, as specified in the repair contract and in conformance with the above-listed specifications and standards.

**C) Casting:** Journal bearings, including ABB's segmented (tilting pad) journal bearing, will be centrifugally cast using special tooling designed and developed by Pioneer. The bearings will be spun at the appropriate speed, as designated in Pioneer Spec. No. 9304, which will minimize metal segregation and porosity. Thrust bearings (plates or shoes) will be statically cast using a static casting method, approved by ABB Hydro Power Division, to promote directional cooling for proper bonding and minimize metal segregation.



Metal spraying of babbitt will never be used.

Gas welding of babbitt (inert or other) will not be used.

**D)** Ultrasonic Bond Testing: will be performed using equipment calibrated to satisfy MIL-STD-45662A and personnel certified to Level I or Level II in accord with MIL-STD-271F. The babbit bond will be ultrasonically tested to satisfy HZLM-PA-21-025 accept/reject criteria.

**E) Machining:** Rough and finish machining of babbitt will conform to ABB drawing specifications or special instructions in the contract (i.e., customer may request a "semi-finished" bore). Surface finish in bearing bore to 32 RMS or better unless otherwise specified. Outer bearing surfaces, oil passages, drain slots, and all drilled or tapped holes will be free of tin, babbitt or other foreign material. Oil grooving will be hand blended and sharp edged deburred.

**F)** Quality Assurance Record Retention: Pioneer will retain for not less than 5 years the following documentation, which will be properly identified with the corresponding purchase order number:

- Babbitt Alloy Certificate: Certification of analysis of the babbitt alloy used.
- Ultrasonic Examination Certificate: Certification of the bond test (which may include a plot of findings) evidencing an acceptable babbitt bond as per ABB HZLM-PA-21-025.
- **Dimensional Certificate:** Certification indicating actual sizes of all critical features including outside and inside diameters, and thrust widths as found at final inspection, as per ABB UTGD-G20-053.



#### 5. PLACING INQUIRIES AND ORDERS:

For more information about ABB bearing repairs, to request price and delivery, or to place repair orders, contact our Exclusive Licensee direct:

#### **Pioneer Motor Bearing**

Califo	rnia: 116 Be	eacon St., South San Francisco 94080
	Phone: Fax:	(650) 871-8144 (650) 873-5717
	Ask for:	<b>Donald Wengler</b> <i>Technical Services Manager</i>
	or	<b>Al Hayes</b> <i>Production Manager</i>
North	Carolina: 1	29 Battleground Road, Kings Mountain 28086
	Phone: Fax:	(704) 937-7000 (704) 937-9429
	Ask for:	<b>Stephen Bonino</b> <i>Technical Services Manager</i>
	or	<b>Bob Swisher</b> <i>Quality Assurance Manager</i>

#### For more information on the ABB/Pioneer License, contact:

Mr. G. Randall Riggs Product Line Director, Spare Parts

ABB Power Generation Inc. Steam Turbine Division 5309 Commonwealth Centre Parkway Midlothian, VA 23112

Phone: (804) 763-2047 FAX: (804) 763-2193