

LEE COUNTY, FLORIDA
 PROPOSAL QUOTE FORM
 FOR ELECTRIC MOTOR REPAIR & REPLACEMENT SERVICES

DATE SUBMITTED: 8/1/13

VENDOR NAME: Mader Electric Motors

TO: The Board of County Commissioners
 Lee County
 Fort Myers, Florida

Having carefully examined the "General Conditions", and the "Detailed Specifications", all of which are contained herein, the Undersigned proposes to furnish the following which meet these specifications:

NOTE REQUIREMENT: IT IS THE SOLE RESPONSIBILITY OF THE VENDOR TO CHECK LEE COUNTY PROCUREMENT MANAGEMENT WEB SITE FOR ANY PROJECT ADDENDA ISSUED FOR THIS PROJECT. THE COUNTY WILL POST ADDENDA TO THIS WEB PAGE, BUT WILL NOT NOTIFY.

The undersigned acknowledges receipt of Addenda numbers: _____

CONTRACTOR'S RESPONSE TIME MUST, IN KEEPING WITH THE CRITICALITY OF THE SERVICE PROVIDED BY LEE COUNTY UTILITIES (LCU), BE NO MORE THAN 8 HOURS; AND PREFERABLY SIGNIFICANTLY LESS THAN THAT. PREFERENCE MAY BE GIVEN AT TIME OF AWARD TO VENDORS WHOSE RESPONSE TIME IS 4 HOURS OR LESS. PLEASE PROVIDE YOUR RESPONSE TIME IN THE SPACE PROVIDED BELOW.

RESPONSE TIME: 1 hour

Hourly Rates – Personnel	(Basis of Award)	Straight Time
Classification		
In house Shop Technicians (300 hrs/yr)		300hrs x \$ <u>30</u> /hr = \$ <u>9000</u> /yr.
Machinists, lathe operators (100 hrs/yr.)		100hrs x \$ <u>28</u> /hr = \$ <u>2800</u> /yr.
Field Service Technicians (600 hrs/yr.)		600hrs x \$ <u>10</u> /hr = \$ <u>6000</u> /yr.
Technical Specialists (225 hrs/yr.)		225hrs x \$ <u>0</u> /hr = \$ <u>0</u> /yr.
Shop Coordinator (225 hrs/yr.)		225hrs x \$ <u>0</u> /hr = \$ <u>0</u> /yr.
Welder (175 hrs/yr.)		175hrs x \$ <u>10</u> /hr = \$ <u>1750</u> /yr.
Straight Time		
(1.) Total Annually		* \$ <u>19,550</u>
Hourly Rates – Equipment and Crew	(Basis of Award)	Straight Time
Item/Classification		
Crane – 20 ton with 75- foot reach. (50		50hrs x \$ <u>85</u> /hr = \$ <u>4250</u> /yr

hrs./yr.)	
Two man crane crew. (50 hrs/yr.)	50hrs x \$ <u>40</u> /hr = \$ <u>2000</u> /yr
Transportation for field service personnel. (50 hrs/yr.)	50hrs x \$ <u>0</u> /hr = \$ <u>0</u> /yr

Straight Time

(2.) Total Annually * \$ 6250

Mark-Ups (Basis of Award)	
Repair components (annual expense \$66,000)	\$66,000 x <u>12</u> %Mark up = \$ <u>73920</u> annual cost
New equipment (annual expense \$120,000)	\$120,000 x <u>16</u> %Mark up = \$ <u>137200</u> annual cost
Miscellaneous Items: e.g. overnight freight on special parts, consumables...etc	Cost plus a <u>0</u> % Mark-up
(3.) TOTAL ANNUALLY (For Mark-Ups add annual costs for repair & new) *\$ <u>205,920.00</u>	

***GRAND TOTAL (Basis of Award)**

\$ 231,720.00

(Grand total includes all total annual costs for straight time and mark-ups only. Do not include Options "A"-Overtime or Option "B"-Specialty Service)

OPTION A

Hourly Rates – Personnel (Option A) OVERTIME	
Classification	Overtime shall not exceed time and a half. (125 hrs/yr overtime for all positions)
In house Shop Technicians	75hrs x \$ <u>45</u> /hr = \$ <u>3375</u> /yr.
Machinists, lathe operators	75hrs x \$ <u>40</u> /hr = \$ <u>3000</u> /yr.
Field Service Technicians	75hrs x \$ <u>15</u> /hr = \$ <u>1125</u> /yr.
Technical Specialists	75hrs x \$ <u>0</u> /hr = \$ <u>0</u> /yr.
Shop Coordinator	75hrs x \$ <u>0</u> /hr = \$ <u>0</u> /yr.
Welder	75hrs x \$ <u>15</u> /hr = \$ <u>1125</u> /yr.
(1.) Total Annually	\$ <u>8625</u>

Hourly Rates – Equipment and Crew (Option A) OVERTIME	
Item/Classification	Overtime shall not exceed time and a half
Crane – 20 ton with 75- foot reach. (50 hrs/yr.)	Same as straight time rate

Two man crane crew. (50 hrs/yr.)	50hrs x \$ <u>60</u> /hr = \$ <u>3000</u> /yr
Transportation for field service personnel. (50 hrs/yr.)	Same as straight time rate.

(2.) Total Annually \$ 11,625.⁰⁰

OPTION B:

Specialty Service Classification (if any are anticipated). \$ <u>90</u> /HR. (for example: laser alignment, vibration analysis)

TO BE STARTED WITHIN 1 CALENDAR DAYS AFTER RECEIPT OF AWARD AND PURCHASE ORDER.

WILL YOU DELIVER WITH YOUR OWN VEHICLE AS OPPOSED TO COMMON CARRIER?
 YES X NO _____

Does your firm have a location/office/facility in Lee County?
 YES X NO _____

Address: 18161 N. Tamiami Tr. N. Ft. Myers, FL. 33903

Bidders should carefully read all the terms and conditions of the specifications. Any representation of deviation or modification to the bid may be grounds to reject the bid.

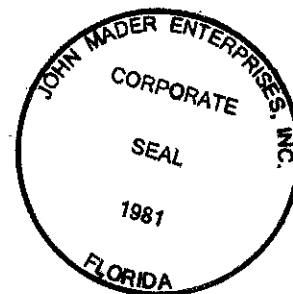
Are there any modifications to the bid or specifications:
 YES _____ NO X

Failure to clearly identify any modifications in the space below or on a separate page may be grounds for the bidder being declared nonresponsive or to have the award of the bid rescinded by the County.

MODIFICATIONS:

Bidder shall submit his/her bid on the County's Proposal Quote Form, including the firm name and authorized signature. Any blank spaces on the Proposal Quote Form, qualifying notes or exceptions, counter offers, lack of required submittals, or signatures, on County's Form may result in the Bidder/Bid being declared non-responsive by the County.

[Handwritten Signature]



LETTER OF TRANSMITTAL

Lee County Project No.: B-130513

Title: Electric Motor Repair & Replacement Services

1. REPORT ON THE FIRM
2. PROJECT APPROACH
3. ADDITIONAL INFORMATION

1. REPORT ON THE FIRM

Report on the firm:

John Mader Enterprises Inc., DBA Mader Electric Motors has been in the business of electric motor, pump, and related product service and sales for over 30 years. The business has 2 locations, our main office is in N. Ft. Myers, Fl. and our second location is in Tampa, Fl. Our corporate structure is led by John Mader Sr., who is the owner and serves as president of the corporation. John has been in the electric motor field for 40+ years. Mader Electric Motors corporate office has been located in N. Ft. Myers since 1981. Jeremy Mader who has been with company for over 15 years serves as the VP of the company, and John Mader Jr. as the manager completing the corporate structure.

Our main office is located at 18161 N. Tamiami Trail in N. Ft. Myers and consists of approximately 10,000 sq. feet, with all of the machinery and test equipment needed to complete any of the City's motor and pump repairs. We have approximately 12,000 sq ft. in our Tampa facility which is located at 7401 Adamo Dr. in Tampa.

Our inventory encompasses electric motors both new and rebuilt in multiple RPM ranges and up to 150 HP. At all times we have the equipment and inventory needed to rewind and rebuild electric motors for most all applications. We stock only hi-temperature inverter duty rated material in our winding department so that our motor rewinds meet or exceed all manufacturer standards regardless of the application. We also stock several different types of pump, electrical equipment, and accessories that are used by municipalities on a daily basis.

Our staff consists of motor repairmen and winders from several backgrounds, some of whom have over 40 years experience in the field, and as listed in the corporate structure, are led by some 4th generation motor repairmen. Our staff has experience in every aspect of the motor repair process, our capabilities include all aspects involved in rewinding and repairing electric motors. Most members of our staff have completed numerous technical training courses from EASA as well as other organizations. We have a full service machine shop with dynamic balancing equipment, all of the process control ovens, computerized coil forming, insulating equipment, and test equipment needed to complete all aspects of electric motor repair. Different members of our staff have completed several manufacturer sponsored and EASA industry sponsored motor and pump training events.

LIST OF CLIENTS FOR WHOM WE PROVIDE SIMILAR SERVICES PER SECTION 1.1C

Sarasota County Government

PO Box 8

Sarasota, Fl. 34230

Contract # 4828JH

Contact: Victor Carlano 941-650-2173

Description of services provided: Repair, rewind, sell, and install various motors, pumps, and controls for utility plants and lift stations.

Start / completion date: 2000-current

Manatee County Government

PO Box 1000

Manatee County, Fl. 34206

IFB # 04-176MR

Contact: Jim Marble 941-755-1853

Description of services provided: Repair and rewind various motors and pumps for utility plants and lift stations.

Start / completion date: 1982-current

Collier County Utilities

10500 Goodlette Frank Rd.

Naples, Fl. 34109

Contract # 08-5137

Contact: Fred Price 239-253-2734

Description of services provided: Repair, rewind, and sell various pumps and motors for utility plants and lift stations.

Start / completion date: 2005-2013

Lee County Utilities

PO Box 2238

Ft. Myers, Fl. 33902

Contract # Q-100073

Contact: Rich Sims 239-634-0161

Description of services provided: Repair, rewind, and sell various pumps, motors, and controls for utility plants and lift stations.

Start / completion date: 2001-present

*Many more references can be furnished upon request

MADER ELECTRIC MOTORS

Equipment list

- 1 Ford F750 flat bed crane truck with 20 ton crane lifting capacity
- 1 Ford F250 utility bed truck with 9,000 lb hoist lifting capacity
- 3 Ford F350 ¾ ton pick up trucks

10,000 square ft. of repair facility in main N. Ft. Myers facility and 12,000 square ft. in Tampa facility

Crane capacity: 10: 2 ton cranes and 4: 1 ton cranes in N. Ft. Myers facility, 6: 2 ton cranes in Tampa facility

30 full time employees between both facilities

All trained / certified mechanics and or machinists / welders, coil formers, and winders

We have 2 cabinet type sand blasters and 2 full size recyclable outdoor sandblaster. One steam cleaner, 2 pressure cleaners, and 6 solvent tank cleaning systems.

We have 3 lathes with up to 28" swing and 10' centers on site, 3 full size milling machines, 2 band saws

Varnish dip tank & bake oven size: 60" X 60" X 48"

VPI system: EpoxyLite Model # E5X5

2 Temperature controlled burn out ovens, largest is 8' x 8' x 6'

Test equipment: BEM electrical apparatus test centers with computerized test report printing, Crown # 2110 insulation testers, Baker # ST112S & # DX 2012 surge testers, Phenix core loss tester model # CL10-A, 4 Baker meg-o-meters, 1 BJM Corp. All-Test III motor analyzer, Crown # 2505 growler, Ex-Tech digital tachometer # 421305

Calibration by Baker Instruments & Simco Electronics

2: Dyna-Bal computerized balancing machines model # D5HD & # D10HD with unlimited length capacity. National Reliability Systems model # A4300-VA3 vibration analysis tool and Vibralign model # "Shaft Hog" laser alignment tool.

Any type or size of painting and coating application can be applied on-site.

2. PROJECT APPROACH

Project Approach:

The proposed strategy for providing the services and products listed in this RFQ is to be available 24/7 with local experienced personnel that can respond to your needs for motor repair and replacement. Our strategy starts before you call us with a motor failure by our staff becoming acquainted with all of the County's motors and knowing which ones are the most critical to your operation. We typically have everything in stock to handle most of your repair needs but if we don't already stock it then we will. Our philosophy is that if you as a customer are going to commit a contract to us with the potential to last 5 years then any non-perishable items needed to service your most critical motors will be purchased within that 5 year period anyway so we will be a step ahead if we put those parts into stock now. Aside from the parts and products in inventory, we consider our biggest asset in being able to fulfill a contract of this scale to be our people, more specifically their experience. We have on call at all times mechanics, motor winders, machinists, and a crane truck / field service crew that is familiar with all of the Lee County water, wastewater, lift station, and well facilities and can provide emergency service in less than 1 hour. Our history with Lee County Utilities has afforded us to be able to provide this advantage. Once we have decided what personnel are best suited to handle the specific job that you need repair work done on they are either dispatched by our VP of operations, Jeremy Mader, or our shop foreman, John Miller.

For repair jobs that are being done in our service center the work is documented when it arrives by recording all of the name plate information and a digital picture is also taken for documentation purposes. Jobs are assigned to the proper personnel and the repair process follows the steps from beginning to end that you have listed in your guidelines for repair procedures in this RFQ. Our non-emergency response time is typically the same day, but again with being located in Lee County we are less than 1 hour away from any County facility. A typical repair time for pumps and motors is based on the size and scale of each pump and motor, but for most of the County's motors covered in this RFQ which the majority will range from 30 HP to 200 HP the repair time will be less than 5 business days for standard turn around, and 8-48 hours for emergency turnaround, again depending on the size and scale of the repair required.

- Samples of our forms that we use for predictive maintenance report / motor information forms and our Test and inspection Report. Our standard warranty as per your bid is also attached.

AS FOUND REPORT

DISASSEMBLY

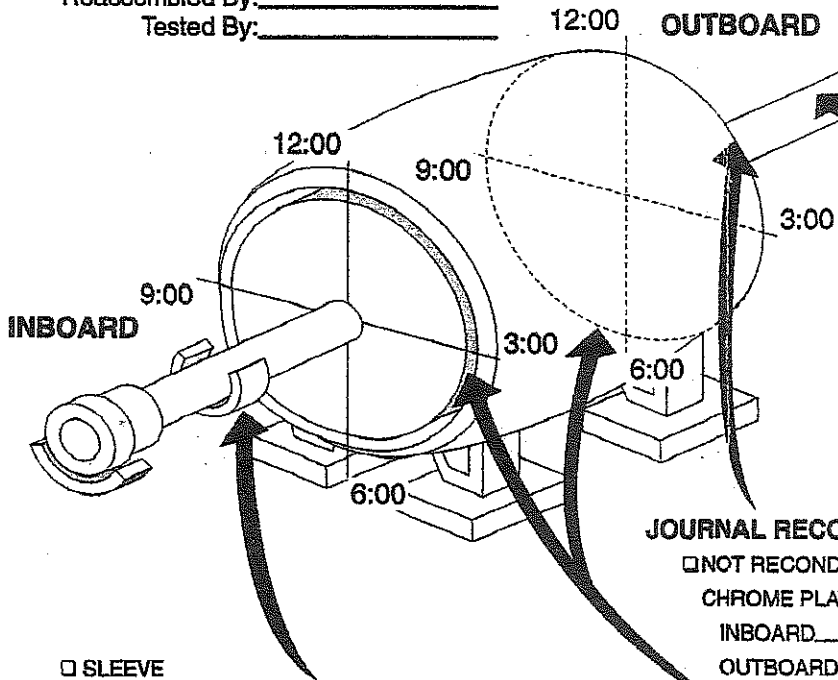
OVERALL LENGTH _____
 NORMAL THICKNESS _____
 INSIDE DIAMETER _____
 OUTSIDE DIAMETER _____
 WINDING FLAPS _____
 FRAME CLEARANCE _____
 WINDING PITCH _____

NUMBER OF LEAD WIRES _____
 SIZE OF LEAD WIRE _____
 SIZE OF MAGNET WIRE _____
 TYPE OF MAGNET WIRE _____
 NUMBER OF TURNS PER COIL _____
 NUMBER OF COILS PER POLE _____
 NUMBER OF SLOTS _____
 CONDITION OF CONNECTION LEADS _____

MECHANICAL REPAIR

Disassembled By: _____
 Mechanical Readings: _____
 Electrical Readings: _____
 Reassembled By: _____
 Tested By: _____

END FLOAT
 ENTER
 VALUES
 ↙ ↘
MAG. CTR.



SHAFT
 TIR INITIAL _____
 FINAL _____
 STRAIGHTENING METHOD
 NOT APPLICABLE
 PEENING
 HEATING
 BENDING
 LOCATION OF BEND _____
 (DISTANCE FROM IB END)

JOURNAL RECONDITION

NOT RECONDITIONED
 CHROME PLATE DEPOSITION THICKNESS
 INBOARD _____
 OUTBOARD _____

- SLEEVE
 ANTI-FRICTION

BEARINGS

	MFG/MODEL	
	IB	OB
INBOARD		
OUTBOARD		
MEASUREMENTS		
BRG. HOUSING I.D.		
BRG. O.D.		
CLEARANCE		
BRG I.D.		
JOURNAL O.D.		
CLEARANCE		

AIR GAP (AS VIEWED FROM COUPLING END)

	IB	OB
INITIAL 12:00		
3:00		
6:00		
9:00		
FINAL 12:00		
3:00		
6:00		
9:00		

CUST: _____
 P.O. #: _____
 JOB #: _____
 DATE: _____

MAJOR REPAIR ITEMS

- INSPECT/CLEAN
- REWIND
- RESTACK ROTOR
- BEARING REPLACEMENT
- JOURNAL SURFACE RECONDITION
- SHAFT STRAIGHTENED
- SHAFT REPLACED
- HOUSING LINE BORED
- ROTOR BALANCED
- PAINTED
- OTHER _____

COND. BEFORE REPAIR

- 1. BEARING**
- | | | |
|-----------------|--------------------------|--------------------------|
| | INBOARD | OUTBOARD |
| GOOD CONDITION | <input type="checkbox"/> | <input type="checkbox"/> |
| CHATTER | <input type="checkbox"/> | <input type="checkbox"/> |
| FROZEN TO SHAFT | <input type="checkbox"/> | <input type="checkbox"/> |
| SCORED/WIPED | <input type="checkbox"/> | <input type="checkbox"/> |
| OTHER | _____ | _____ |
- 2. LUBRICATION**
- | | | |
|----------|---------------------------------|------------------------------------|
| INBOARD | <input type="checkbox"/> NORMAL | <input type="checkbox"/> VARNISHED |
| OUTBOARD | <input type="checkbox"/> NORMAL | <input type="checkbox"/> VARNISHED |
- 3. ROTOR**
- GOOD CONDITION
 - DISCOLORED/HOT SPOTS
 - CRACKED ROTOR BARS
 - OTHER _____
 - ARCED/FUSED AREAS
 - ROTOR FAN CRACKED
 - RUBBED TO STATOR
- 4. SHAFT**
- GOOD CONDITION
 - BENT
 - JOURNAL SURFACE DAMAGED
 - OTHER _____
 - DIAM @ SLEEVE BEARING
 - RUN OUT / TIR
- 5. STATOR**
- GOOD CONDITION
 - DISCOLORED/HOT SPOTS
 - RUBBED/WARPED/WORN
 - OTHER _____
 - ARCED/FUSED AREAS
 - BENT LAMINATIONS
 - LOOSENESS
- 6. FLAME PATH BUSHING**
- GOOD CONDITION
 - WEAR
 - SCORING
 - I.D. _____
 - OUT OF ROUND/TIR _____
 - JOURNAL CLEARANCE _____
- 7. SUSPECTED CAUSE OF FAILURE, COMMENTS, SUGG.**
- _____
- _____

MOTOR INFORMATION

MANUFACTURER _____	SERVICE FACTOR _____
SERIAL NO. _____	NEMA TYPE _____
HORSE POWER _____	RPM _____
VOLTAGE _____	BEARING TYPE _____
PHASES _____	FULL LOAD AMPS _____

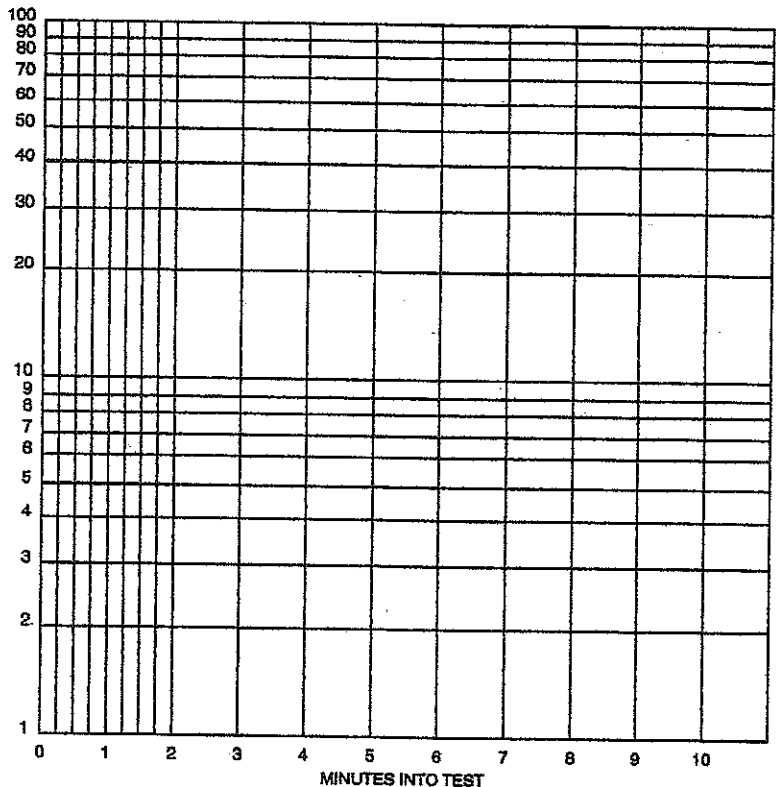
- YES NO COUPLING OR PULLEY ATTACHED TO MOTOR ON ARRIVAL?
- DELTA(Δ) COIL CONNECTION WYE(Y) COIL CONNECTION
- YES NO CONNECTION BOX ATTACHED TO MOTOR ON ARRIVAL?

TEST

NO LOAD CURRENT 1ST PHASE _____ NO LOAD SPEED (RPM) _____
 2ND PHASE _____ INSULATION RESISTANCE _____
 3RD PHASE _____ TEST VOLTS _____

INSULATION RESISTANCE DURING TEST (IF REQUIRED)

- | | | |
|--------------------|--------------------|--------------|
| 0 SEC _____ | 1 MIN 30 SEC _____ | 6 MIN _____ |
| 15 SEC _____ | 1 MIN 45 SEC _____ | 7 MIN _____ |
| 30 SEC _____ | 2 MIN 0 SEC _____ | 8 MIN _____ |
| 45 SEC _____ | 3 MIN _____ | 9 MIN _____ |
| 1 MIN 0 SEC _____ | 4 MIN _____ | 10 MIN _____ |
| 1 MIN 15 SEC _____ | 5 MIN _____ | |



POLORIZATION INDEX = $\frac{\text{RESISTANCE : VALUE @ 10 MIN:}}{\text{RESISTANCE : VALUE @ 1 MIN:}}$

AS RELEASED REPORT

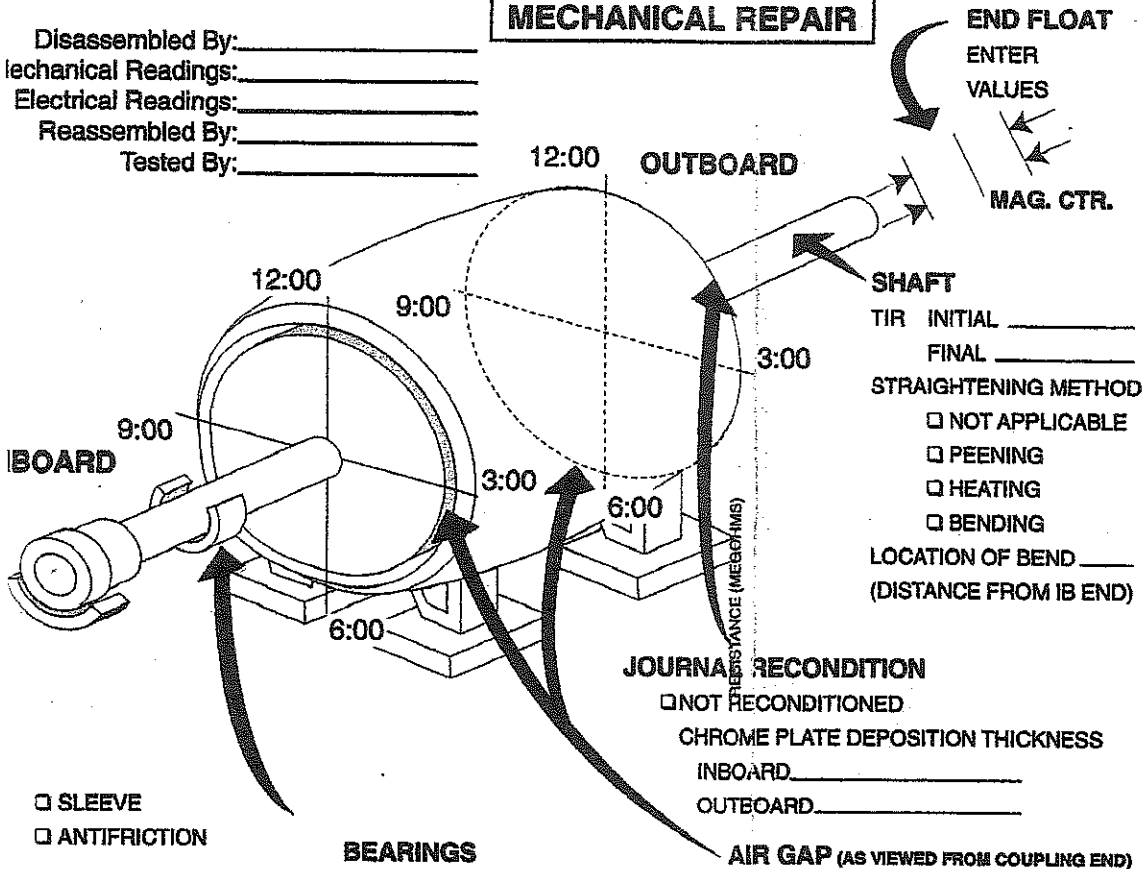
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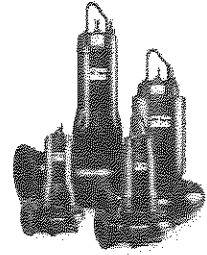
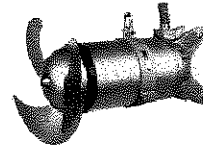
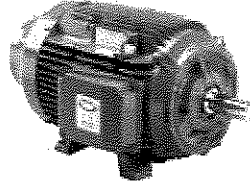
OVERALL LENGTH _____
 NORMAL THICKNESS _____
 INSIDE DIAMETER _____
 OUTSIDE DIAMETER _____
 WINDING FLAPS _____
 FRAME CLEARANCE _____
 WINDING PITCH _____

NUMBER OF LEAD WIRES _____
 SIZE OF LEAD WIRE _____
 SIZE OF MAGNET WIRE _____
 TYPE OF MAGNET WIRE _____
 NUMBER OF TURNS PER COIL _____
 NUMBER OF COILS PER POLE _____
 NUMBER OF SLOTS _____
 CONDITION OF CONNECTION LEADS _____

MECHANICAL REPAIR

Disassembled By: _____
 Mechanical Readings: _____
 Electrical Readings: _____
 Reassembled By: _____
 Tested By: _____





18161 N. Tamiami Trail, N. Ft. Myers, FL 33903
Office (239) 731-5455 • Fax (239) 731-8165

Basic Vibration Analysis Report

Database: Largo WWTP
Selected tree item: Largo Plant Blowers
Date, time: 11/20/2012 14:59

Machine: Largo Plant Blowers/North Blower Room/Blower N1

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/21/2008 0:43:31 Velocity OverAll [in/s] **0.06**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/21/2008 0:43:59 Velocity OverAll [in/s] **0.12**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/21/2008 0:44:31 Velocity OverAll [in/s] **0.11**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/21/2008 0:45:13 Velocity OverAll [in/s] **0.09**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/21/2008 0:45:47 Velocity OverAll [in/s] **0.08**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/21/2008 0:46:21 Velocity OverAll [in/s] **0.07**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/21/2008 0:46:52 Velocity OverAll [in/s] **0.22/w**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/21/2008 0:47:30 Velocity OverAll [in/s] **0.04**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/21/2008 0:48:04 Velocity OverAll [in/s] **0.04**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/21/2008 0:49:02 Velocity OverAll [in/s] **0.15**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

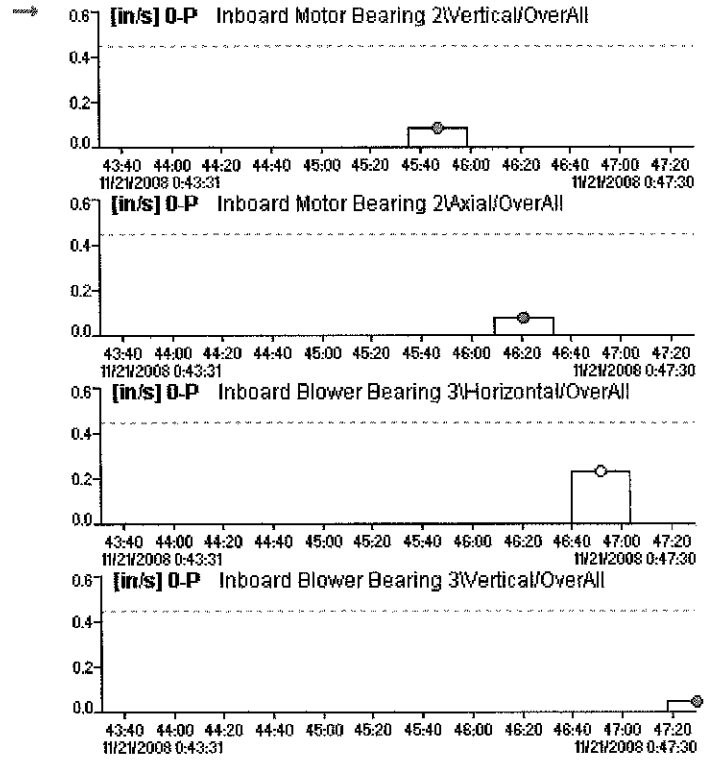
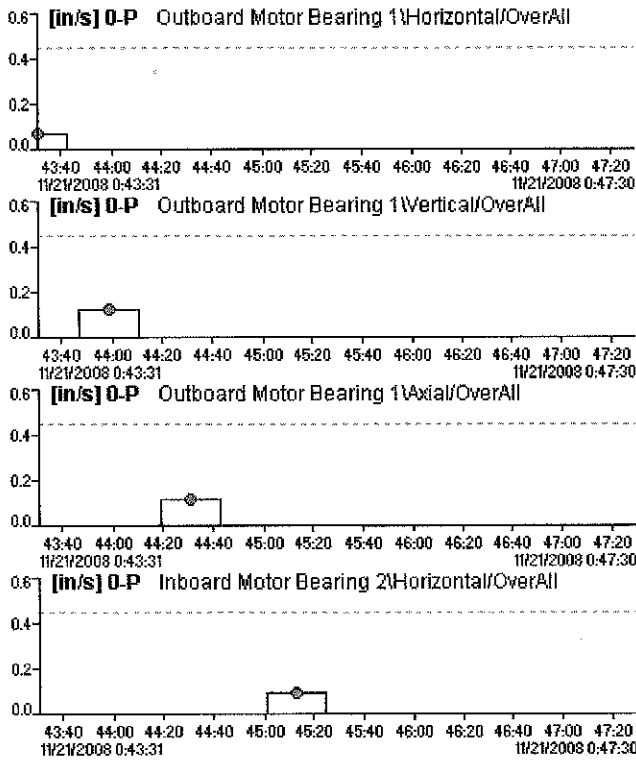
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Measurement Place: **Outboard Blower Bearing 4/Axial**

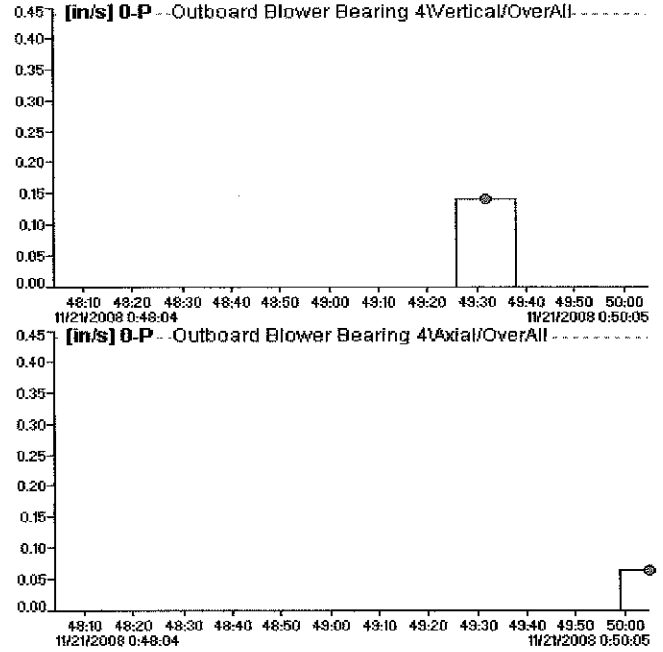
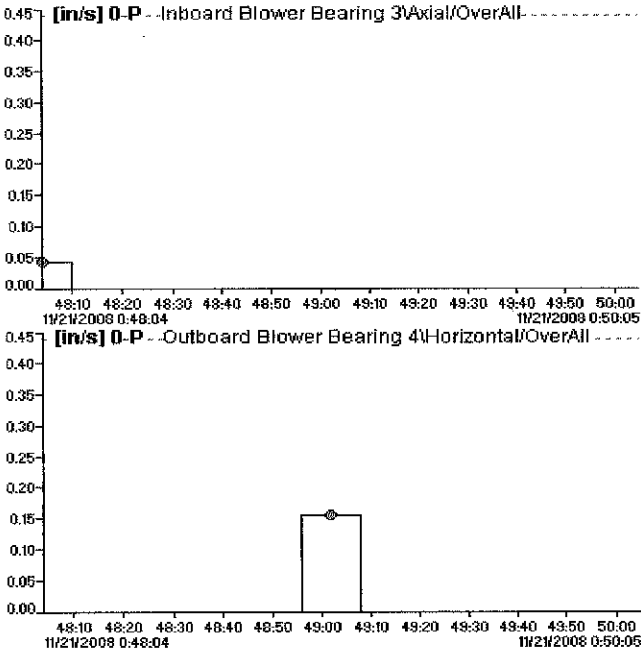
11/21/2008 0:50:05 Velocity OverAll [in/s] **0.06**

Overall Spectrum with Tolerances

Blower N1

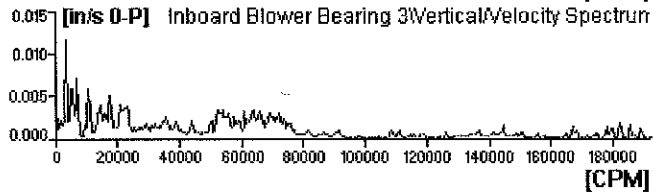
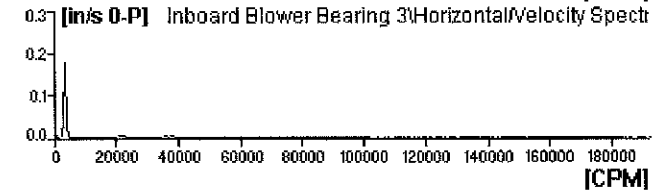
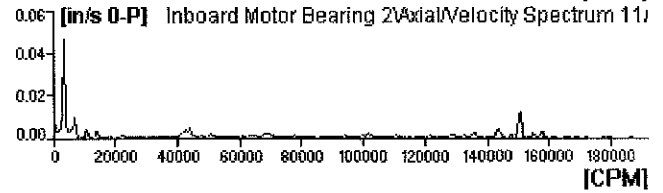
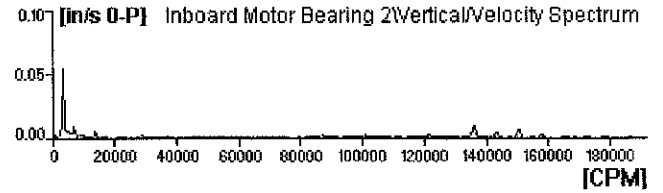
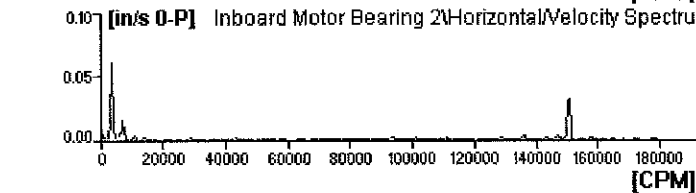
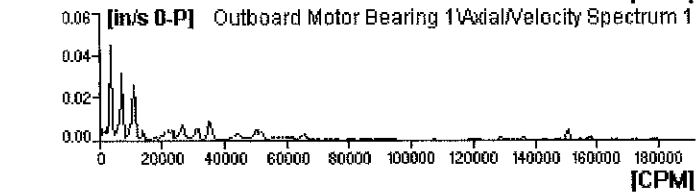
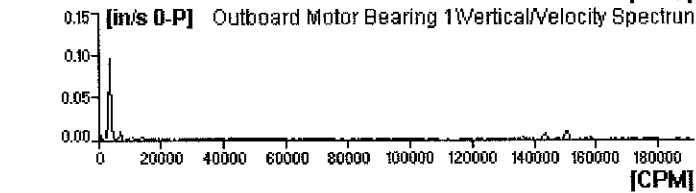
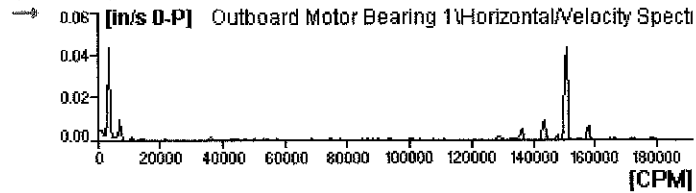


Blower N1

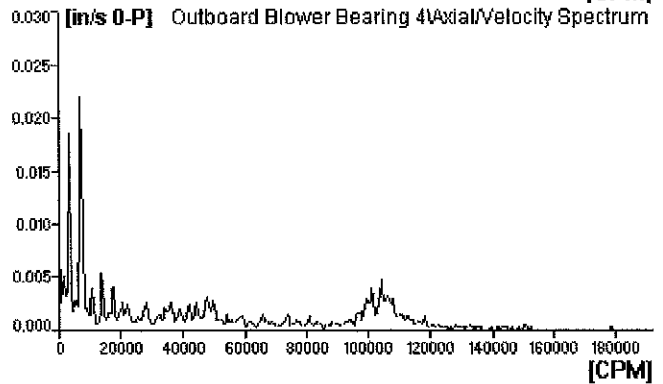
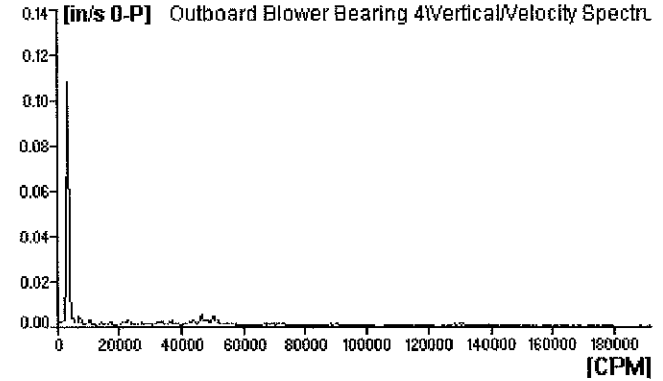
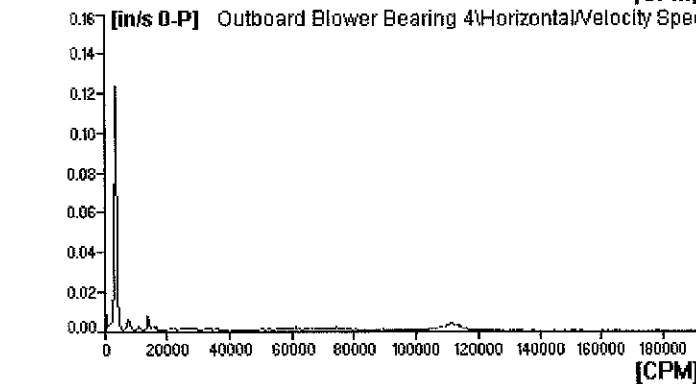
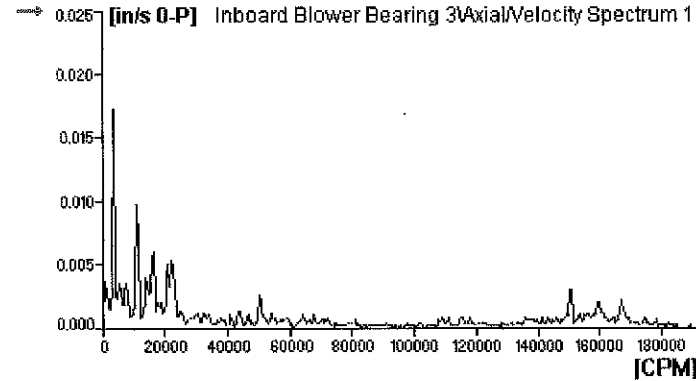


Velocity Spectrum

Blower N1

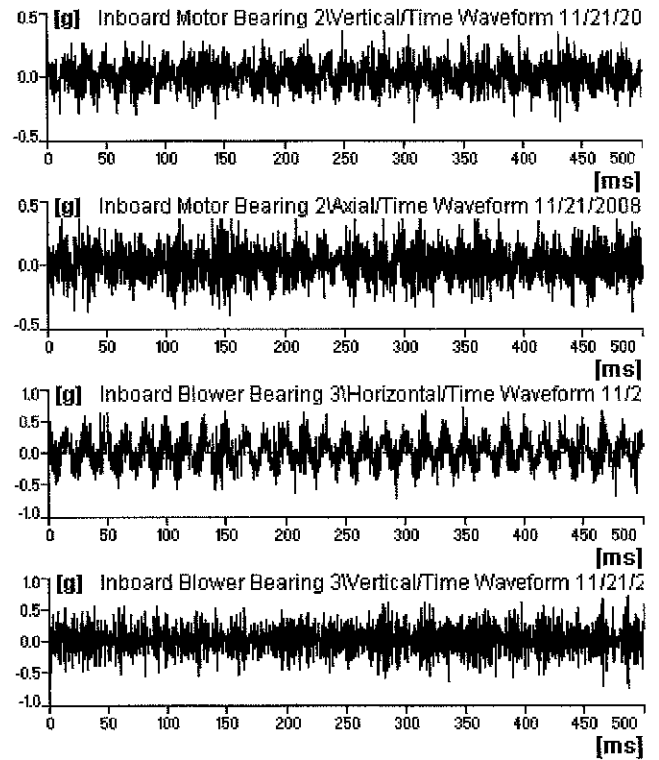
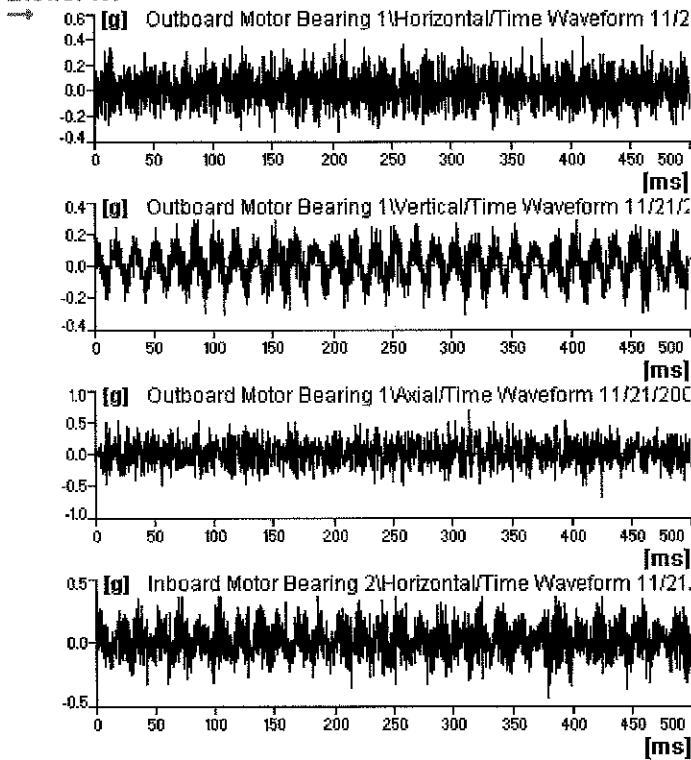


Blower N1

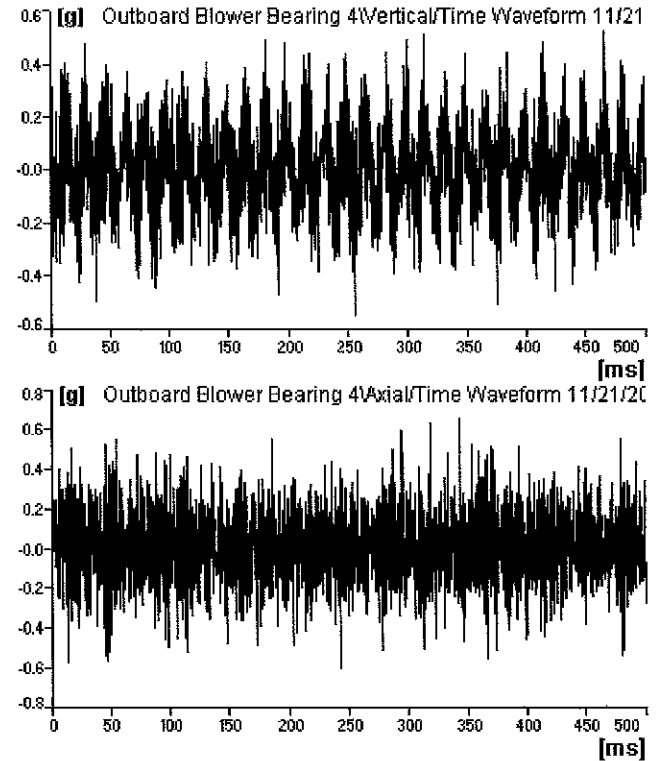
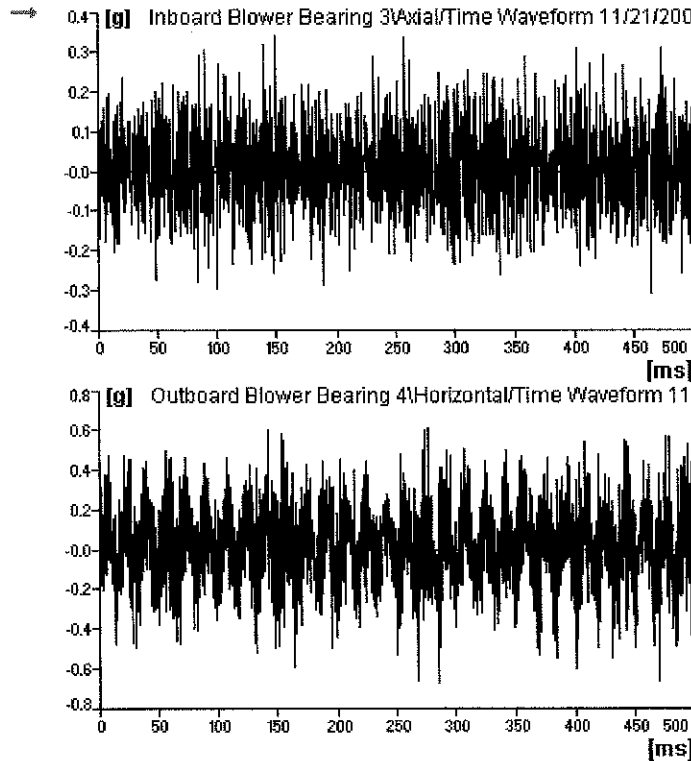


Time Wave Form

Blower N1



Blower N1



Special Notes on Blower N1:

Warning List

Machine: Largo Plant Blowers/North Blower Room/Blower N1

Measurement Place: Inboard Blower Bearing 3/Horizontal

OverAll 11/21/2008 0:46:52 **0.224 [in/s] Warning Confirmed**

Note

Mechanical Seals are leaking air on both inboard and outboard. **(Recommendation – Replace seals)**

The Flex coupler is leaking on the Discharge Piping. **(Recommendation –Tighten flange or Replace unit, it was stated this unit was tightened and leaks often)**

Inboard Blower Bearing is in Warning (Alignment looks good, Bearing life is going away) **(Recommendation – Watch for descending trend – Replace Blower Bearing)**

Model# -75106A1 / Serial#POO4877

Machine: Largo Plant Blowers/North Blower Room/Blower N2

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/20/2008 23:17:05 Velocity OverAll [in/s] **0.14**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/20/2008 23:17:40 Velocity OverAll [in/s] **0.05**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/20/2008 23:18:50 Velocity OverAll [in/s] **0.08**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/20/2008 23:19:37 Velocity OverAll [in/s] **0.23/w**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/20/2008 23:20:15 Velocity OverAll [in/s] **0.09**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/20/2008 23:20:43 Velocity OverAll [in/s] **0.06**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/20/2008 23:21:26 Velocity OverAll [in/s] **0.53/a**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/20/2008 23:21:55 Velocity OverAll [in/s] **0.08**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/20/2008 23:22:27 Velocity OverAll [in/s] **0.09**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/20/2008 23:23:32 Velocity OverAll [in/s] **0.35/w**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

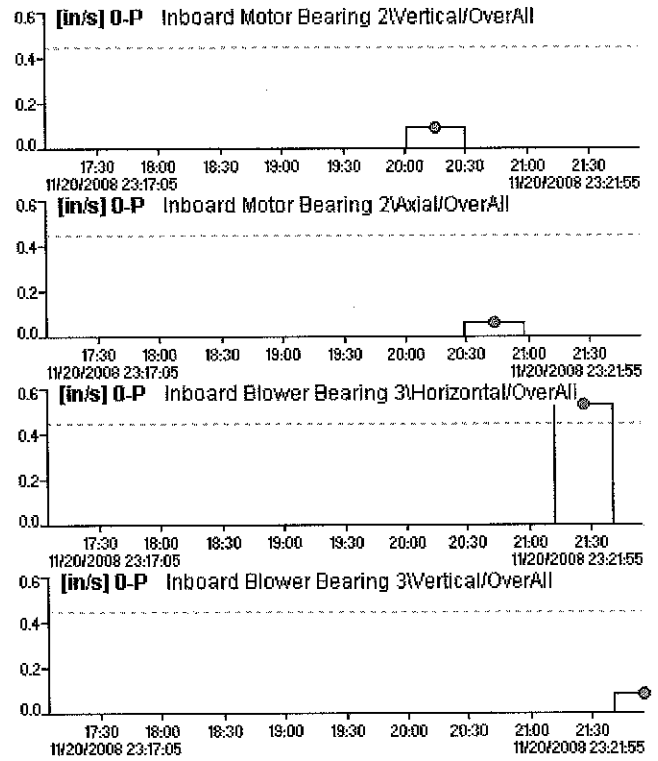
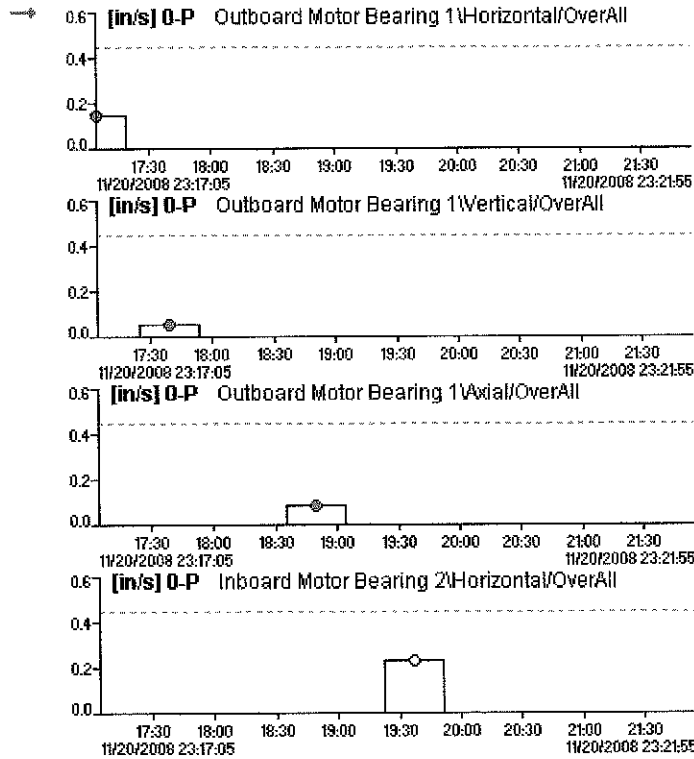
11/20/2008 23:23:59 Velocity OverAll [in/s] **0.11**

Measurement Place: **Outboard Blower Bearing 4/Axial**

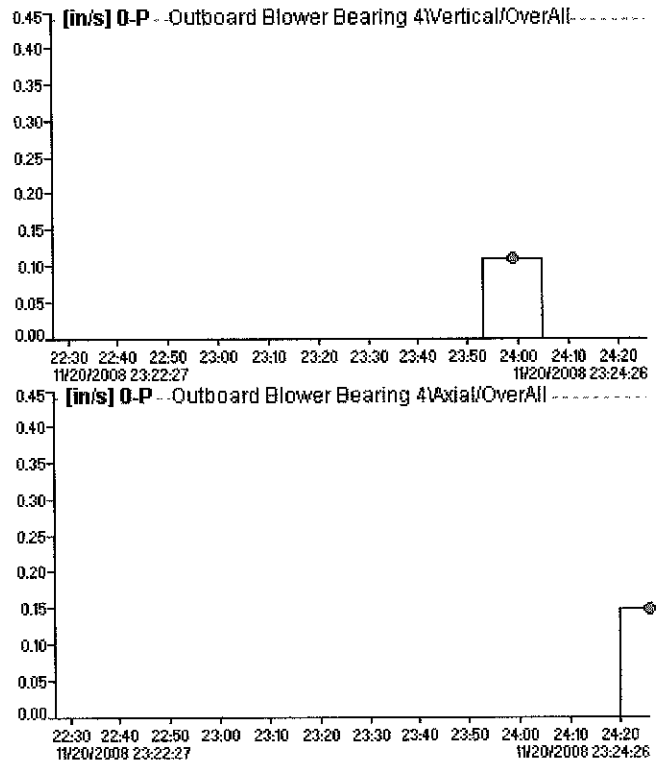
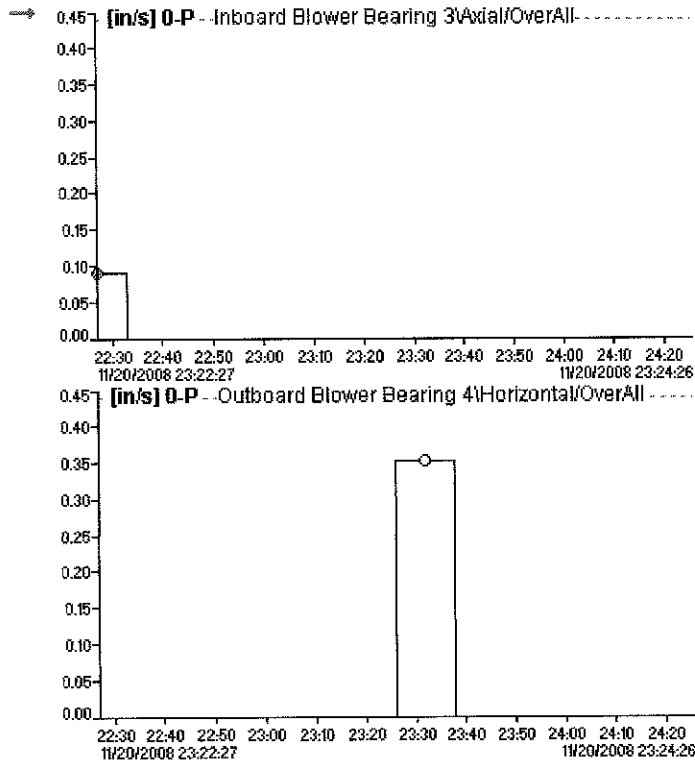
11/20/2008 23:24:26 Velocity OverAll [in/s] **0.15**

Overall Spectrum with Tolerances

Blower N2

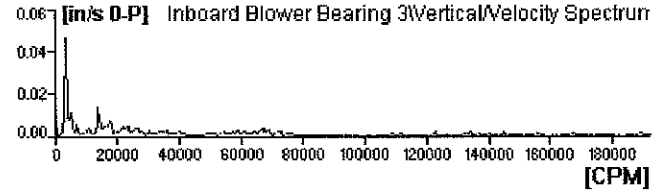
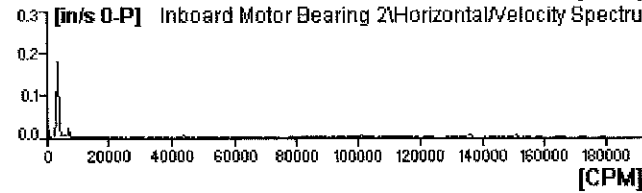
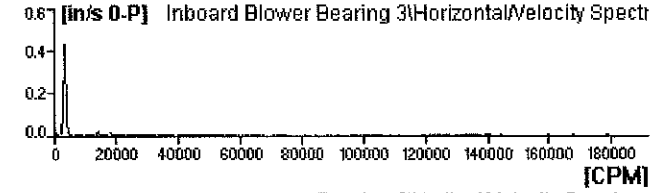
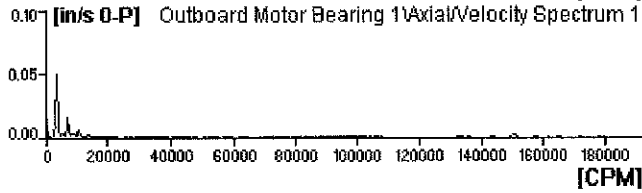
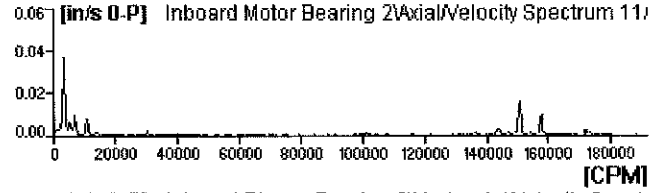
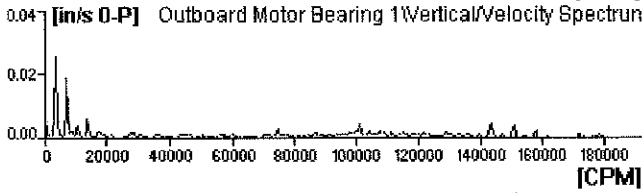
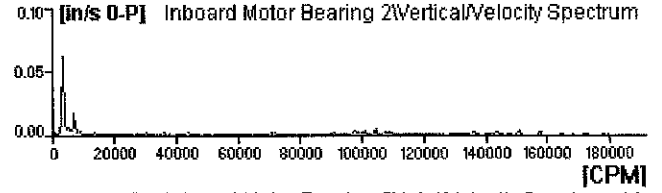
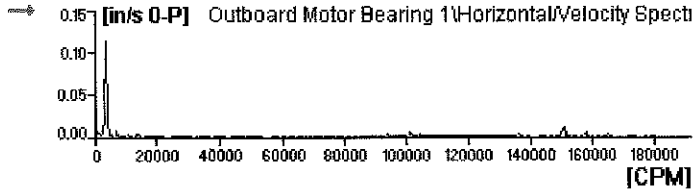


Blower N2

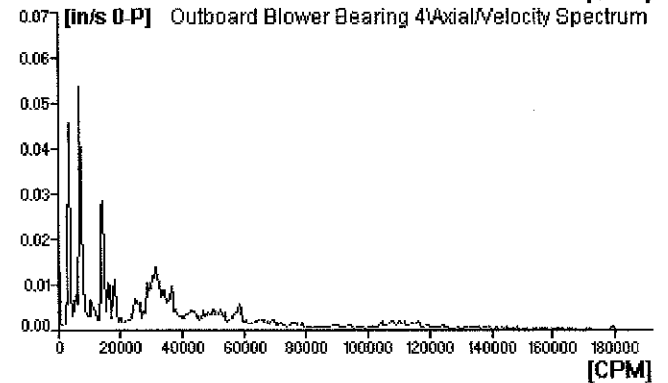
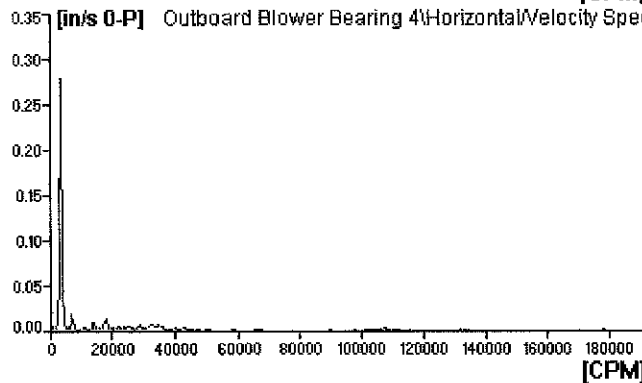
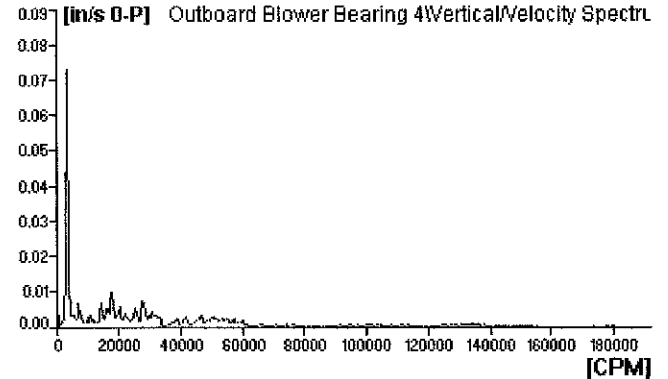
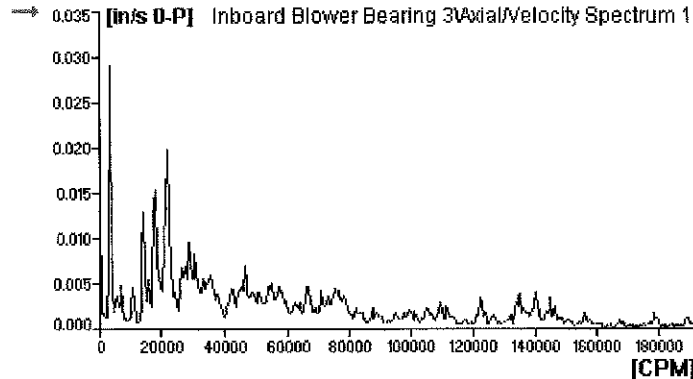


Velocity Spectrum

Blower N2

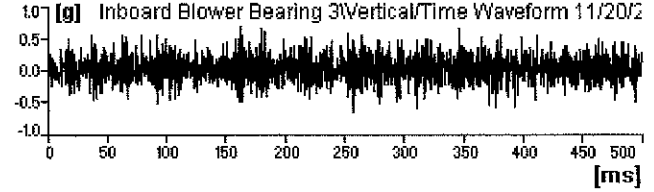
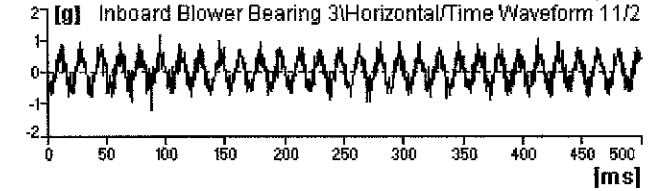
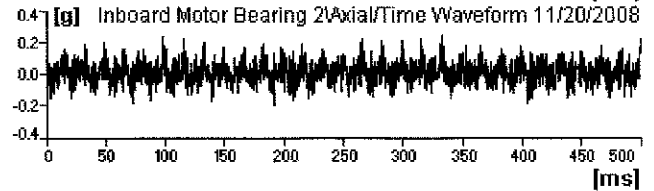
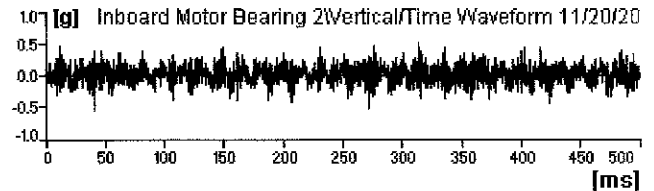
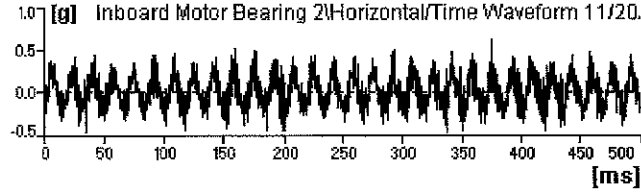
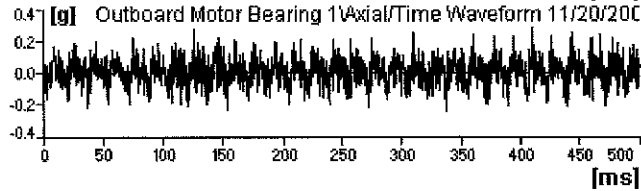
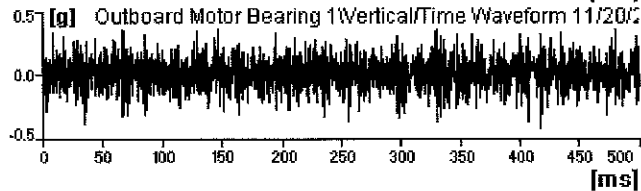
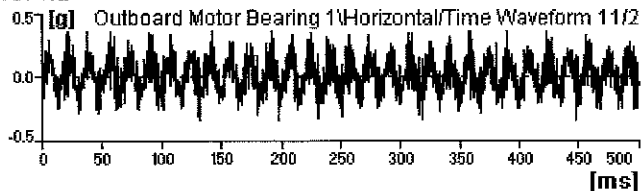


Blower N2

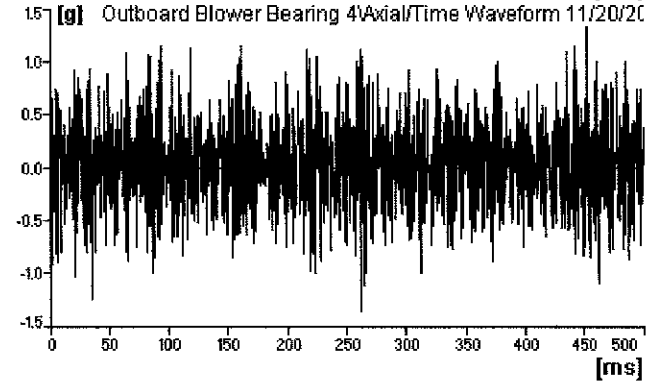
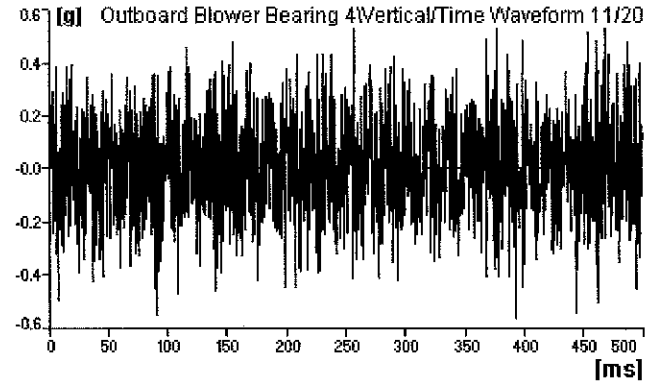
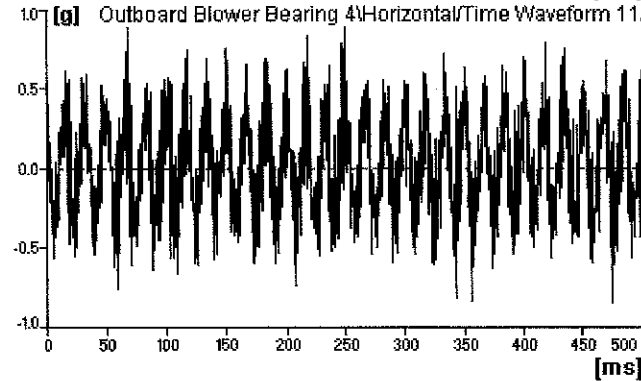
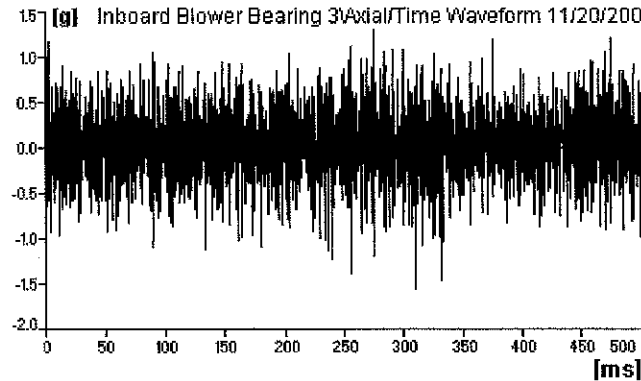


Time Wave Form

Blower N2



Blower N2



Special Notes on Blower N2:

Warning List

Machine: Largo Plant Blowers/North Blower Room/Blower N2

Measurement Place: Inboard Motor Bearing 2/Horizontal

OverAll 11/20/2008 23:19:37 **0.230** [in/s] **Warning Confirmed**

Measurement Place: Inboard Blower Bearing 3/Horizontal

OverAll 11/20/2008 23:21:26 **0.529** [in/s] **Alarm Confirmed**

Measurement Place: Outboard Blower Bearing 4/Horizontal

OverAll 11/20/2008 23:23:32 **0.352** [in/s] **Warning Confirmed**

Note

Mechanical Seal is leaking air outboard. **(Recommendation – Replace seals)**

The Flex coupler is leaking on the Discharge Piping. **(Recommendation –Tighten flange or Replace unit,)**

Inboard Blower Bearing, Outboard Blower Bearing and Inboard Motor Bearing 2/Horizontal is in Warning (Alignment is bad as seen in the AXIAL alignment wave form, Bearing life is going away) **(Recommendation – Align Motor to Blower immediately – Replace Blower Bearings and Motor Bearings)**

Model# -75106A1 / Serial#POO4875

Machine: Largo Plant Blowers/North Blower Room/Blower N3

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/20/2008 23:52:01 Velocity OverAll [in/s] **0.15**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/20/2008 23:52:38 Velocity OverAll [in/s] **0.11**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/20/2008 23:53:09 Velocity OverAll [in/s] **0.08**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/20/2008 23:53:56 Velocity OverAll [in/s] **0.14**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/20/2008 23:54:30 Velocity OverAll [in/s] **0.07**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/20/2008 23:54:56 Velocity OverAll [in/s] **0.10**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/20/2008 23:55:28 Velocity OverAll [in/s] **0.36/w**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/20/2008 23:55:57 Velocity OverAll [in/s] **0.05**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/20/2008 23:58:03 Velocity OverAll [in/s] **0.15**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/20/2008 23:58:35 Velocity OverAll [in/s] **0.23/w**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

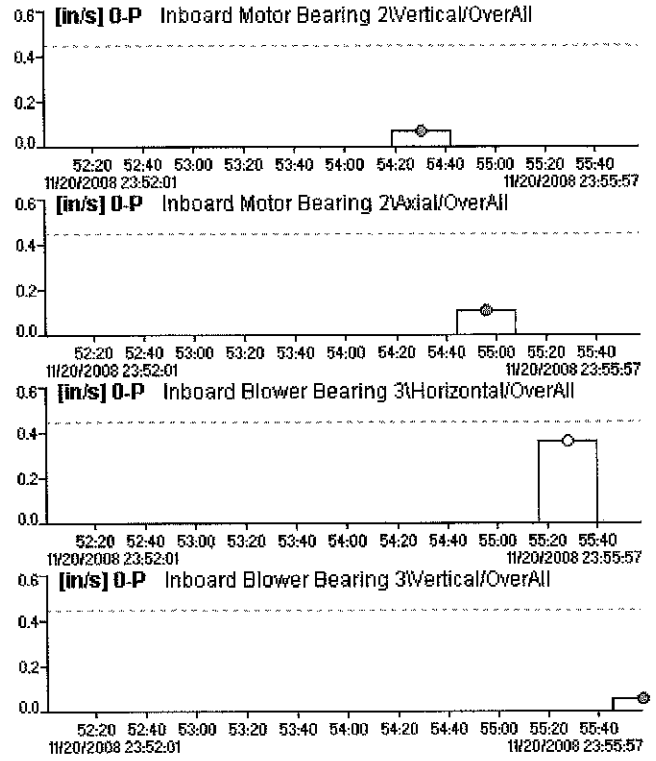
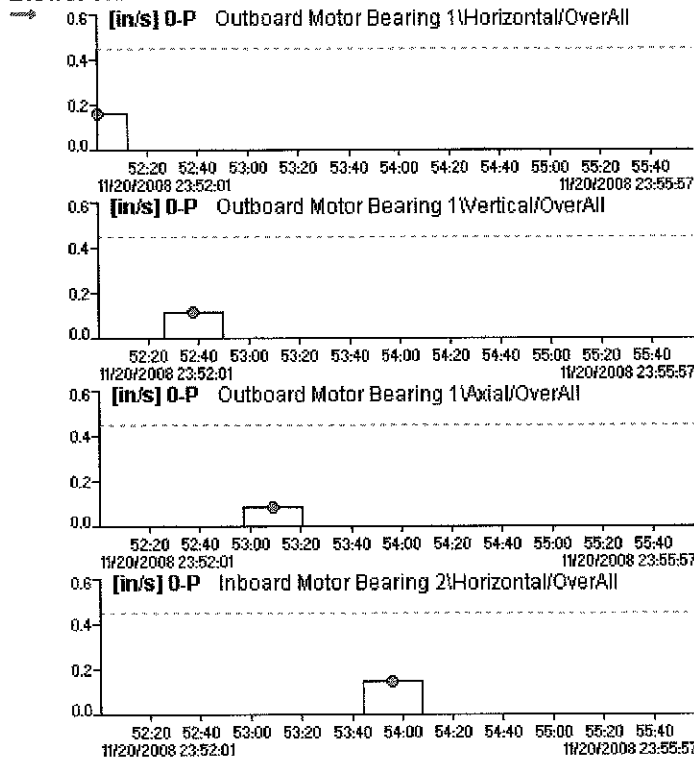
11/20/2008 23:59:10 Velocity OverAll [in/s] **0.16**

Measurement Place: **Outboard Blower Bearing 4/Axial**

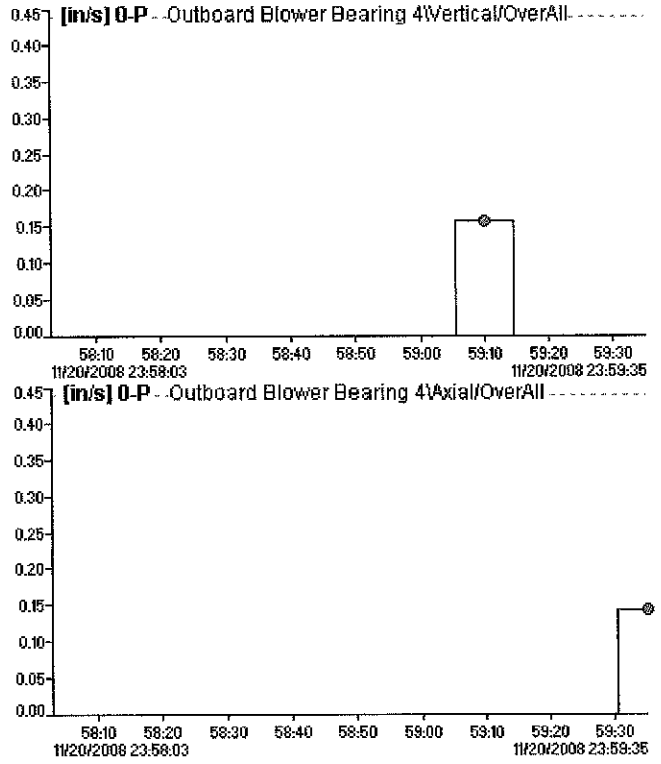
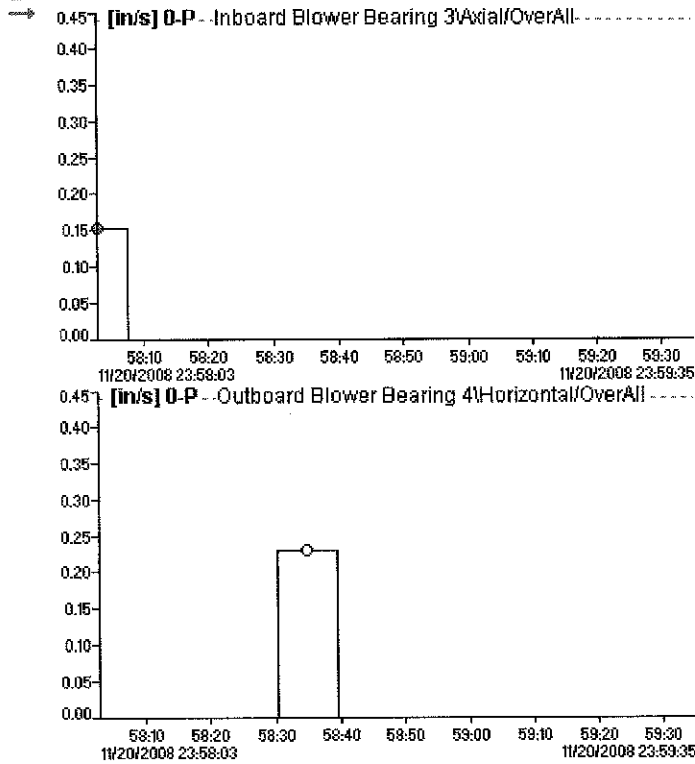
11/20/2008 23:59:35 Velocity OverAll [in/s] **0.14**

Overall Spectrum with Tolerances

Blower N3

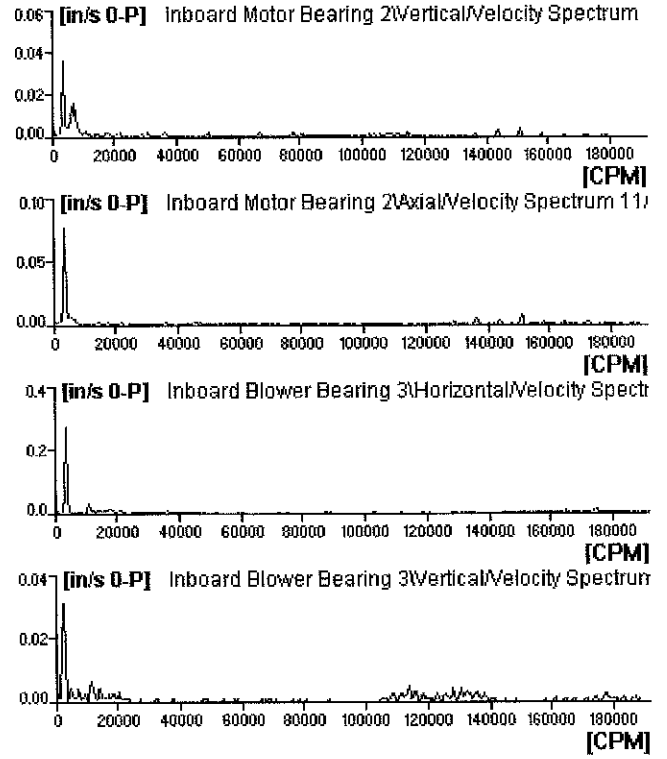
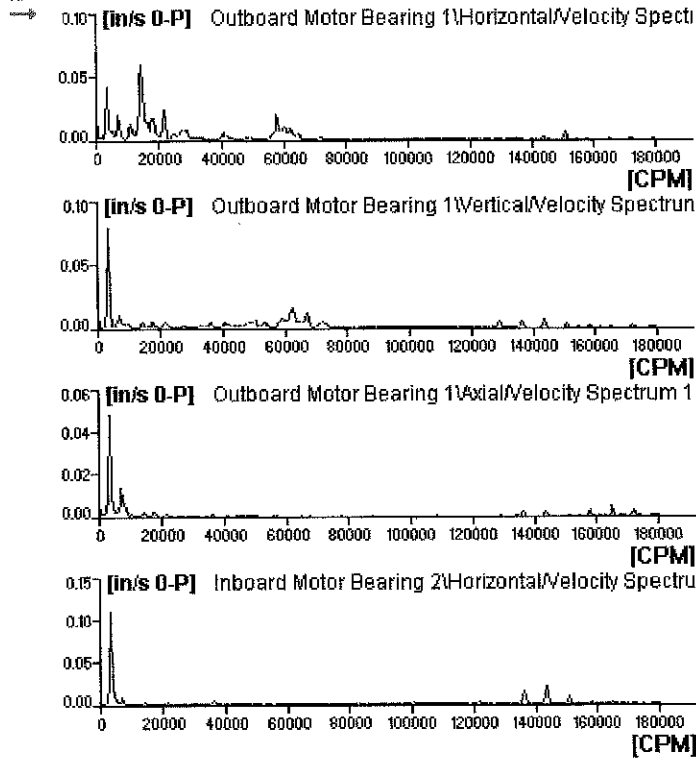


Blower N3

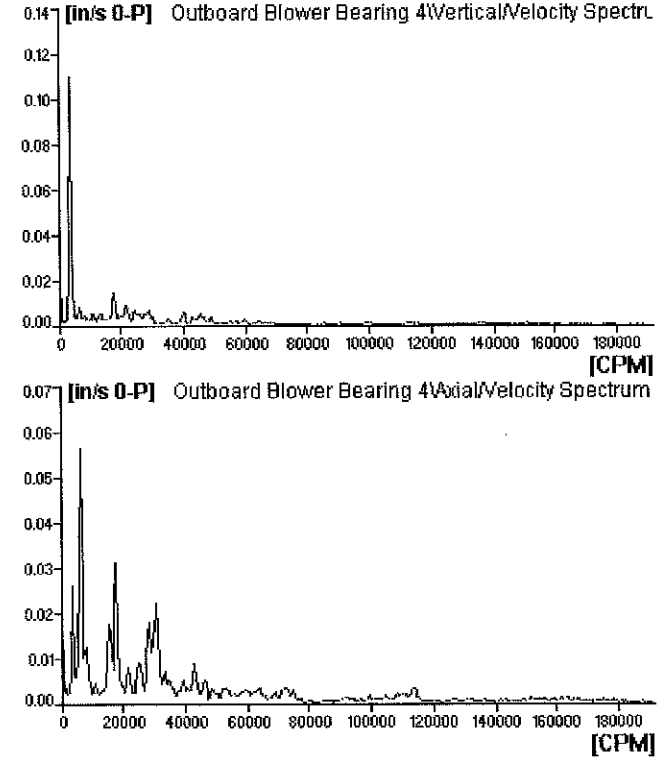
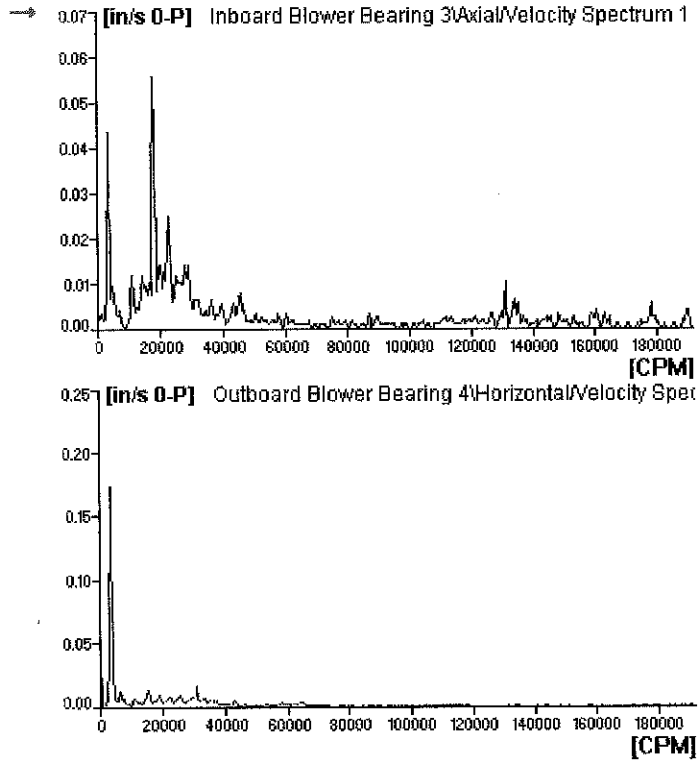


Velocity Spectrum

Blower N3

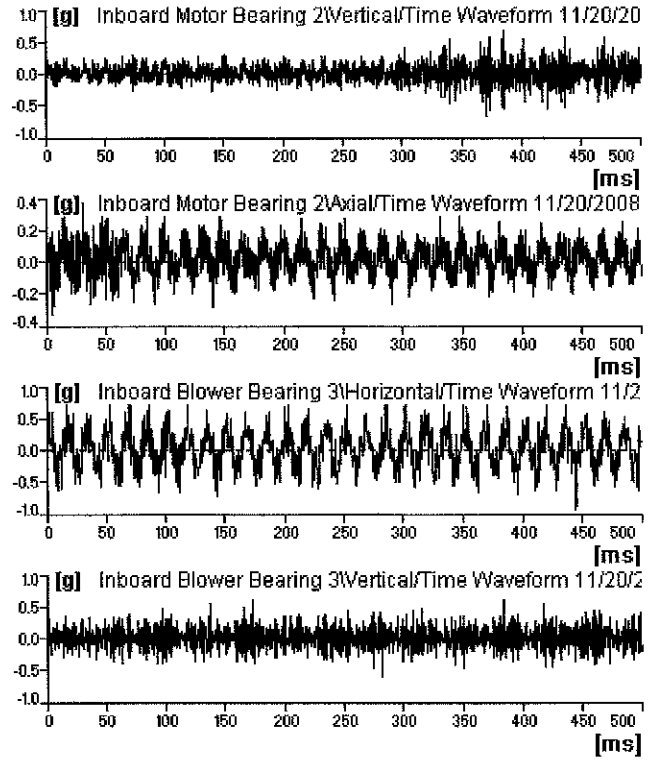
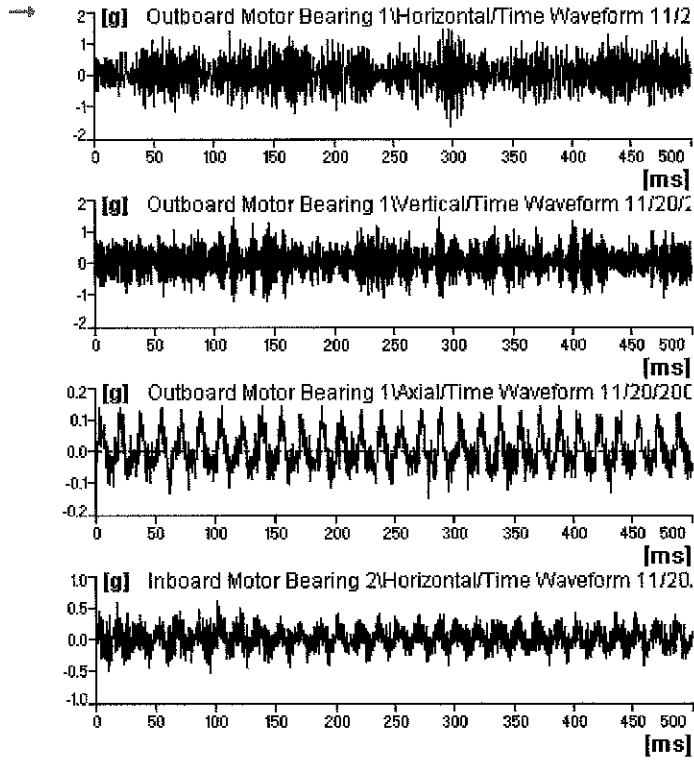


Blower N3

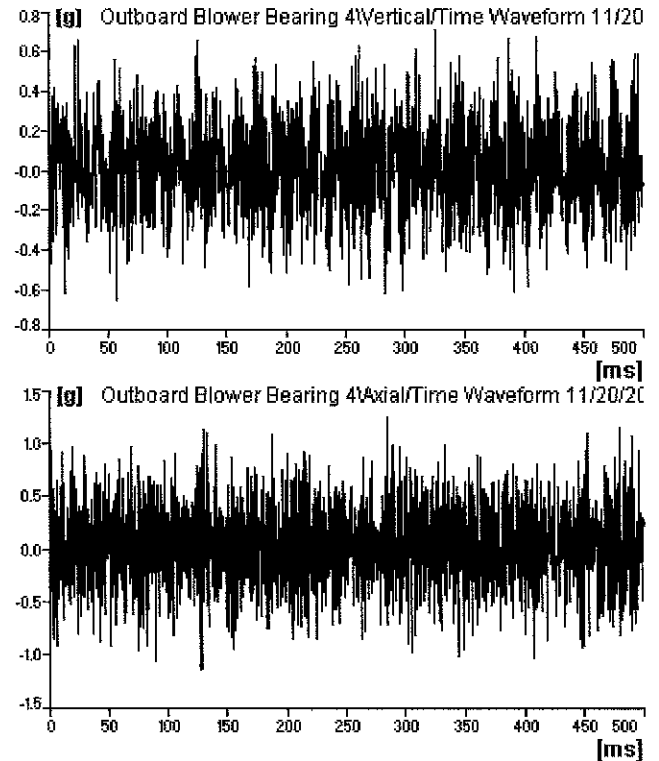
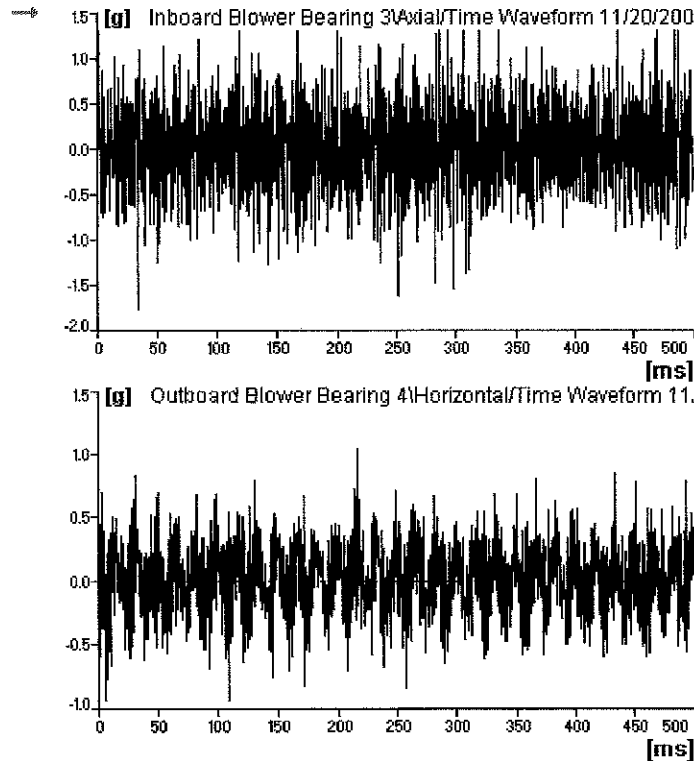


Time Wave Form

Blower N3



Blower N3



Special Notes on Blower N3:

Warning List

Machine: Largo Plant Blowers/North Blower Room/Blower N3

Measurement Place: Inboard Blower Bearing 3/Horizontal

OverAll 11/20/2008 23:55:28 **0.360** [in/s] **Warning Confirmed**

Measurement Place: Outboard Blower Bearing 4/Horizontal

OverAll 11/20/2008 23:58:35 **0.231** [in/s] **Warning Confirmed**

Note

Mechanical Seal is leaking air inboard. **(Recommendation – Replace seals)**

Blower Bearing Housings (both) are leaking Oil **(Recommendation – Replace & Rebuild Both Bearings on Blower)**

Model# -75106A1 / Serial#MO74460

Machine: Largo Plant Blowers/Central Blower Room/Blower C1

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/20/2008 23:29:31 Velocity OverAll [in/s] **0.09**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/20/2008 23:30:05 Velocity OverAll [in/s] **0.05**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/20/2008 23:30:37 Velocity OverAll [in/s] **0.04**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/20/2008 23:31:25 Velocity OverAll [in/s] **0.09**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/20/2008 23:32:06 Velocity OverAll [in/s] **0.05**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/20/2008 23:32:37 Velocity OverAll [in/s] **0.05**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/20/2008 23:33:34 Velocity OverAll [in/s] **0.26/w**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/20/2008 23:34:14 Velocity OverAll [in/s] **0.09**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/20/2008 23:35:29 Velocity OverAll [in/s] **0.11**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/20/2008 23:36:30 Velocity OverAll [in/s] **0.18**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

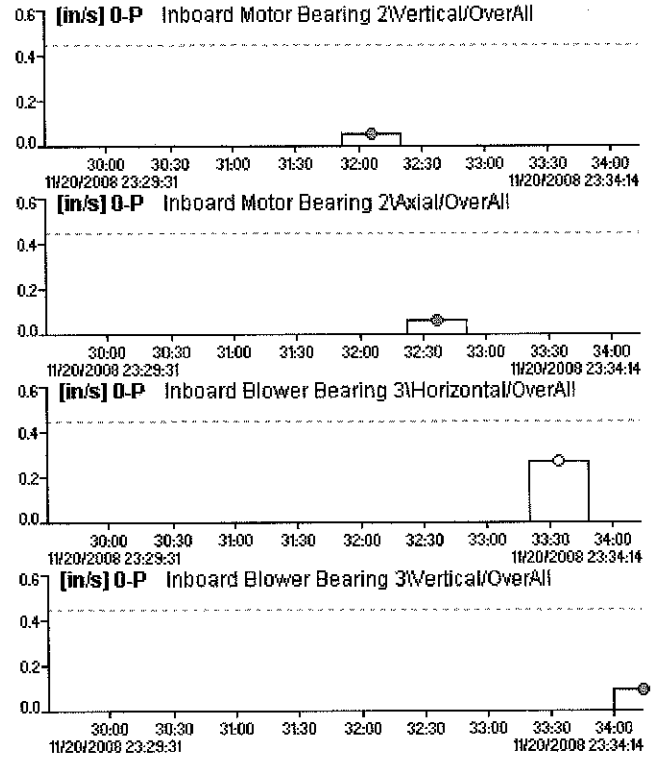
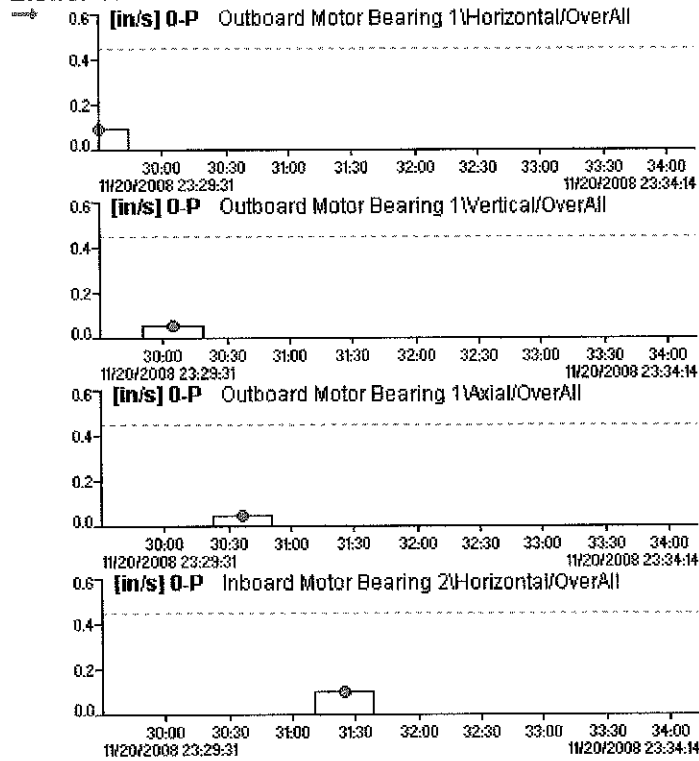
11/20/2008 23:37:05 Velocity OverAll [in/s] **0.08**

Measurement Place: **Outboard Blower Bearing 4/Axial**

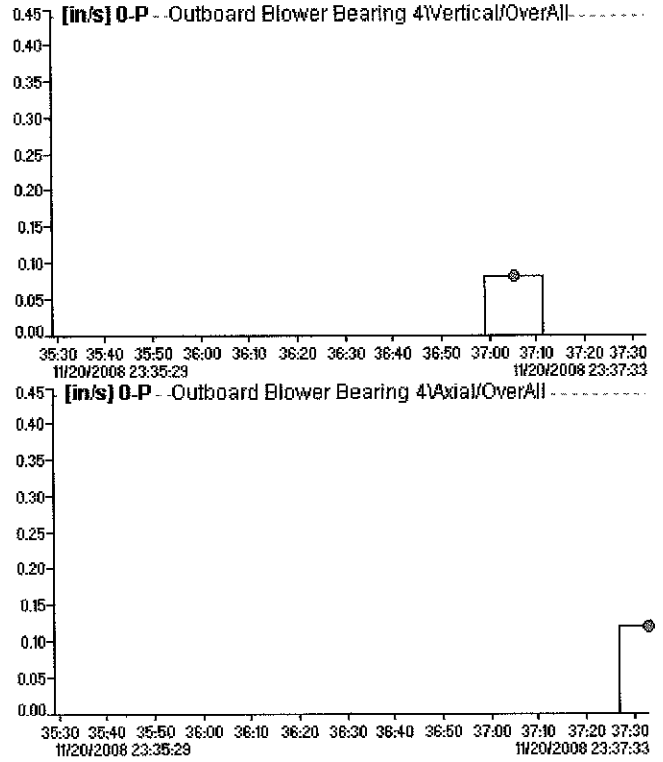
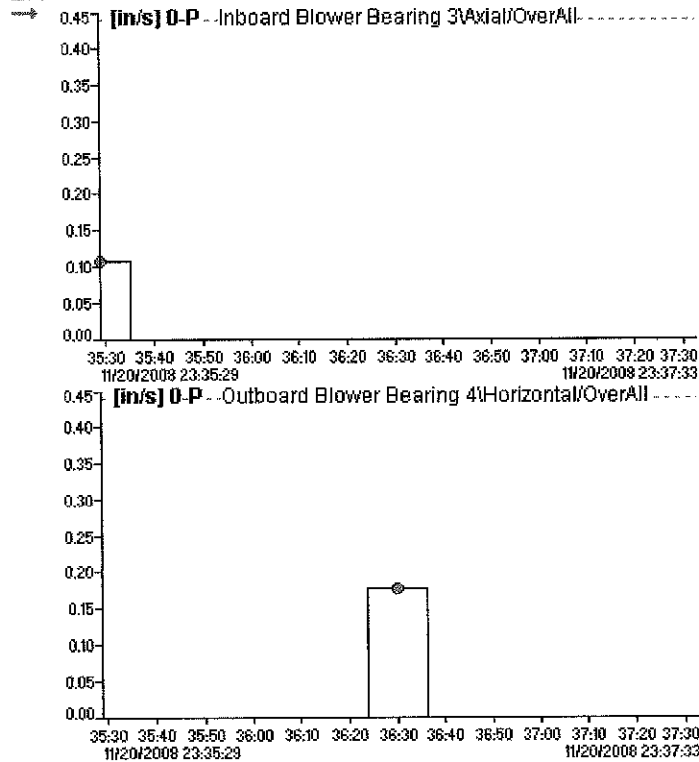
11/20/2008 23:37:33 Velocity OverAll [in/s] **0.12**

Overall Spectrum with Tolerances

Blower C1

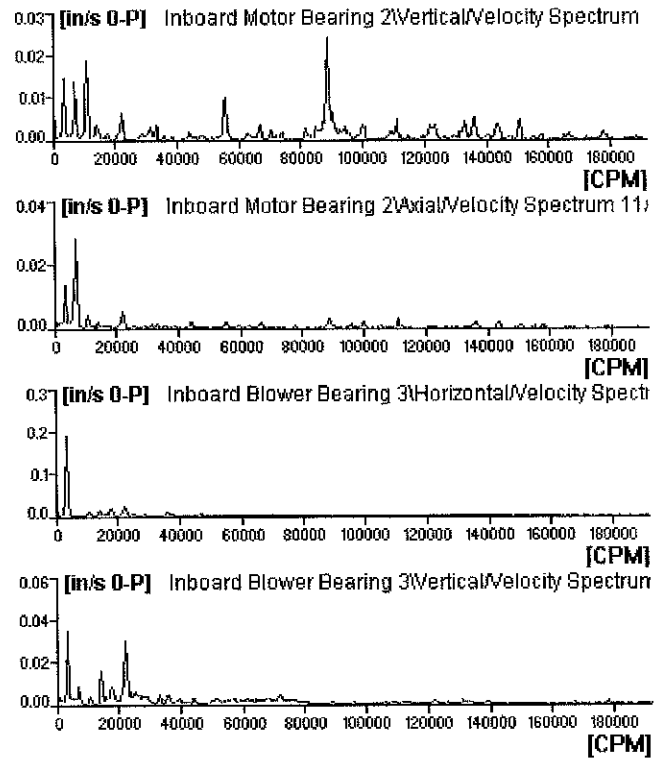
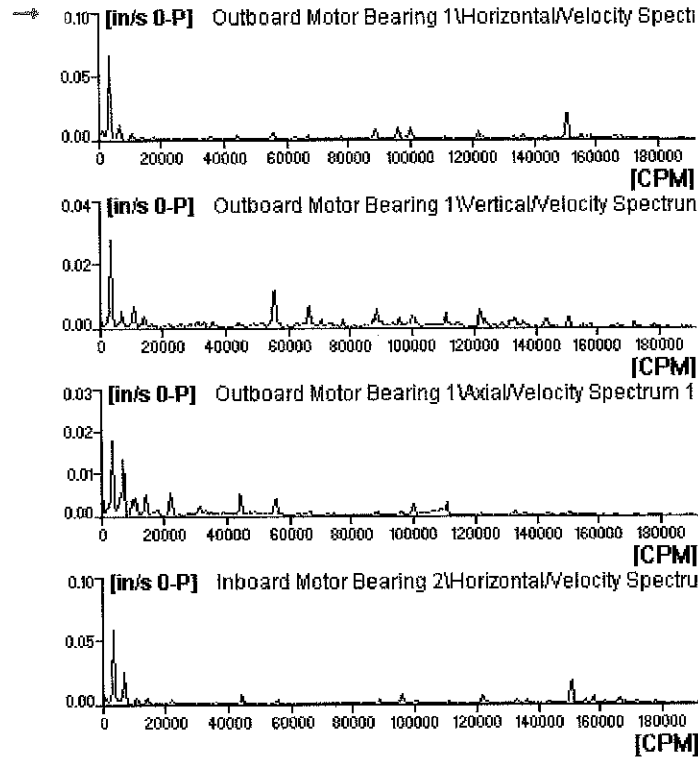


Blower C1

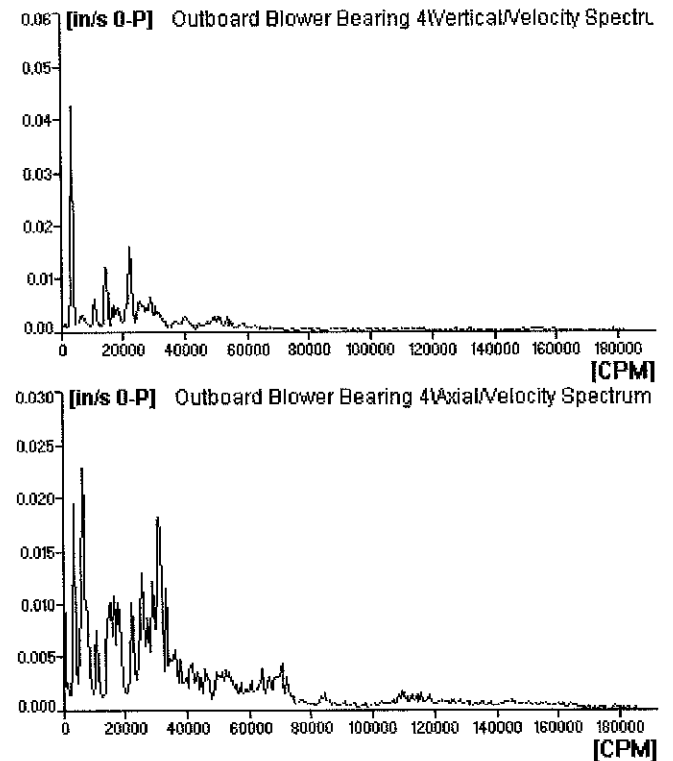
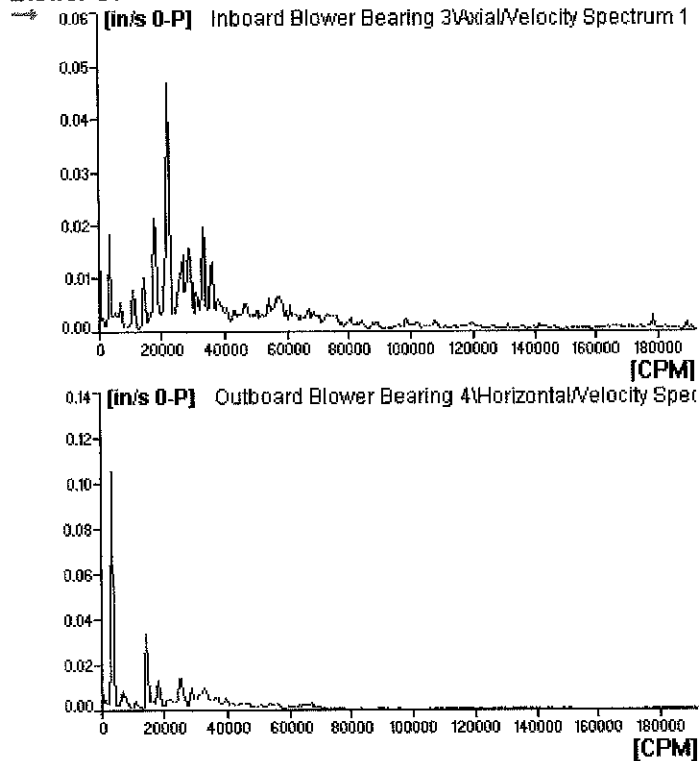


Velocity Spectrum

Blower C1

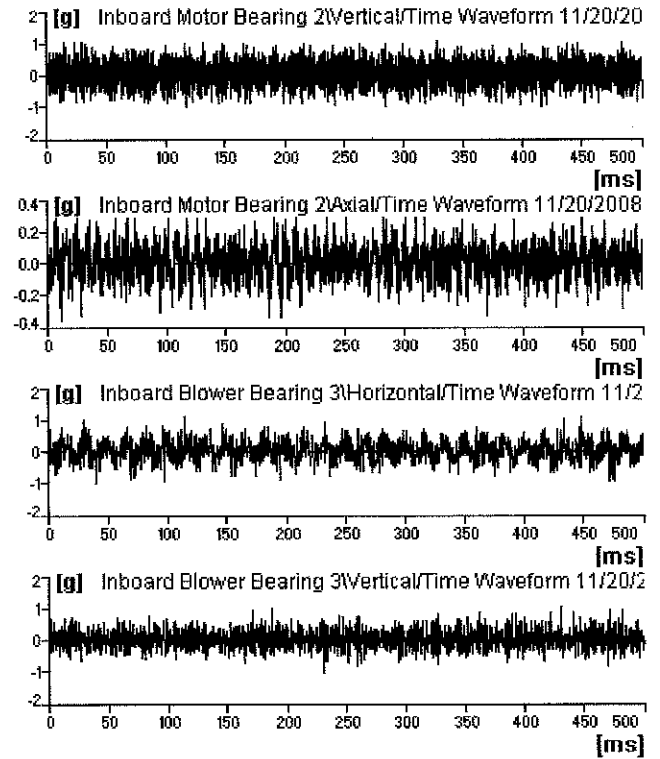
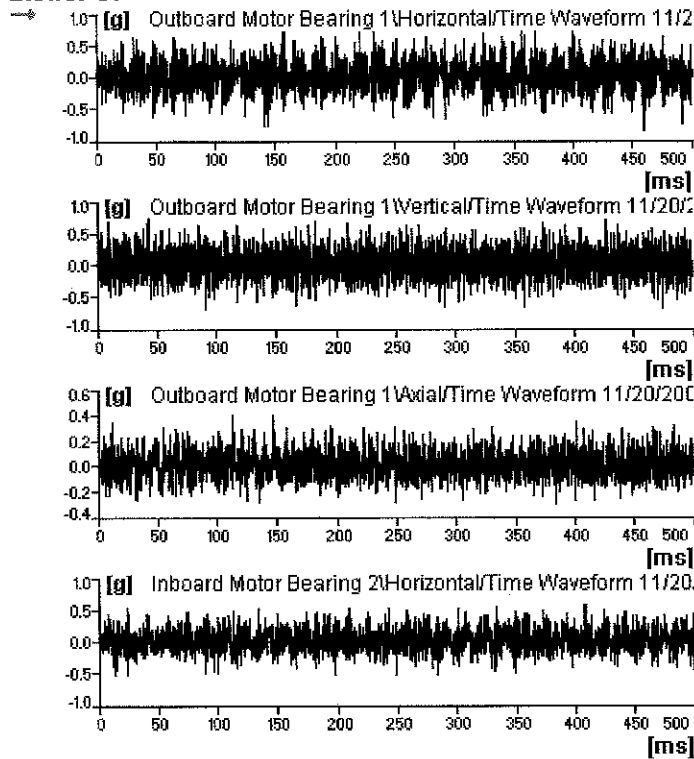


Blower C1

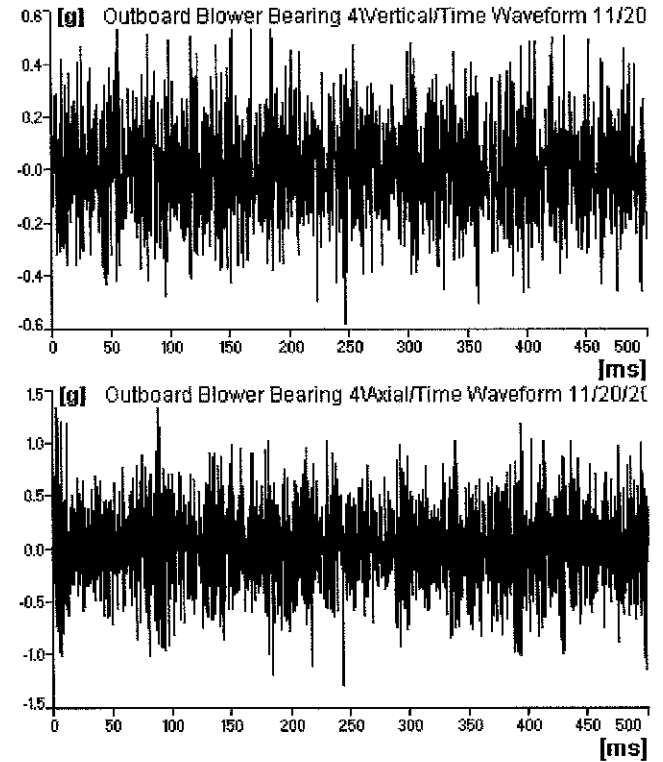
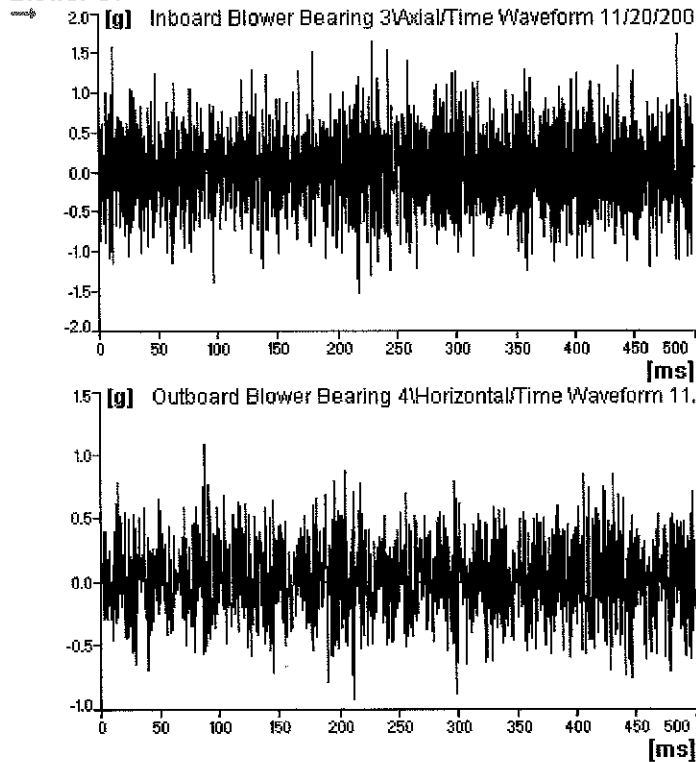


Time Wave Form

Blower C1



Blower C1



Special Notes on Blower C1:

Warning List

Machine: Largo Plant Blowers/Central Blower Room/Blower C1

Measurement Place: Inboard Blower Bearing 3/Horizontal

OverAll 11/20/2008 23:33:34 **0.263** [in/s] **Warning Confirmed**

Note

Mechanical Seal is leaking air outboard. (**Recommendation – Replace seals**)

The Flex coupler is leaking on the Discharge Piping. (**Recommendation –Tighten flange or Replace unit,)**

Inboard Blower Bearing Horizontal is in Warning (Alignment is bad. The Growth Alignment is off when the blower heats up (**Recommendation – Align Motor to Blower immediately**

Model# -75106A1 / Serial#POO4878

Machine: Largo Plant Blowers/Central Blower Room/Blower C2

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/21/2008 0:04:58 Velocity OverAll [in/s] **0.30/w**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/21/2008 0:05:25 Velocity OverAll [in/s] **0.10**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/21/2008 0:05:55 Velocity OverAll [in/s] **0.35/w**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/21/2008 0:06:28 Velocity OverAll [in/s] **0.30/w**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/21/2008 0:07:00 Velocity OverAll [in/s] **0.20/w**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/21/2008 0:07:30 Velocity OverAll [in/s] **0.20/w**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/21/2008 0:08:52 Velocity OverAll [in/s] **0.78/s**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/21/2008 0:09:23 Velocity OverAll [in/s] **0.13**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/21/2008 0:09:51 Velocity OverAll [in/s] **0.20/w**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/21/2008 0:10:24 Velocity OverAll [in/s] **0.50/s**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

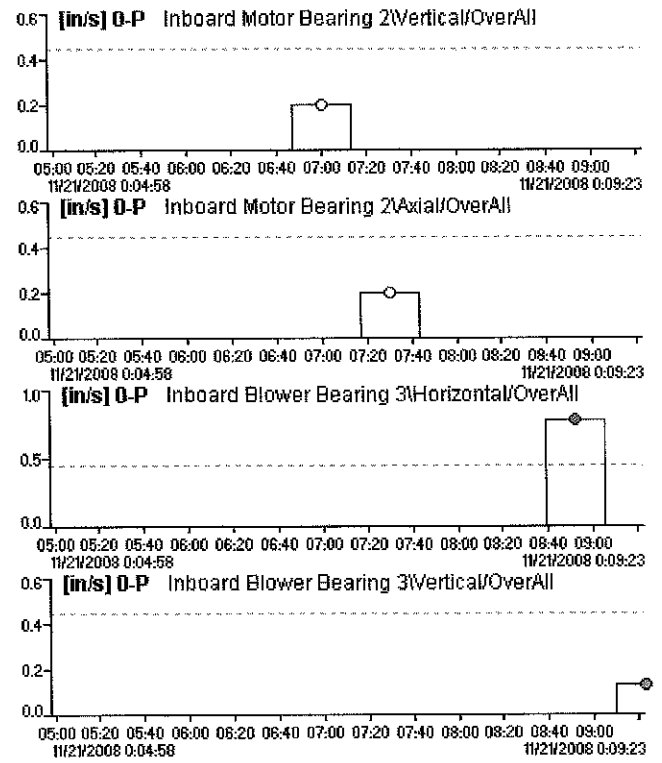
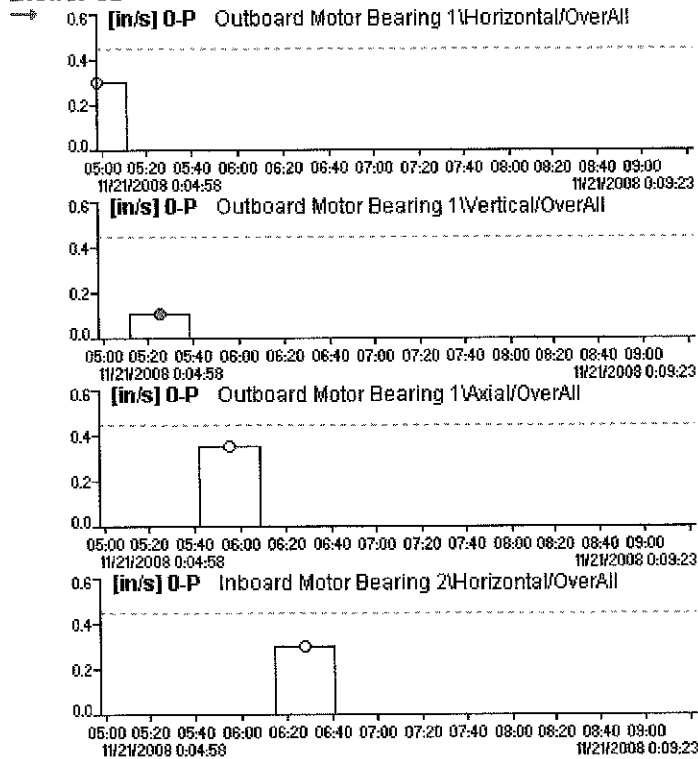
11/21/2008 0:10:53 Velocity OverAll [in/s] **0.09**

Measurement Place: **Outboard Blower Bearing 4/Axial**

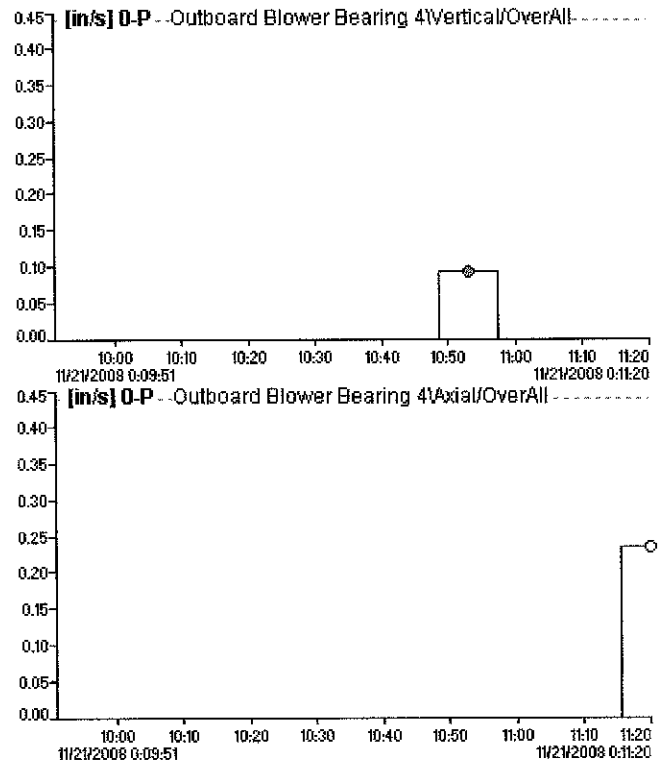
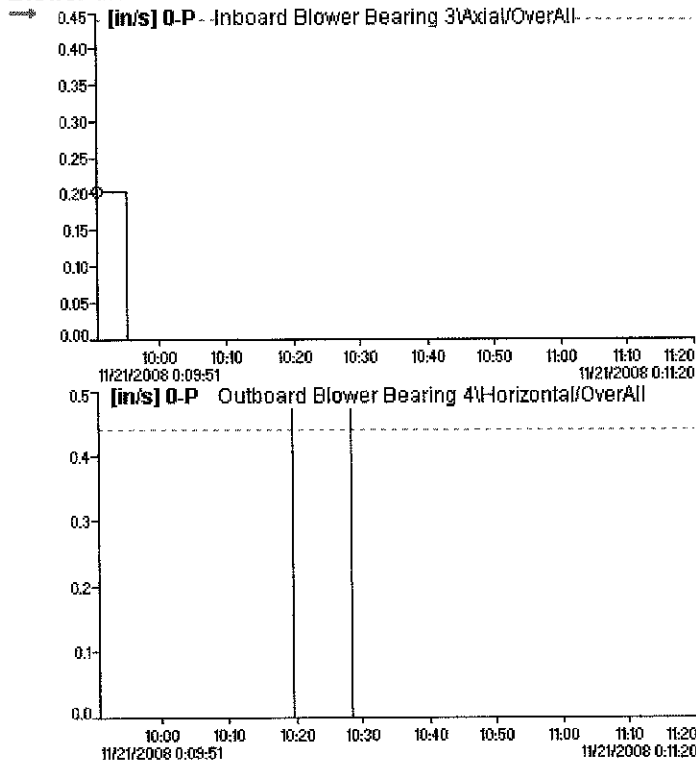
11/21/2008 0:11:20 Velocity OverAll [in/s] **0.23/w**

Overall Spectrum with Tolerances

Blower C2

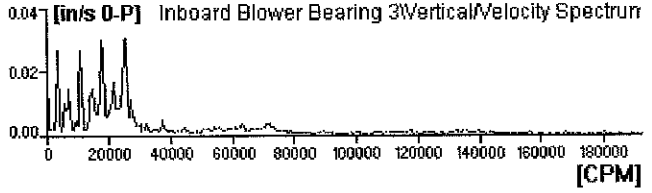
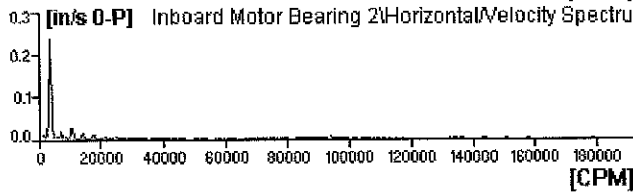
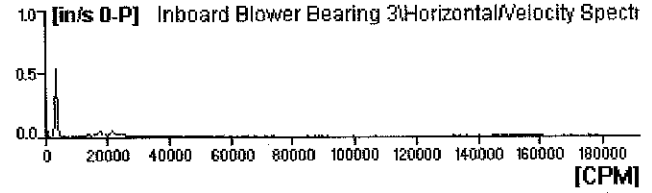
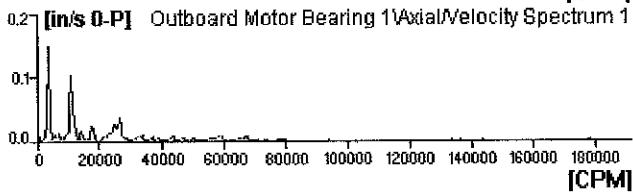
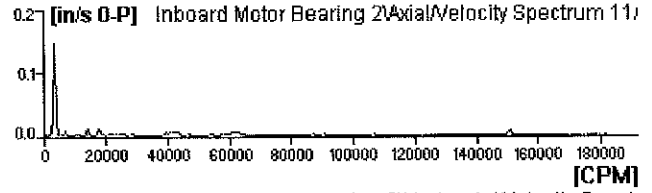
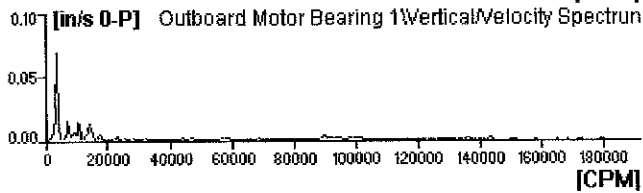
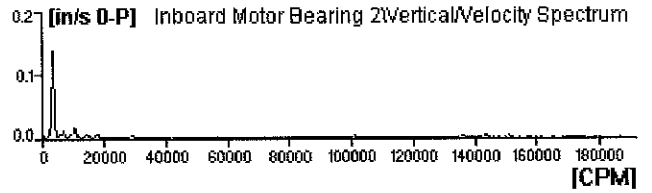
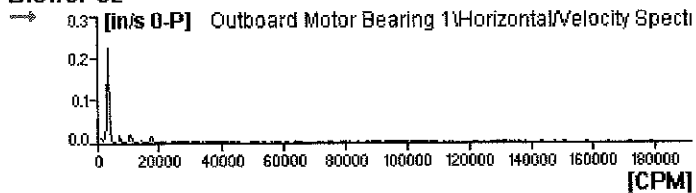


Blower C2

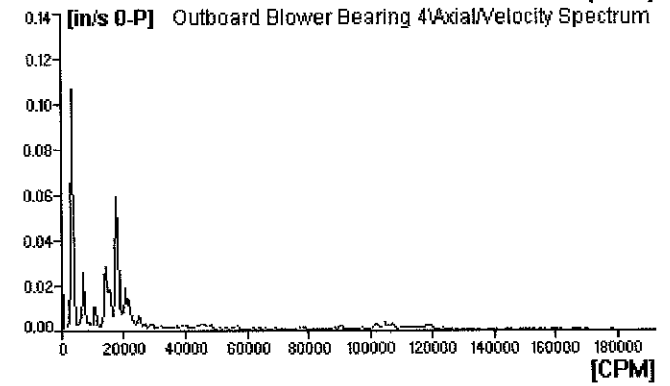
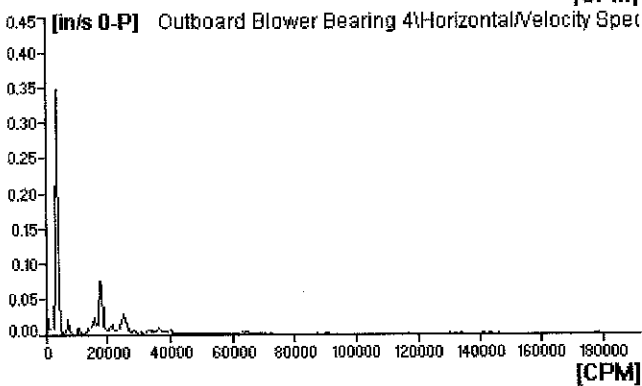
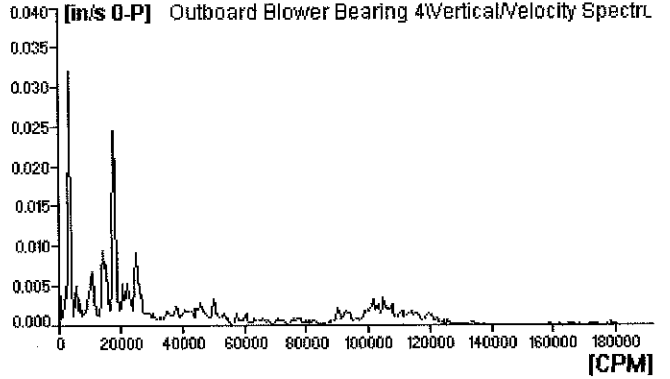
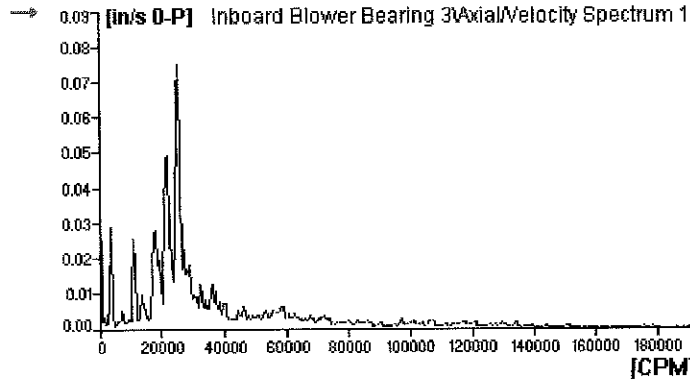


Velocity Spectrum

Blower C2

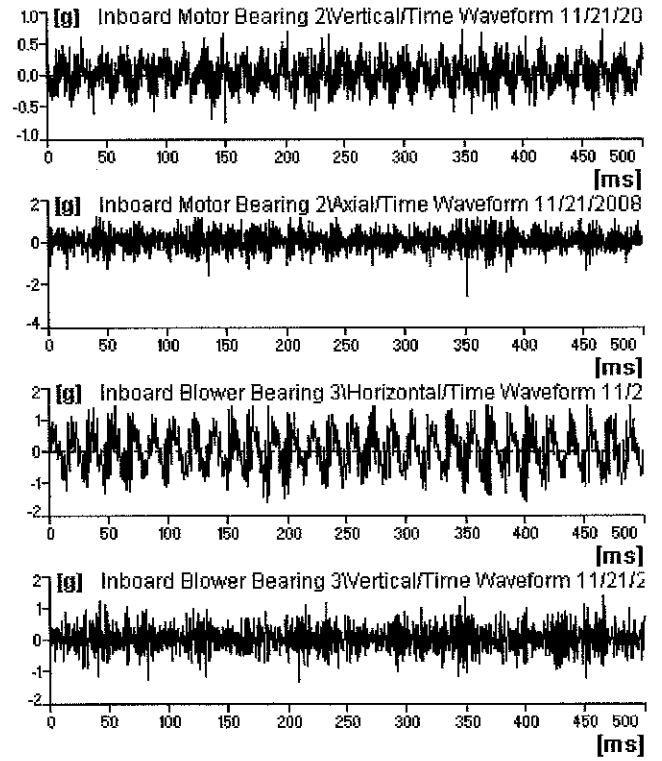
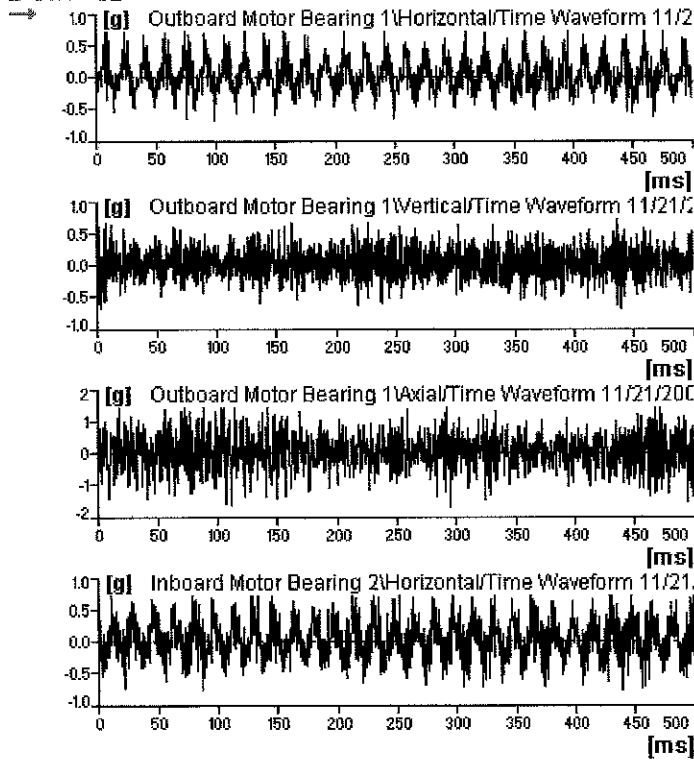


Blower C2

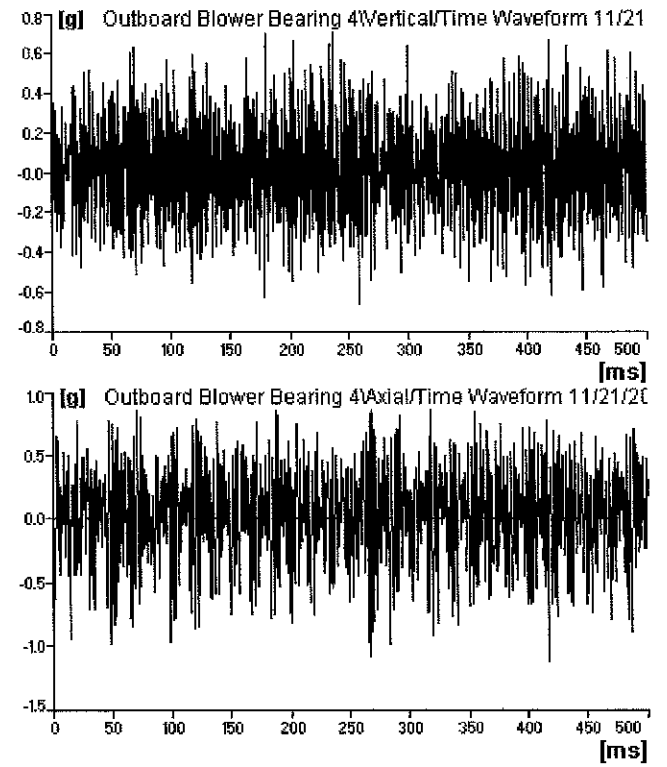
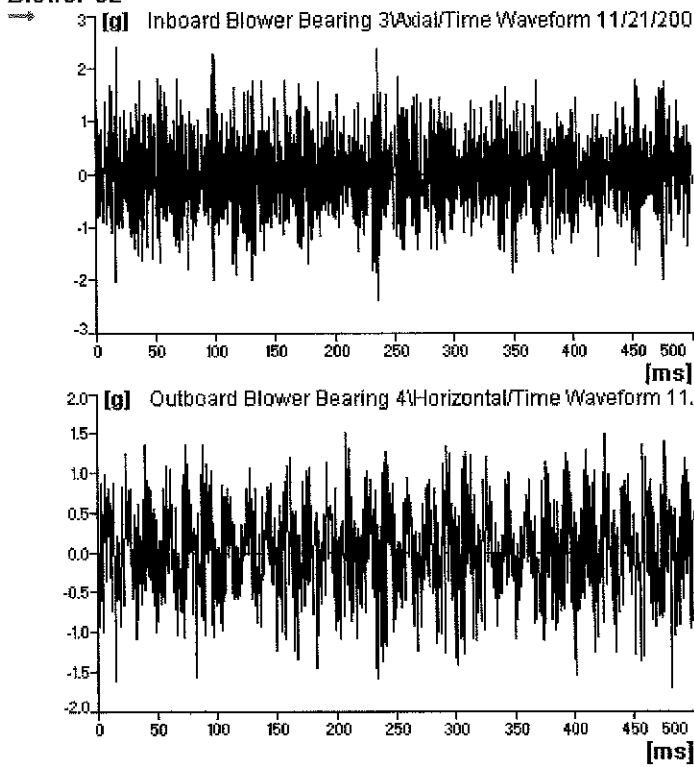


Time Wave Form

Blower C2



Blower C2



Special Notes on Blower C2:

Warning List

Machine: Largo Plant Blowers/Central Blower Room/Blower C2

Measurement Place: Outboard Motor Bearing 1/Horizontal

OverAll 11/21/2008 0:04:58 **0.299** [in/s] **Warning Confirmed**

Measurement Place: Outboard Motor Bearing 1/Axial

OverAll 11/21/2008 0:05:55 **0.347** [in/s] **Warning Confirmed**

Measurement Place: Inboard Motor Bearing 2/Horizontal

OverAll 11/21/2008 0:06:28 **0.297** [in/s] **Warning Confirmed**

Measurement Place: Inboard Motor Bearing 2/Vertical

OverAll 11/21/2008 0:07:00 **0.198** [in/s] **Warning Confirmed**

Measurement Place: Inboard Motor Bearing 2/Axial

OverAll 11/21/2008 0:07:30 **0.199** [in/s] **Warning Confirmed**

Measurement Place: Inboard Blower Bearing 3/Horizontal

OverAll 11/21/2008 0:08:52 **0.781** [in/s] **Alarm Confirmed**

Measurement Place: Inboard Blower Bearing 3/Axial

OverAll 11/21/2008 0:09:51 **0.203** [in/s] **Warning Confirmed**

Measurement Place: Outboard Blower Bearing 4/Horizontal

OverAll 11/21/2008 0:10:24 **0.497** [in/s] **Alarm Confirmed**

Measurement Place: Outboard Blower Bearing 4/Axial

OverAll 11/21/2008 0:11:20 **0.235** [in/s] **Warning Confirmed**

Note

Mechanical Seals are leaking air inboard & outboard. **Outboard Seal is Broken** (Recommendation – Replace seals)

****ALL BEARINGS ARE IN FAILURE MODE! **** (Recommendation – Pull and Perform a Complete Overhaul of Blower!

Rotating Element in need of repair and Balancing!

The coupler is showing signs of wear (Recommendation – Pull and Replace Coupler)

Model# -75106A1 / Serial#POO4873

Machine: Largo Plant Blowers/Central Blower Room/Blower C3

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/21/2008 0:54:43 Velocity OverAll [in/s] **0.13**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/21/2008 0:55:15 Velocity OverAll [in/s] **0.36/w**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/21/2008 0:55:38 Velocity OverAll [in/s] **0.26/w**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/21/2008 0:56:13 Velocity OverAll [in/s] **0.15**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/21/2008 0:56:47 Velocity OverAll [in/s] **0.16**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/21/2008 0:57:56 Velocity OverAll [in/s] **0.22/w**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/21/2008 0:58:30 Velocity OverAll [in/s] **0.22/w**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/21/2008 0:59:04 Velocity OverAll [in/s] **0.10**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/21/2008 0:59:38 Velocity OverAll [in/s] **0.14**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/21/2008 1:00:29 Velocity OverAll [in/s] **0.13**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

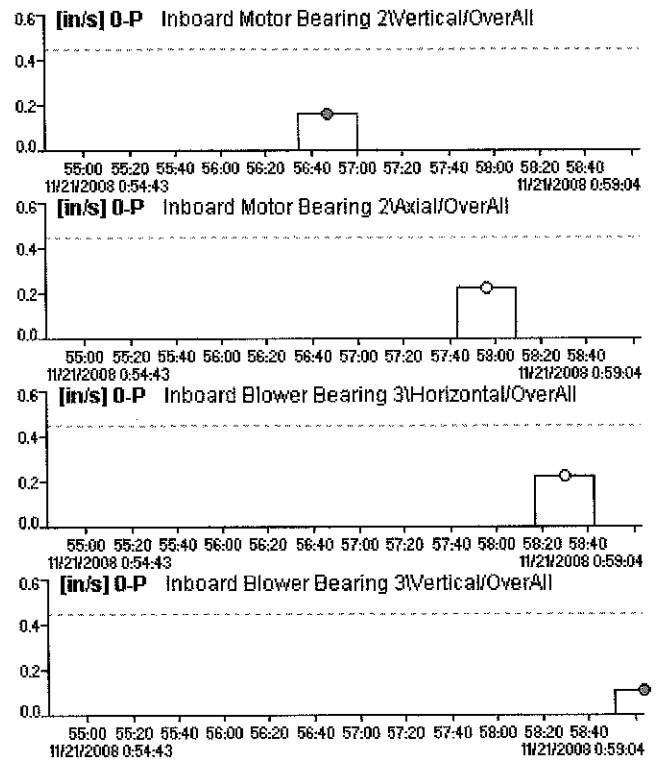
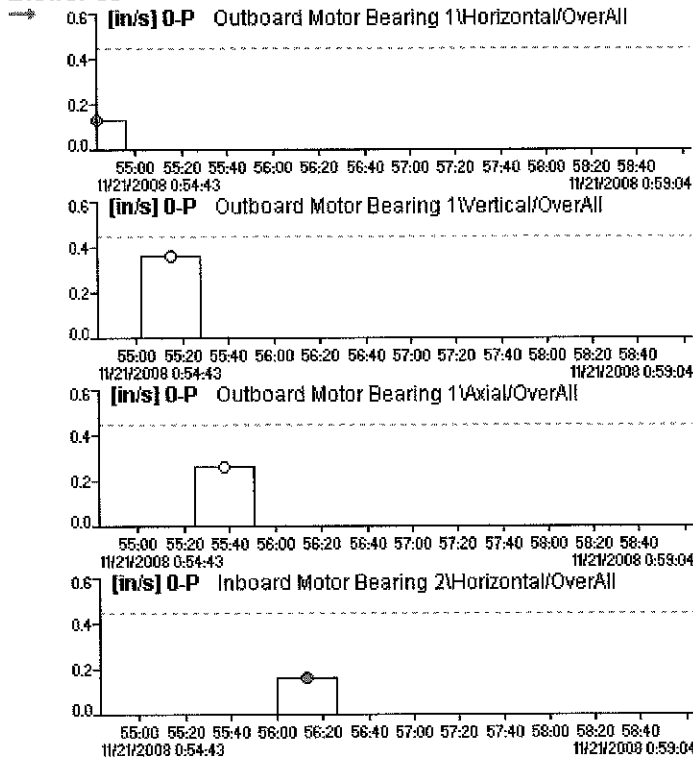
11/21/2008 1:00:58 Velocity OverAll [in/s] **0.17**

Measurement Place: **Outboard Blower Bearing 4/Axial**

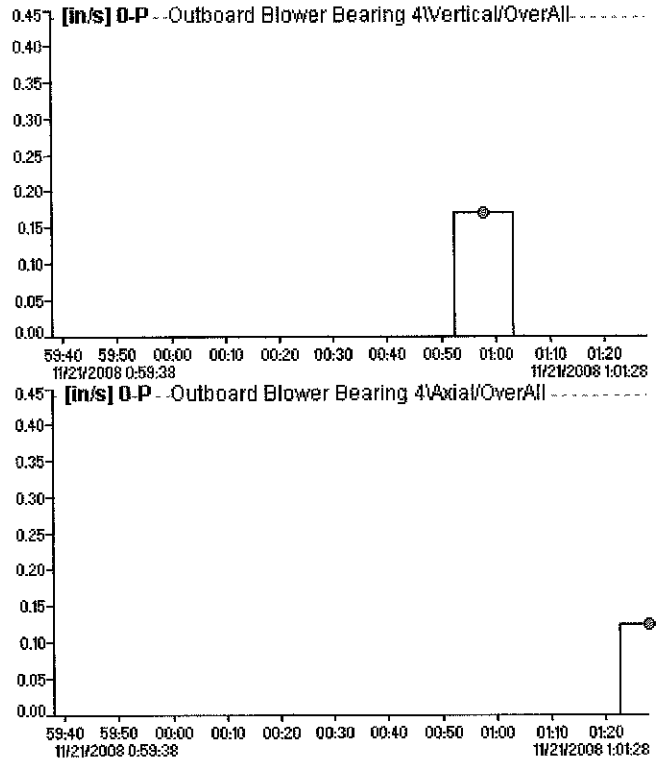
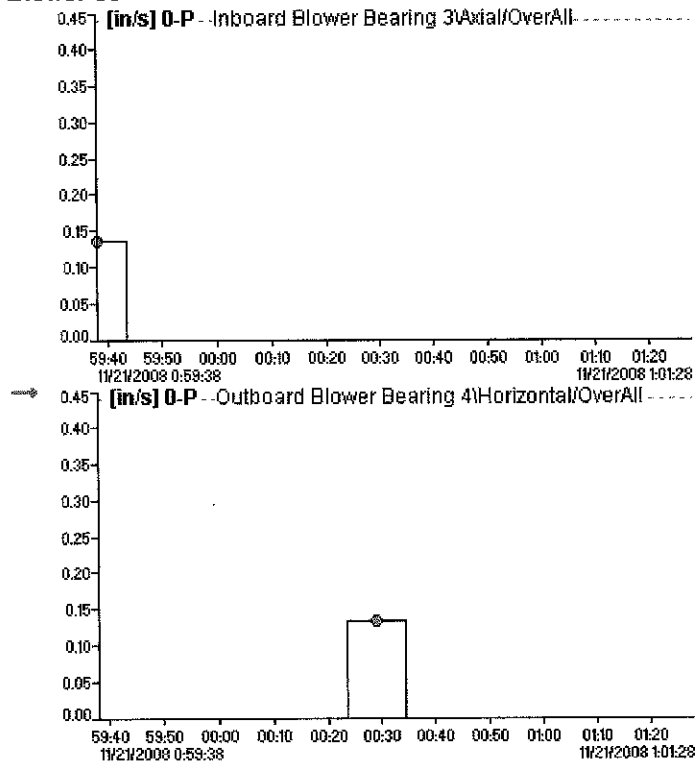
11/21/2008 1:01:28 Velocity OverAll [in/s] **0.12**

Overall Spectrum with Tolerances

Blower C3

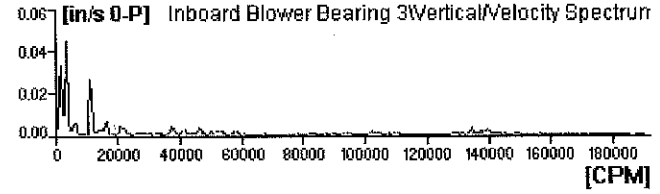
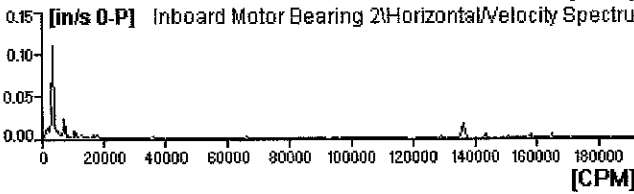
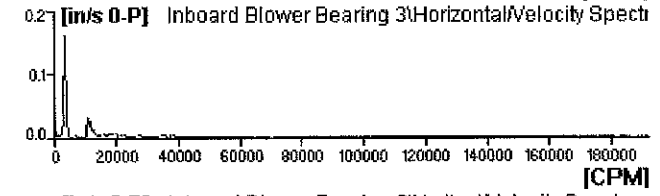
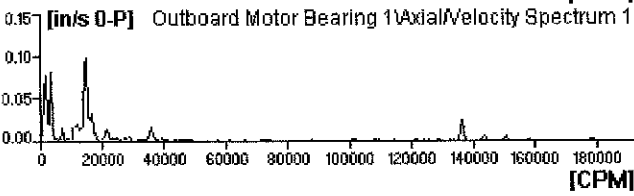
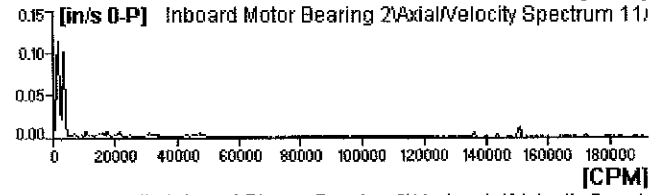
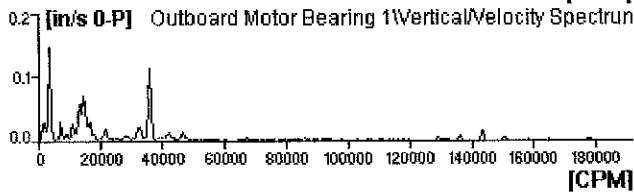
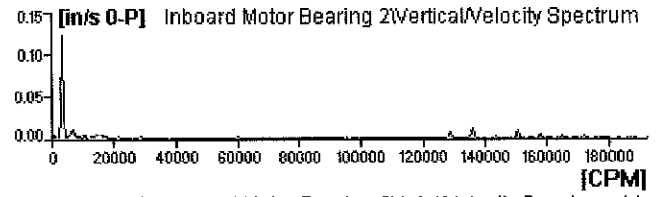
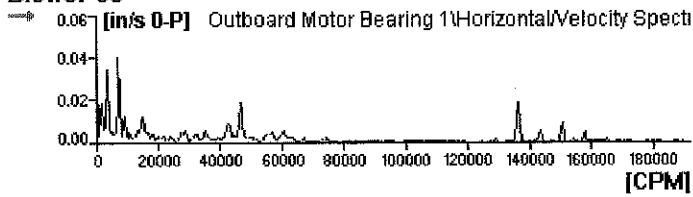


Blower C3

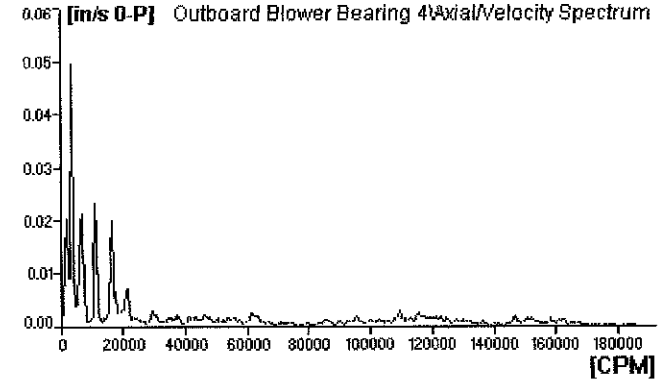
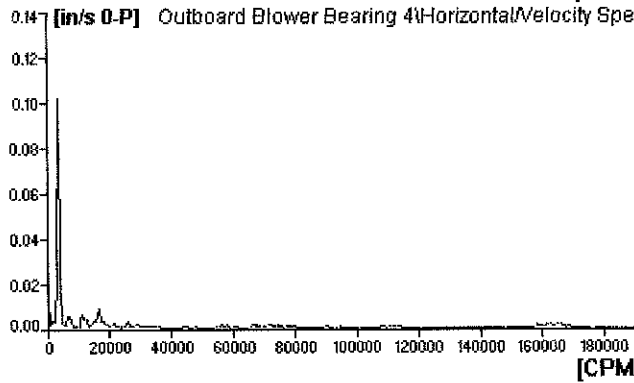
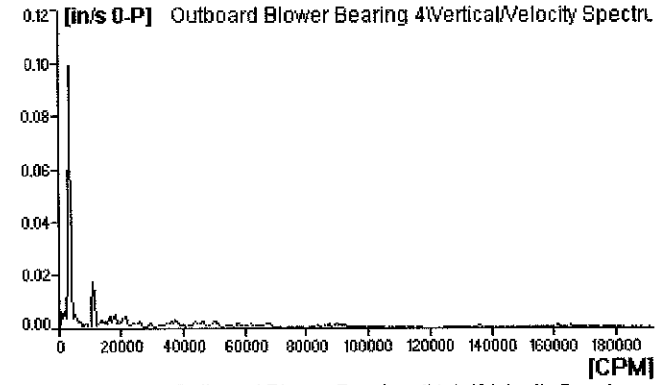
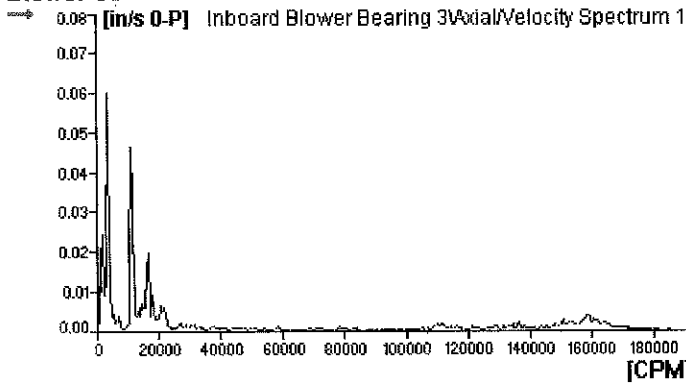


Velocity Spectrum

Blower C3

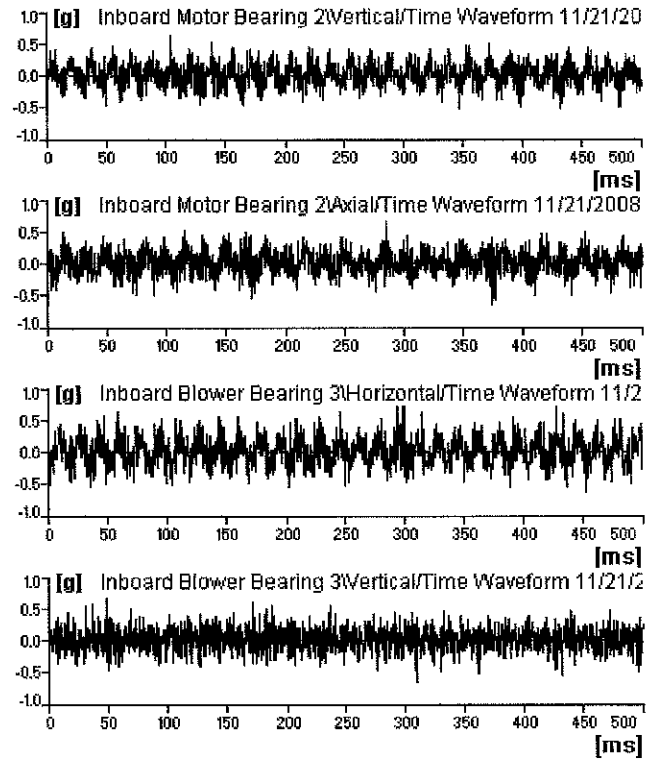
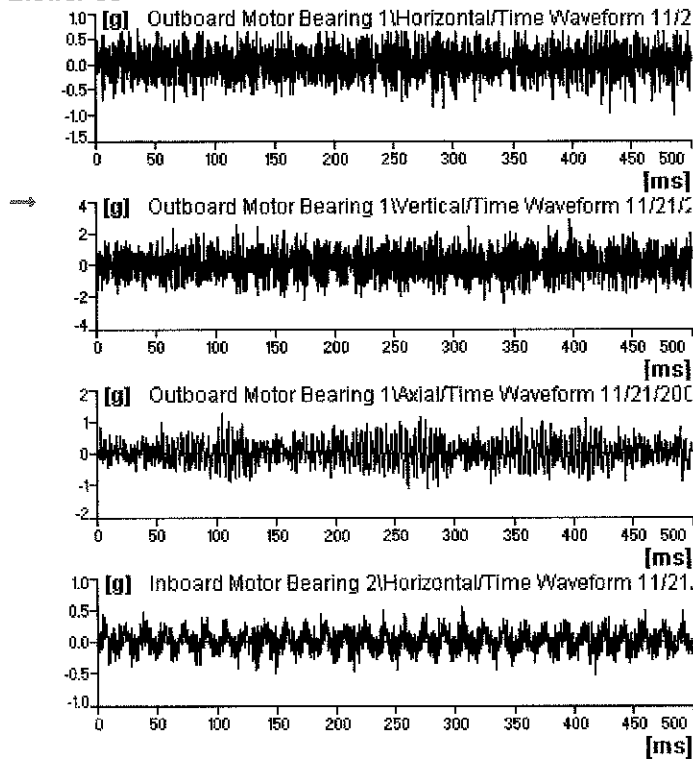


Blower C3

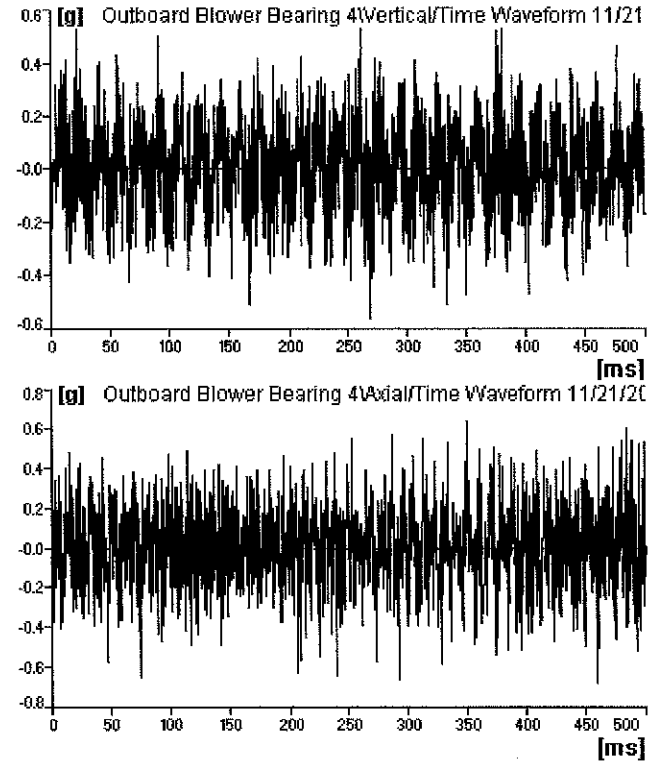
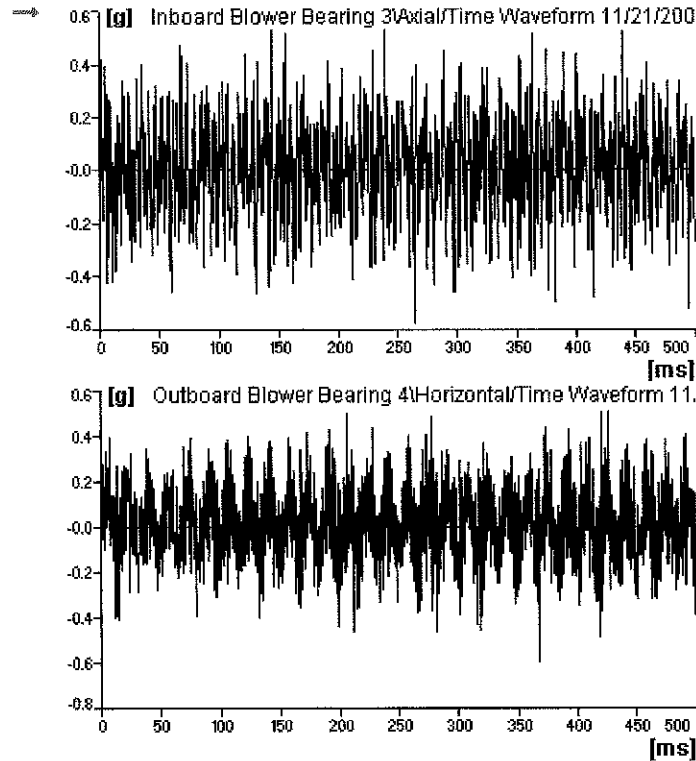


Time Wave Form

Blower C3



Blower C3



Special Notes on Blower C3:

Warning List

Machine: Largo Plant Blowers/Central Blower Room/Blower C3

Measurement Place: Outboard Motor Bearing 1/Vertical

OverAll 11/21/2008 0:55:15 **0.362** [in/s] **Warning Confirmed**

Measurement Place: Outboard Motor Bearing 1/Axial

OverAll 11/21/2008 0:55:38 **0.256** [in/s] **Warning Confirmed**

Measurement Place: Inboard Motor Bearing 2/Axial

OverAll 11/21/2008 0:57:56 **0.221** [in/s] **Warning Confirmed**

Measurement Place: Inboard Blower Bearing 3/Horizontal

OverAll 11/21/2008 0:58:30 **0.221** [in/s] **Warning Confirmed**

Note

Bearing Housings Leak Oil – Inboard and Outboard (**Recommendation – Rebuild Bearing Housings and Install New Bearings**)

Motor Bearings are in Warning (**Recommendation – Recondition Motor with New Bearings, Bake and Dip ASAP**)

***Note-** The Motor is cause for the Inboard Blower Bearing 3/Horizontal Warning

Model# -75106A1 / Serial#POO4875

Machine: Largo Plant Blowers/South Blower Room/Blower S1

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/20/2008 23:41:19 Velocity OverAll [in/s] **0.15**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/20/2008 23:41:47 Velocity OverAll [in/s] **0.14**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/20/2008 23:42:16 Velocity OverAll [in/s] **0.07**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/20/2008 23:42:45 Velocity OverAll [in/s] **0.13**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/20/2008 23:43:13 Velocity OverAll [in/s] **0.13**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/20/2008 23:43:40 Velocity OverAll [in/s] **0.14**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/20/2008 23:44:07 Velocity OverAll [in/s] **0.13**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/20/2008 23:44:37 Velocity OverAll [in/s] **0.14**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/20/2008 23:45:06 Velocity OverAll [in/s] **0.14**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/20/2008 23:45:38 Velocity OverAll [in/s] **0.16**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

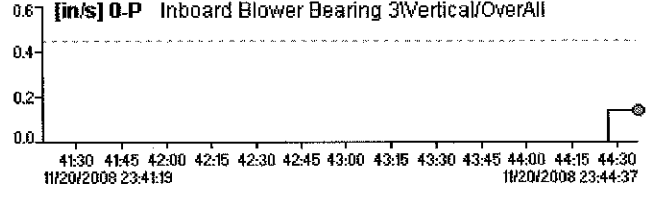
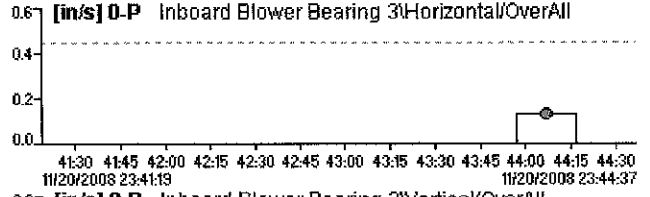
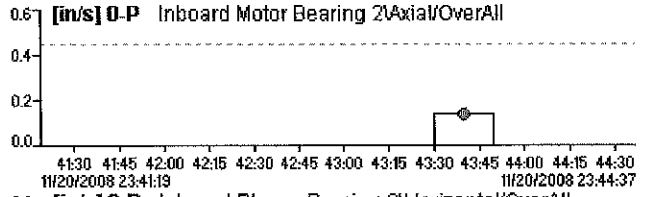
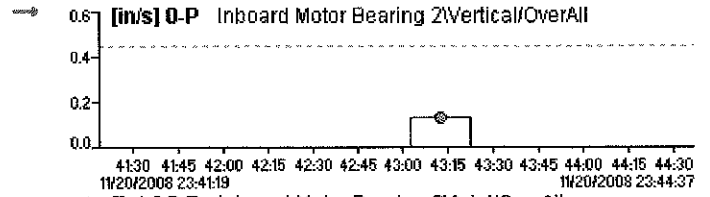
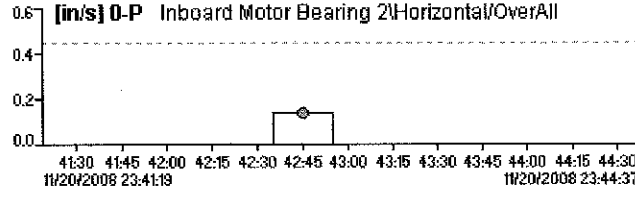
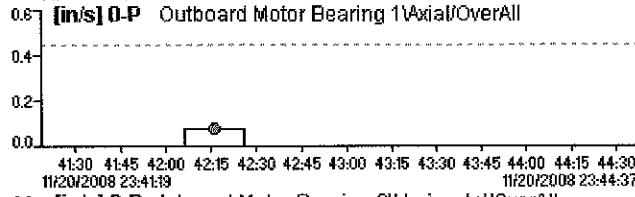
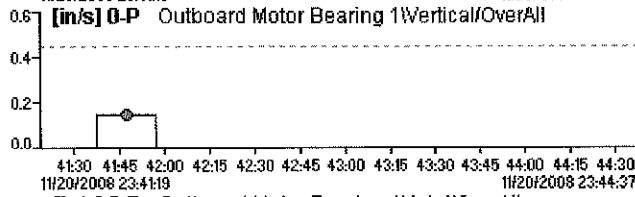
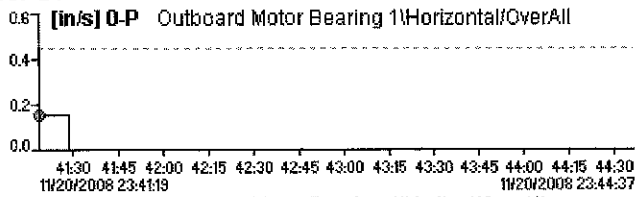
11/20/2008 23:46:08 Velocity OverAll [in/s] **0.12**

Measurement Place: **Outboard Blower Bearing 4/Axial**

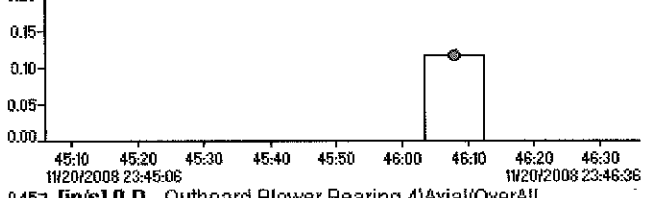
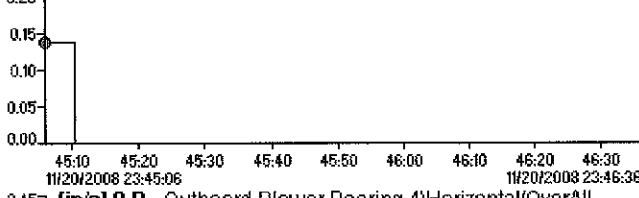
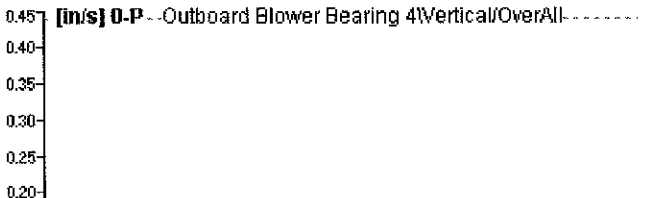
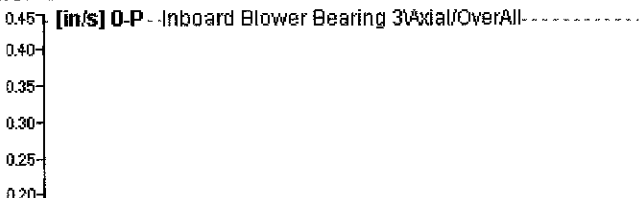
11/20/2008 23:46:36 Velocity OverAll [in/s] **0.24/w**

Overall Spectrum with Tolerances

Blower S1

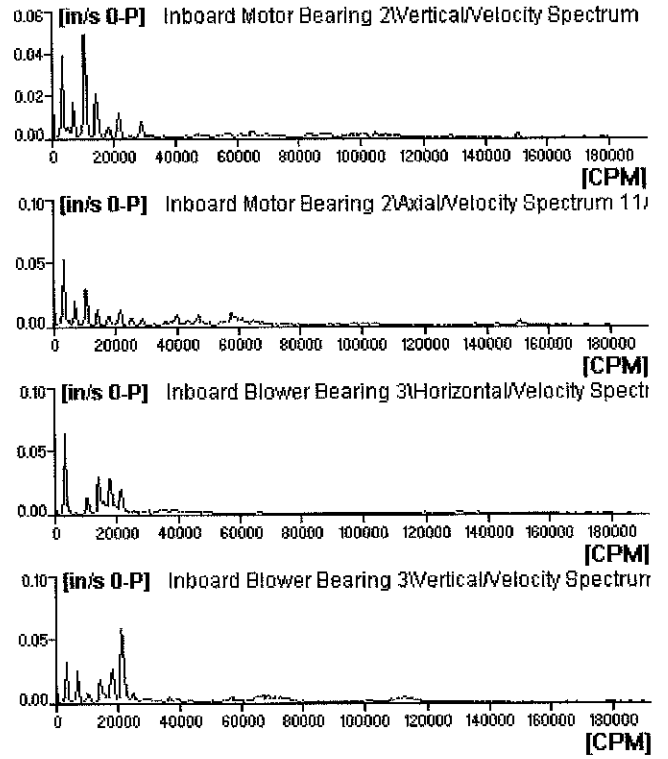
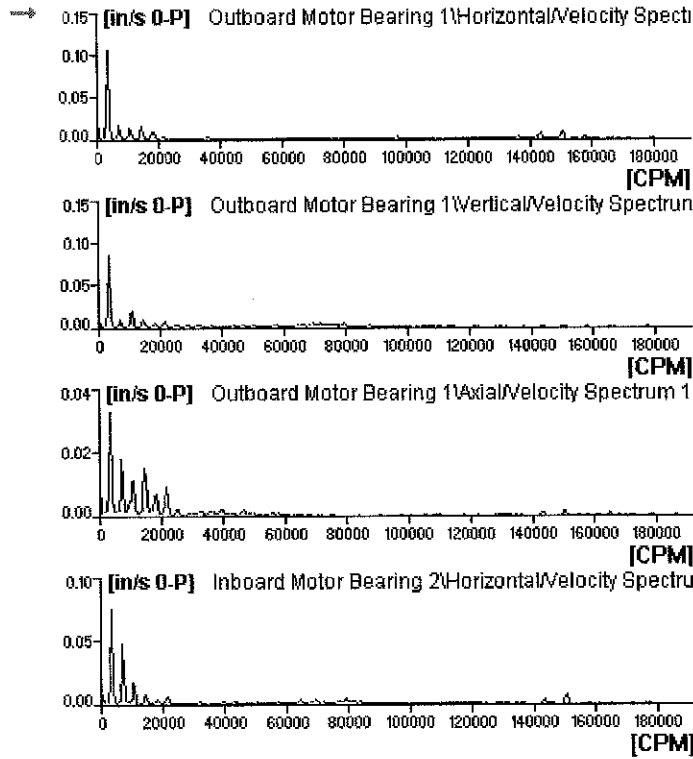


Blower S1

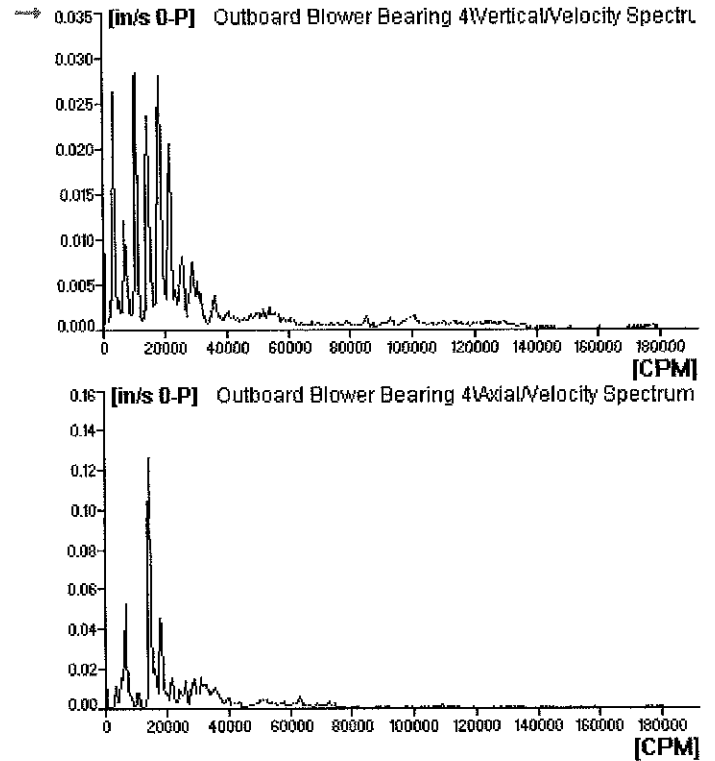
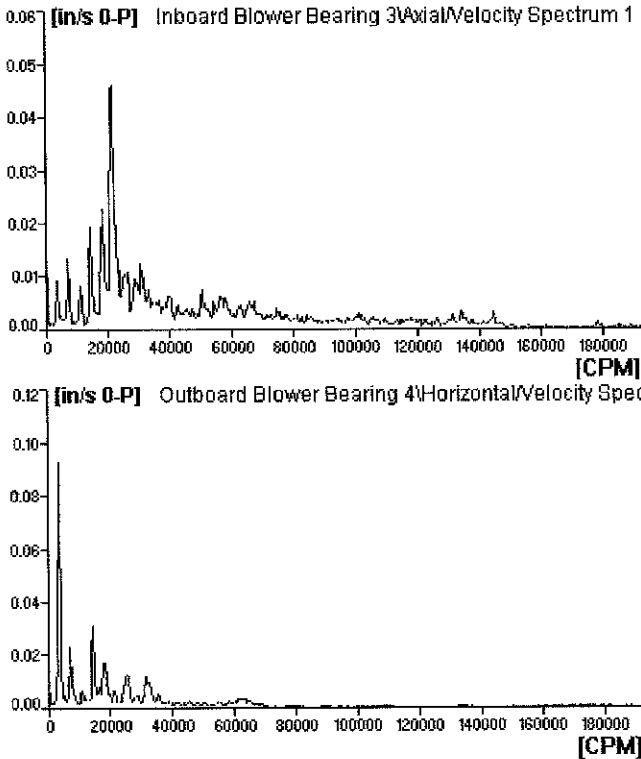


Velocity Spectrum

Blower S1

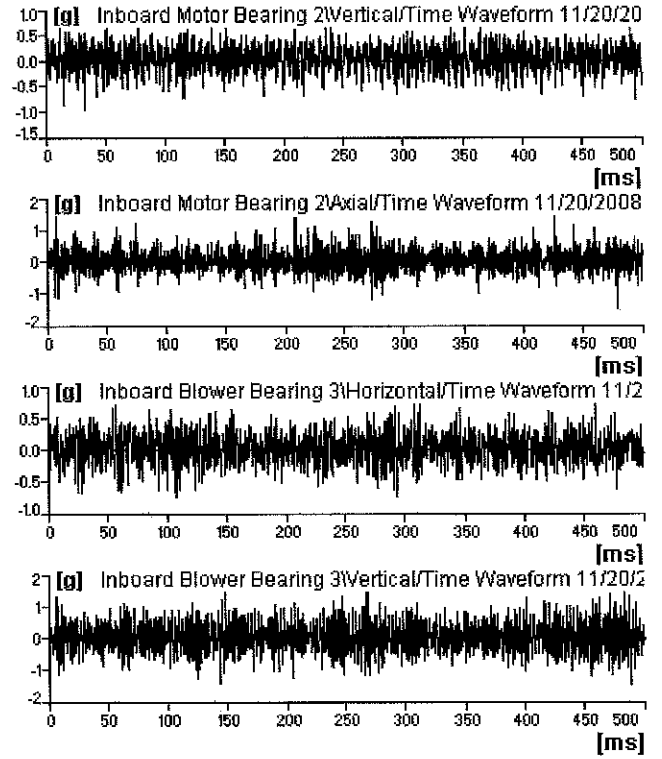
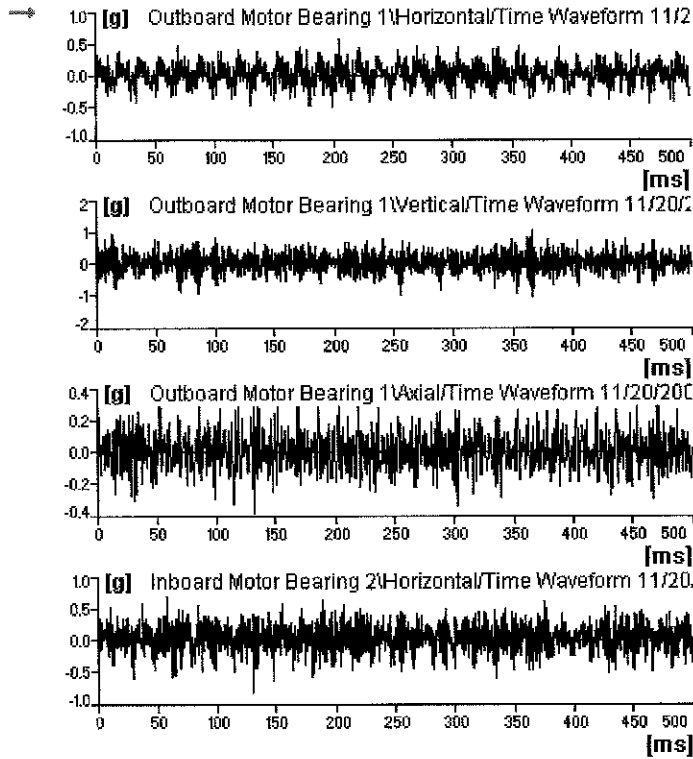


Blower S1

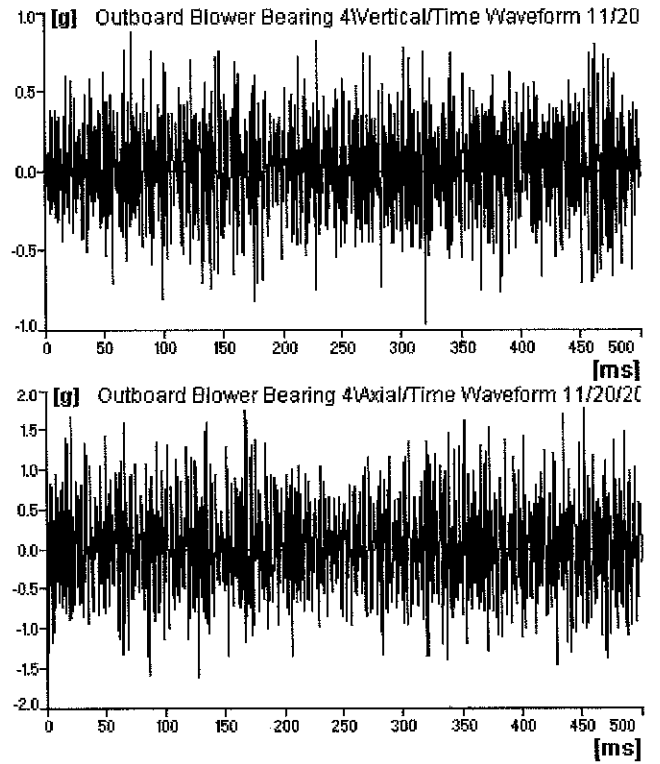
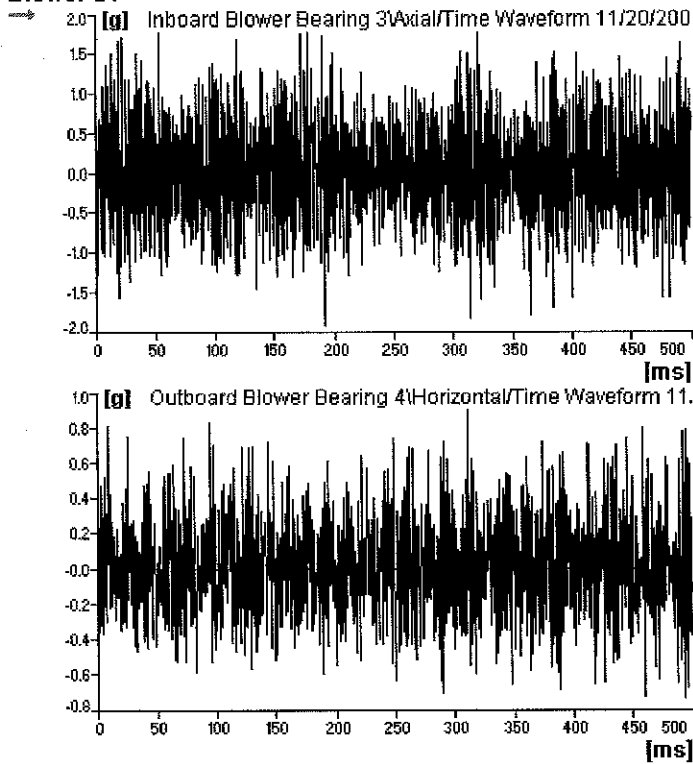


Time Wave Form

Blower S1



Blower S1



Special Notes on Blower S1:

Warning List

Machine: Largo Plant Blowers/South Blower Room/Blower S1

Measurement Place: Outboard Blower Bearing 4/Axial

OverAll 11/20/2008 23:46:36 **0.242** [in/s] **Warning Confirmed**

Note

Mechanical Seals are leaking air inboard & outboard. (**Recommendation – Replace seals**)

Outboard Blower Bearing 4/Axial (**Recommendation – Watch and Trend this Bearing**)

Model# -75106A1 / Serial#POO4874

Machine: Largo Plant Blowers/South Blower Room/Blower S2

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/21/2008 0:20:23 Velocity OverAll [in/s] **0.08**

Measurement Place: **Outboard Motor Bearing 1/Vertical**

11/21/2008 0:20:53 Velocity OverAll [in/s] **0.10**

Measurement Place: **Outboard Motor Bearing 1/Axial**

11/21/2008 0:21:25 Velocity OverAll [in/s] **0.27/w**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/21/2008 0:21:59 Velocity OverAll [in/s] **0.12**

Measurement Place: **Inboard Motor Bearing 2/Vertical**

11/21/2008 0:22:25 Velocity OverAll [in/s] **0.07**

Measurement Place: **Inboard Motor Bearing 2/Axial**

11/21/2008 0:22:56 Velocity OverAll [in/s] **0.17**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/21/2008 0:23:47 Velocity OverAll [in/s] **0.19/w**

Measurement Place: **Inboard Blower Bearing 3/Vertical**

11/21/2008 0:24:20 Velocity OverAll [in/s] **0.05**

Measurement Place: **Inboard Blower Bearing 3/Axial**

11/21/2008 0:24:57 Velocity OverAll [in/s] **0.07**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/21/2008 0:25:56 Velocity OverAll [in/s] **0.18**

Measurement Place: **Outboard Blower Bearing 4/Vertical**

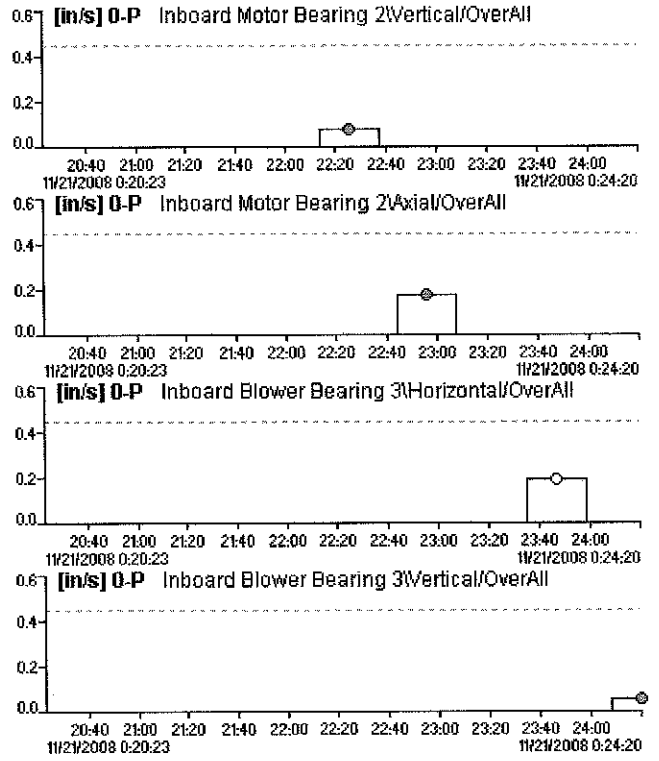
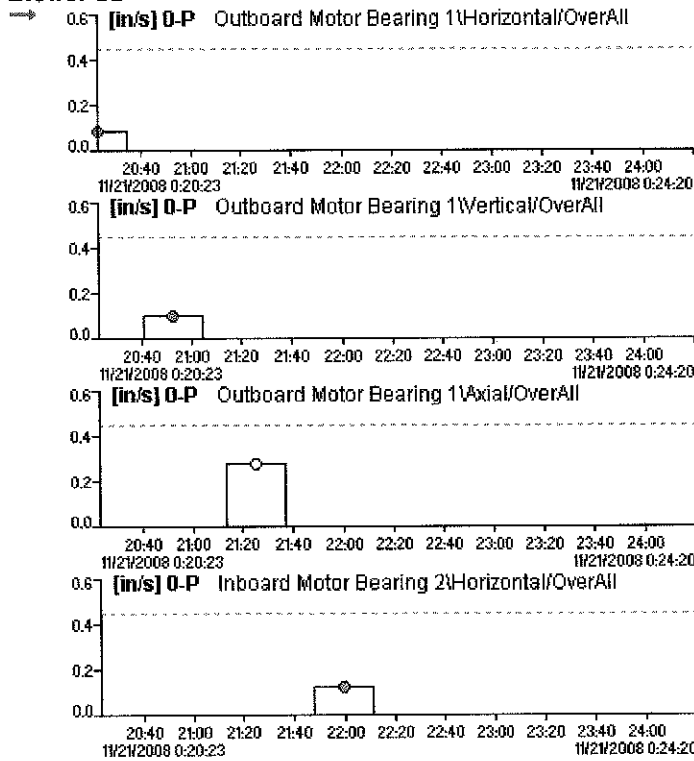
11/21/2008 0:26:26 Velocity OverAll [in/s] **0.06**

Measurement Place: **Outboard Blower Bearing 4/Axial**

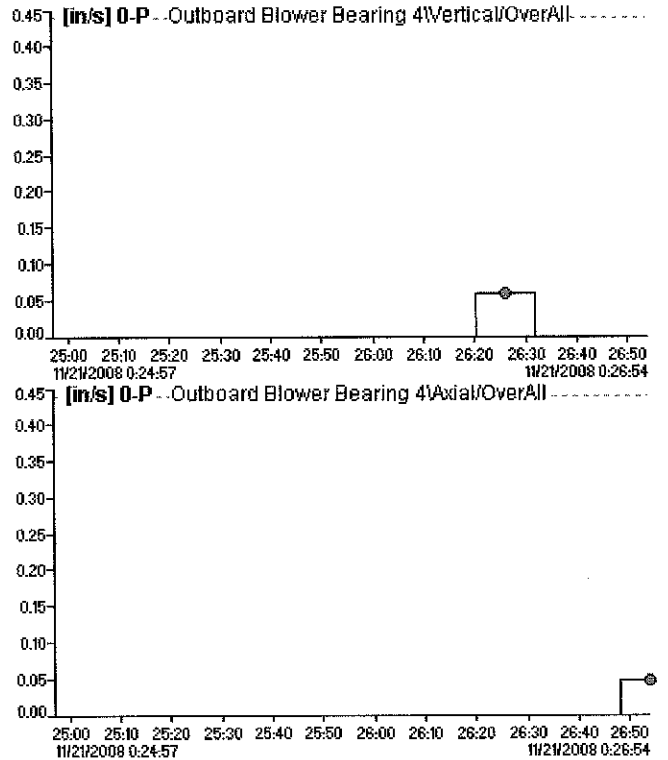
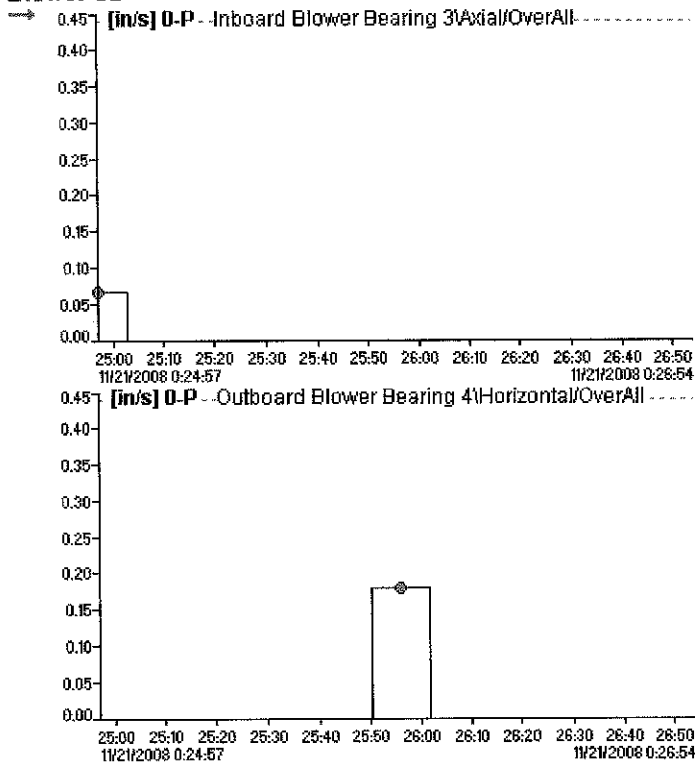
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Overall Spectrum with Tolerances

Blower S2

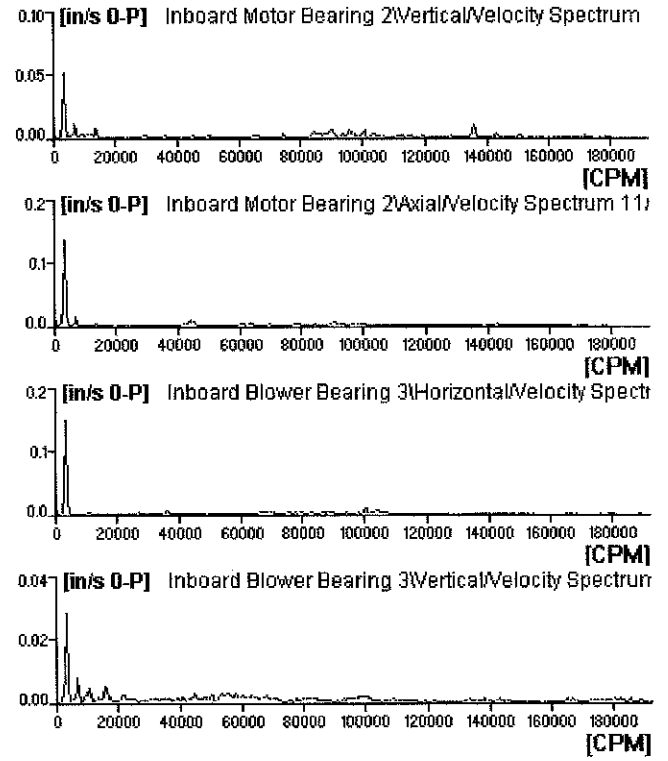
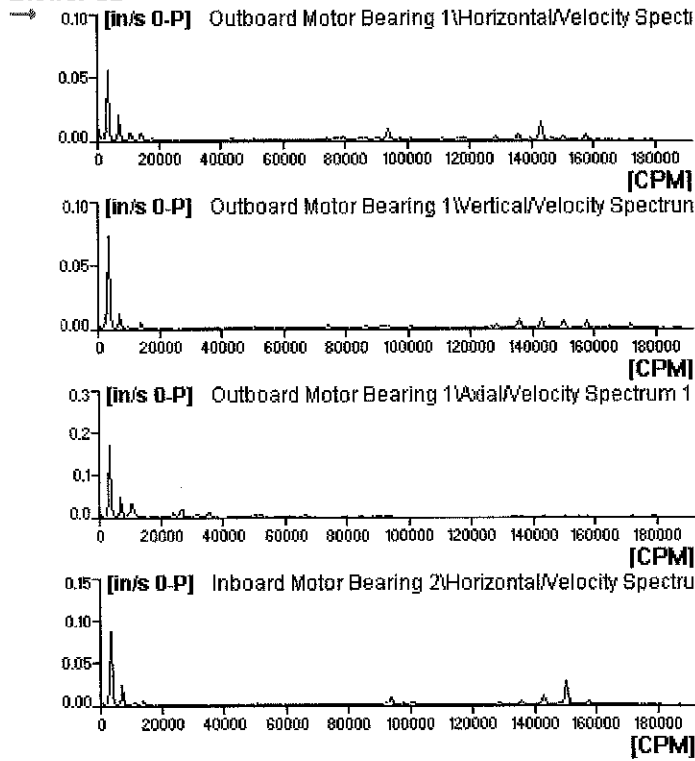


Blower S2

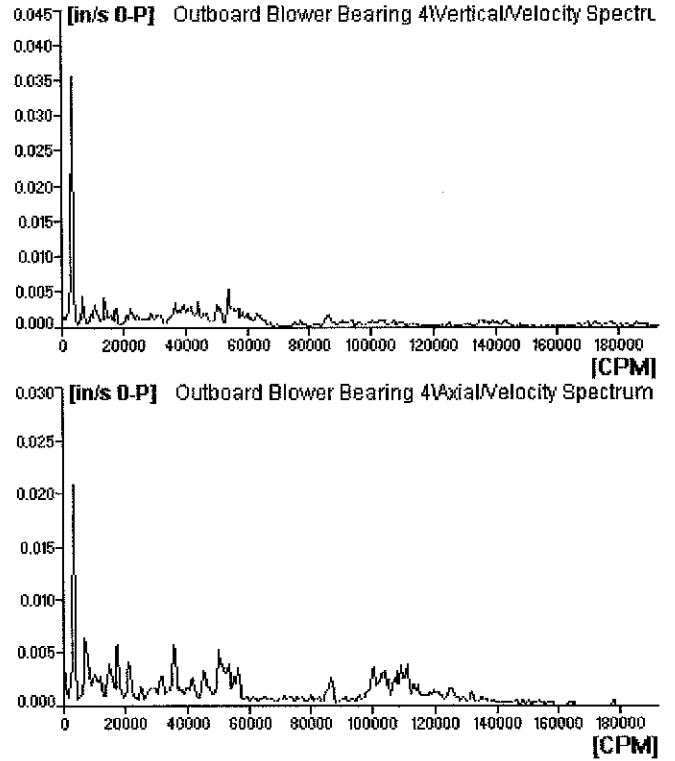
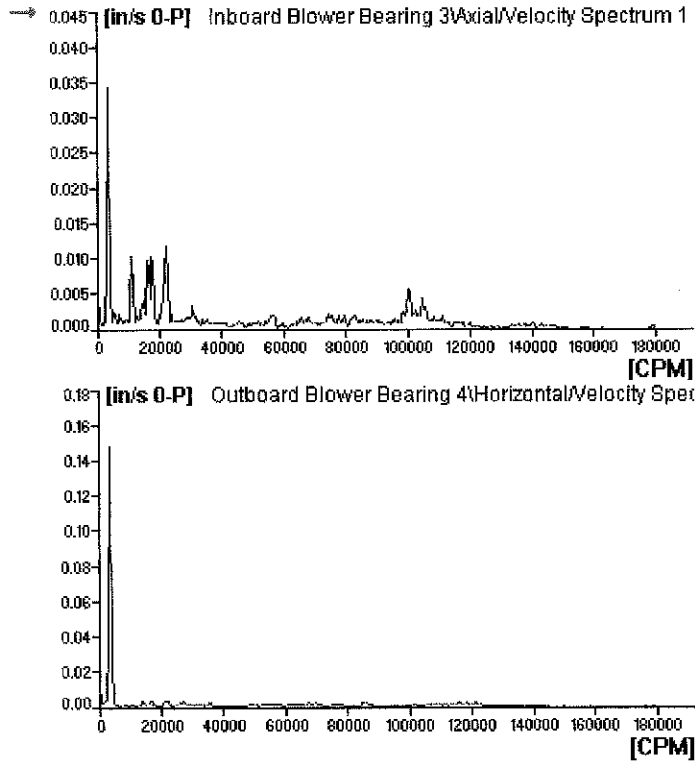


Velocity Spectrum

Blower S2

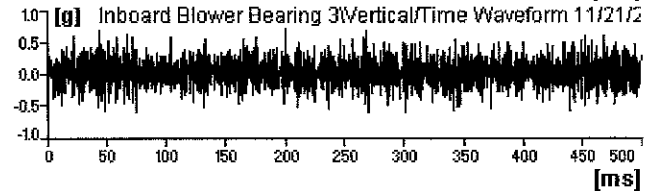
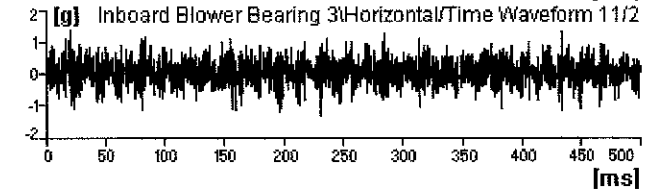
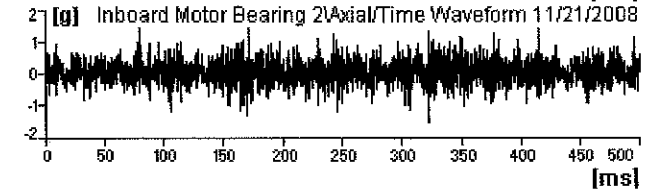
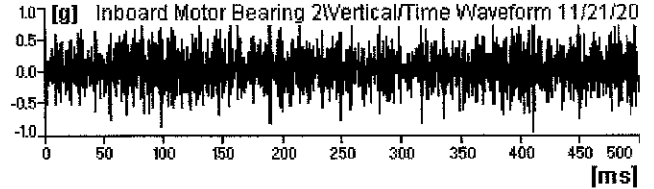
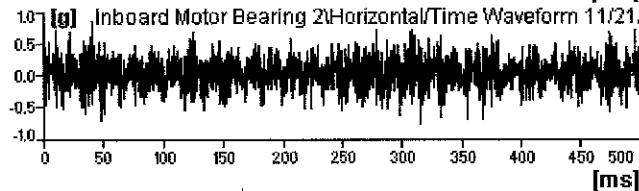
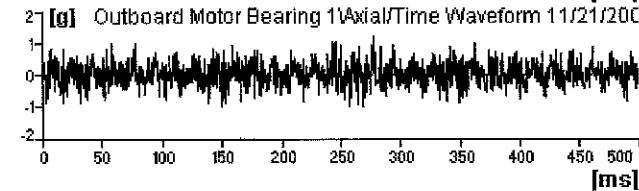
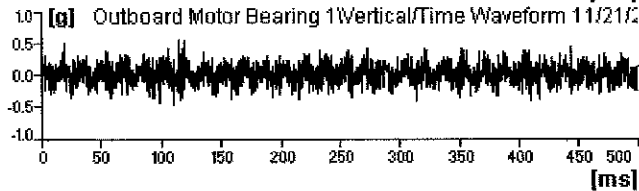
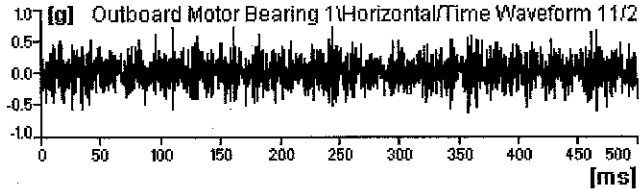


Blower S2

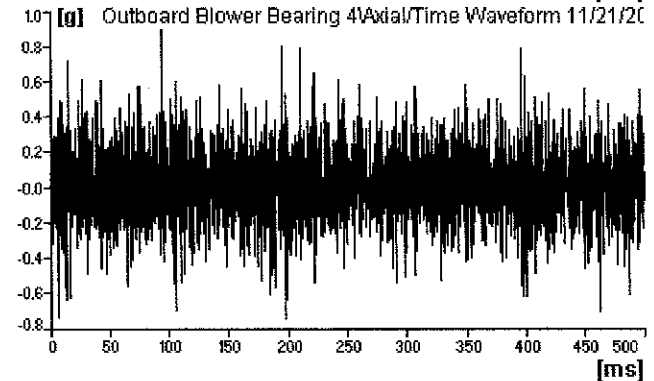
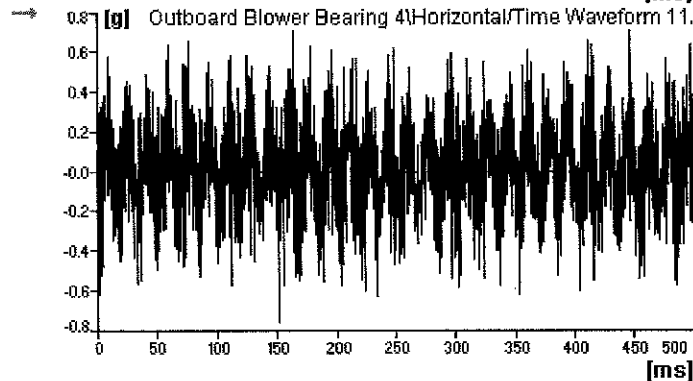
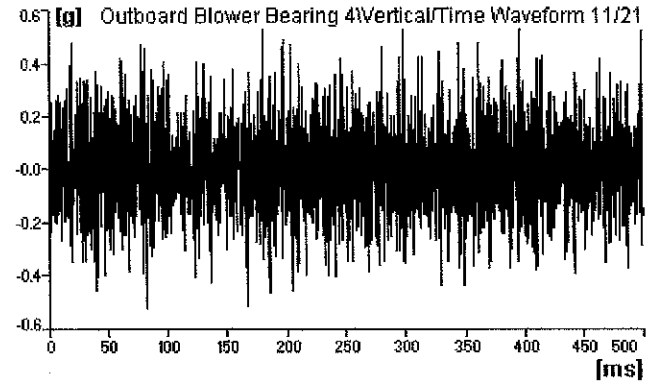
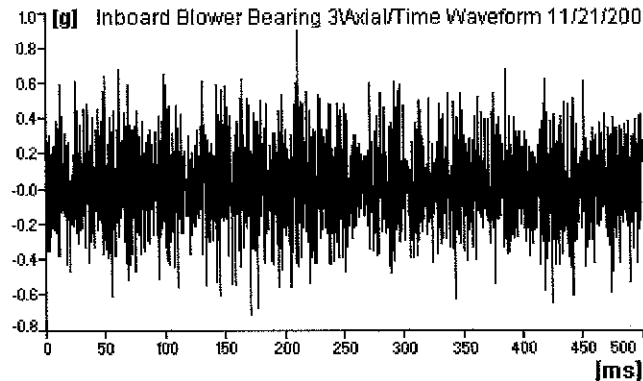


Time Wave Form

Blower S2



Blower S2



Special Notes on Blower S2:

Warning List

Machine: Largo Plant Blowers/South Blower Room/Blower S2

Measurement Place: Outboard Motor Bearing 1/Axial

OverAll 11/21/2008 0:21:25 **0.273** [in/s] **Warning Confirmed**

Measurement Place: Inboard Blower Bearing 3/Horizontal

OverAll 11/21/2008 0:23:47 **0.186** [in/s] **Warning Confirmed**

Note

Mechanical Seals are leaking air inboard & outboard. (**Recommendation – Replace seals**)

Both Bearing Housings are Leaking Oil (**Recommendation – Rebuild Bearing Housings**)

Inboard Blower Bearing3/Horizontal is in Warning (Alignment is bad. The motor requires growth alignment)

(**Recommendation – Align Motor to Blower**)

Model# -75106A1 / Serial#POO4876

Machine: Largo Plant Blowers/South Blower Room/Blower S3

Measurement Place: **Outboard Motor Bearing 1/Horizontal**

11/21/2008 1:04:14 Velocity OverAll [in/s] **0.14**

Measurement Place: Outboard Motor Bearing 1/Vertical

11/21/2008 1:04:46 Velocity OverAll [in/s] **0.10**

Measurement Place: Outboard Motor Bearing 1/Axial

11/21/2008 1:05:16 Velocity OverAll [in/s] **0.10**

Measurement Place: **Inboard Motor Bearing 2/Horizontal**

11/21/2008 1:05:52 Velocity OverAll [in/s] **0.08**

Measurement Place: Inboard Motor Bearing 2/Vertical

11/21/2008 1:06:31 Velocity OverAll [in/s] **0.09**

Measurement Place: Inboard Motor Bearing 2/Axial

11/21/2008 1:07:03 Velocity OverAll [in/s] **0.03**

Measurement Place: **Inboard Blower Bearing 3/Horizontal**

11/21/2008 1:07:32 Velocity OverAll [in/s] **0.11**

Measurement Place: Inboard Blower Bearing 3/Vertical

11/21/2008 1:08:00 Velocity OverAll [in/s] **0.12**

Measurement Place: Inboard Blower Bearing 3/Axial

11/21/2008 1:08:34 Velocity OverAll [in/s] **0.08**

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

11/21/2008 1:09:31 Velocity OverAll [in/s] **0.19/w**

Measurement Place: Outboard Blower Bearing 4/Vertical

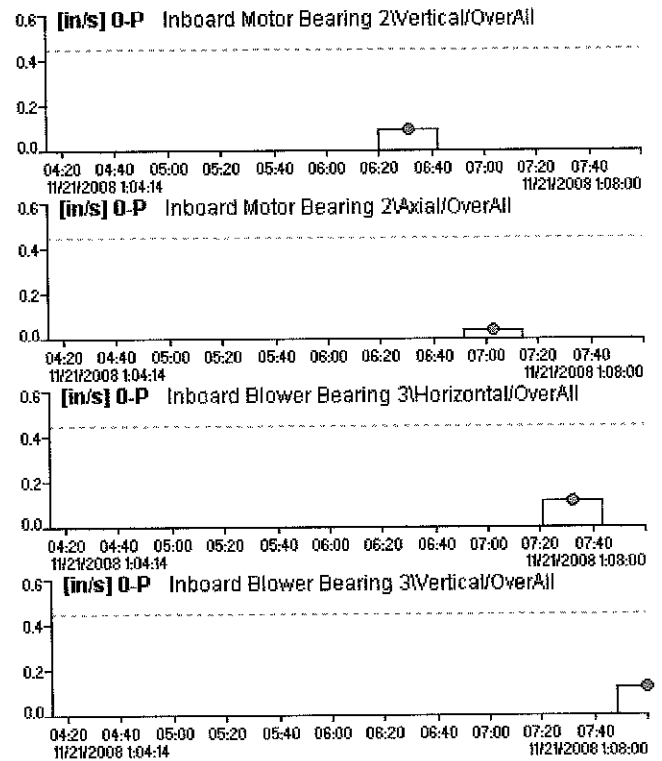
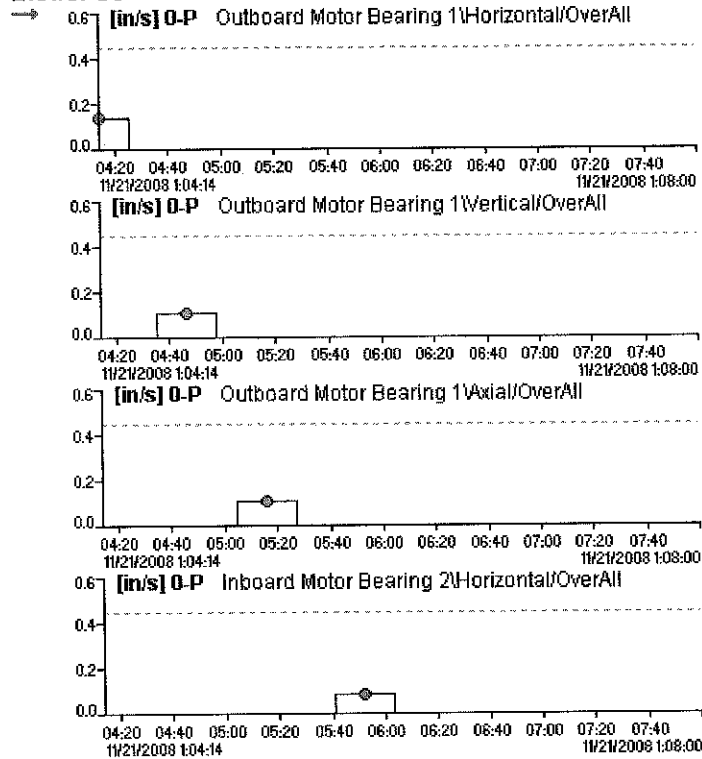
11/21/2008 1:10:01 Velocity OverAll [in/s] **0.15**

Measurement Place: Outboard Blower Bearing 4/Axial

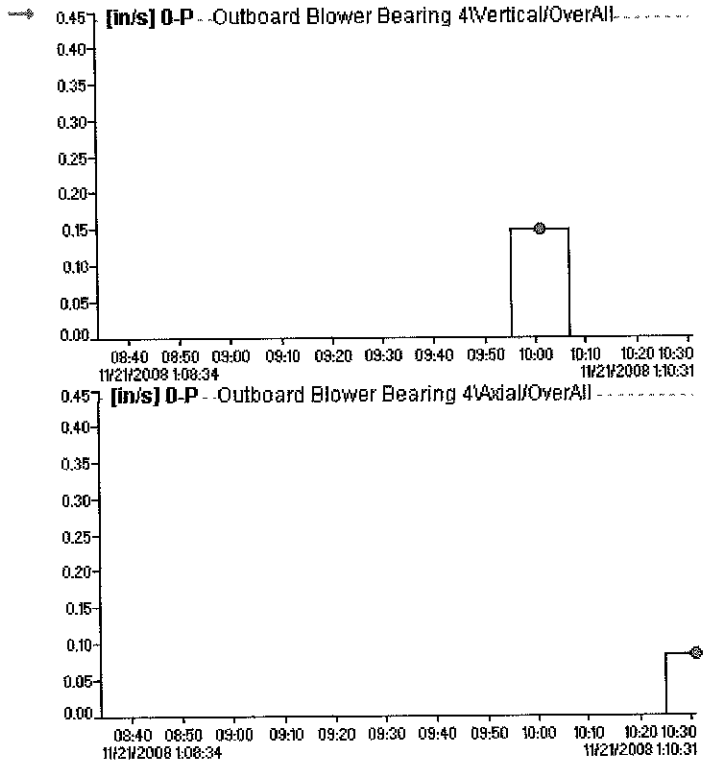
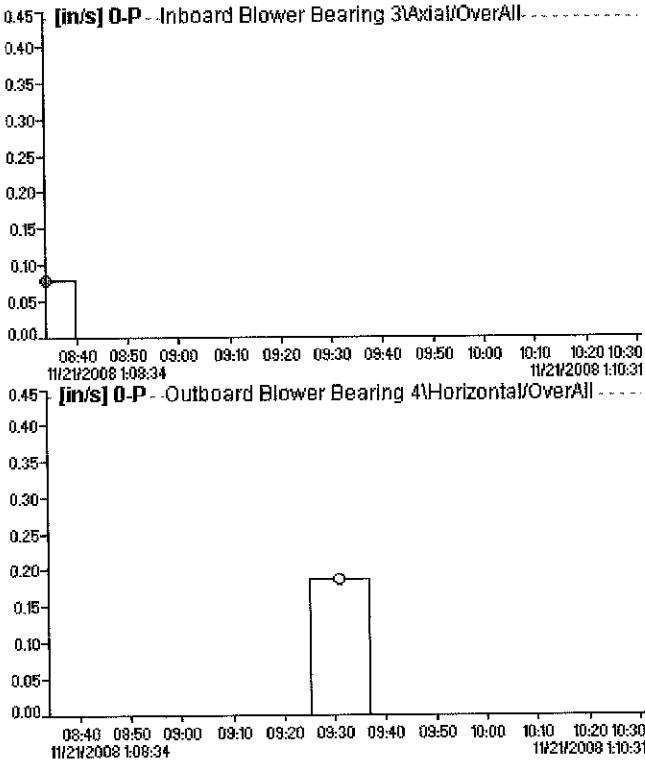
11/21/2008 1:10:31 Velocity OverAll [in/s] **0.08**

Overall Spectrum with Tolerances

Blower S3

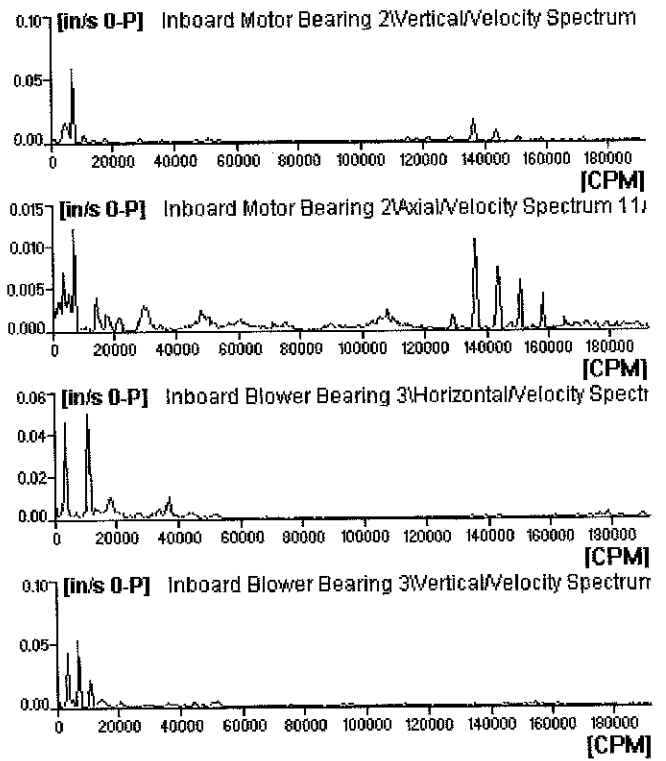
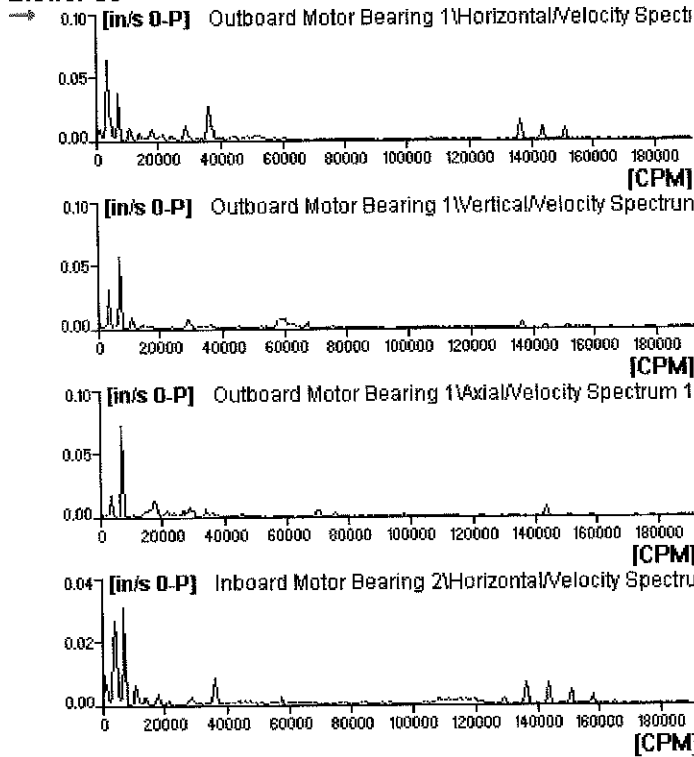


Blower S3

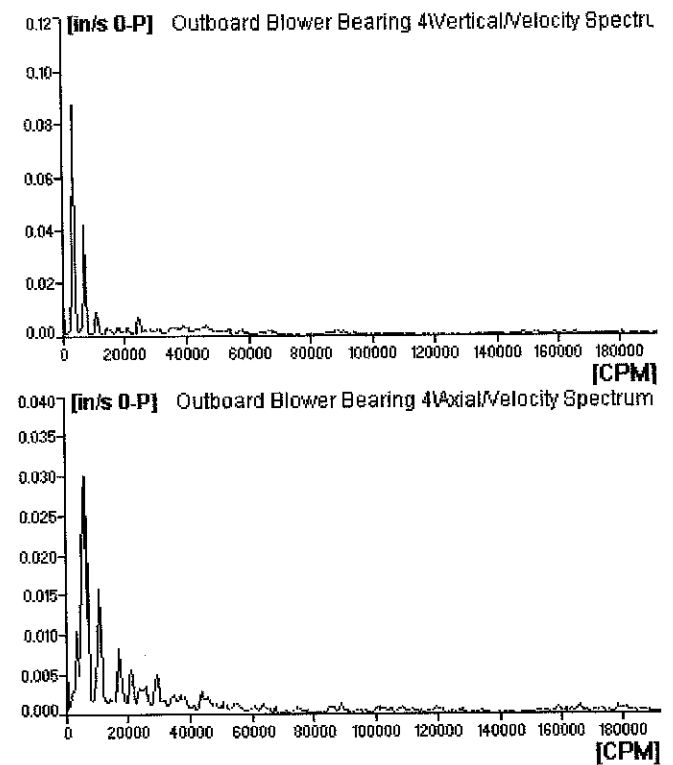
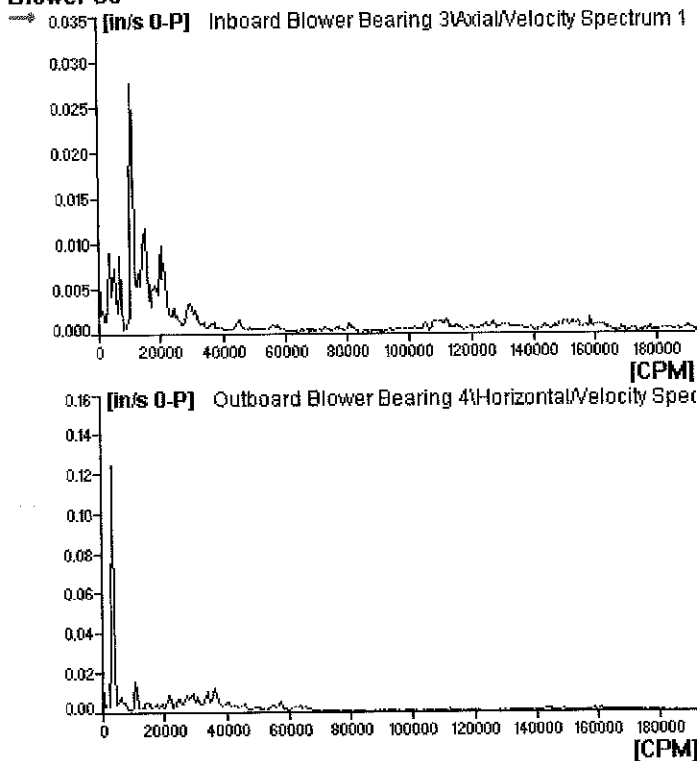


Velocity Spectrum

Blower S3

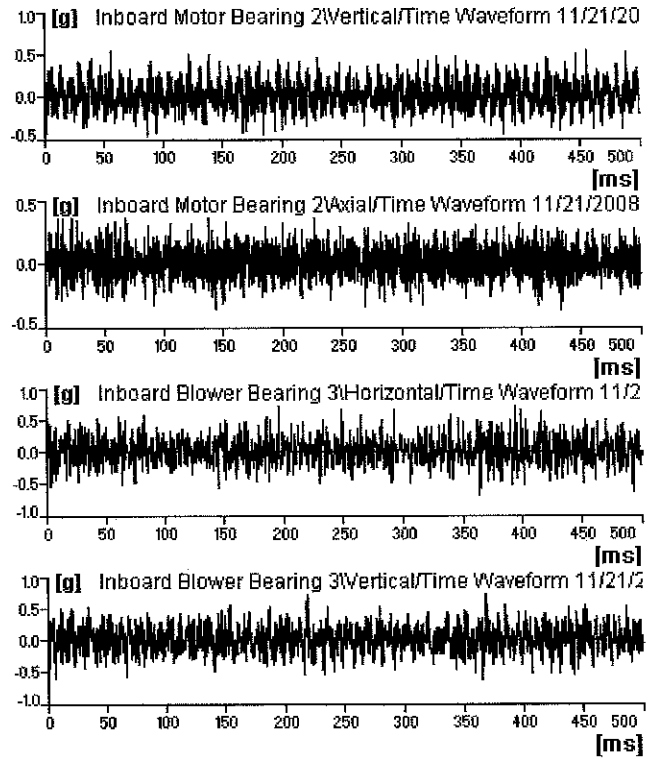
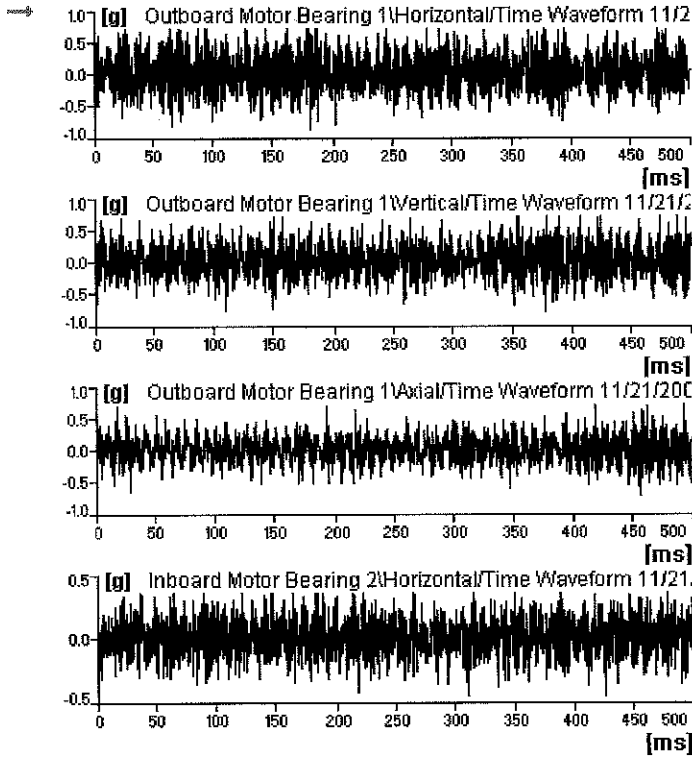


Blower S3

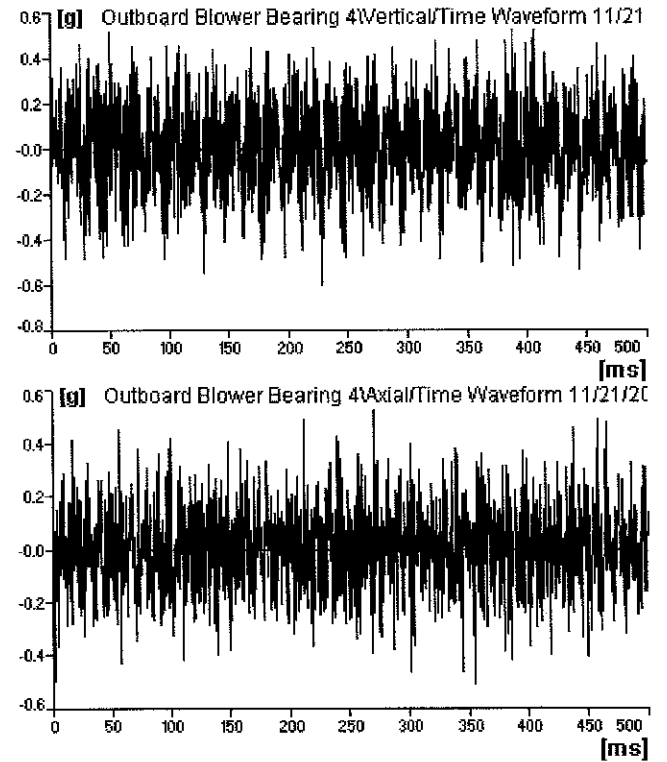
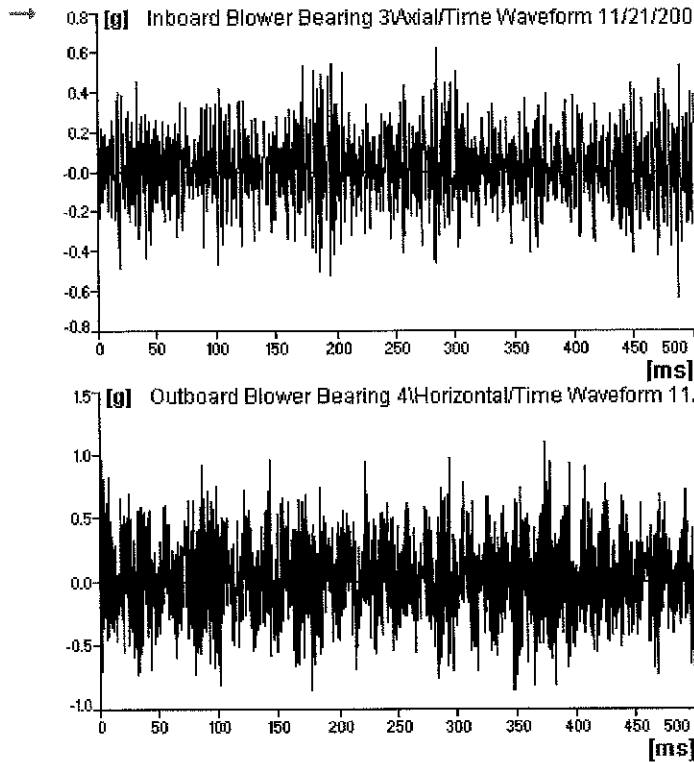


Time Wave Form

Blower S3



Blower S3



Special Notes on Blower S3:

Warning List

Machine: Largo Plant Blowers/North Blower Room/Blower S3

Measurement Place: **Outboard Blower Bearing 4/Horizontal**

OverAll 11/21/2008 0:23:47 **0.19** [in/s] **Warning Confirmed**

Note

Both Bearing Housings are Leaking Oil (**Recommendation – Rebuild Bearing Housings**)

The Flex coupler is leaking on the Discharge Piping. (**Recommendation – Replace Gasket, Brocken**)

Outboard Blower Bearing 4/Horizontal is in Warning (**Recommendation – Watch and Trend Bearing Life**)

Model# -75106A1 / Serial#M074470

ISO 10816 Vibration Severity Chart

ISO 10816 was released in August 2000, establishes the general conditions and procedures for measurement and evaluation of vibrations using measurements made on the non-rotating parts of machines. It also provides general evaluation criteria related to both operational monitoring and acceptance testing established primarily with regard to securing reliable long term operation of the machine.

ISO 10816-3 separates the working conditions into four zones:

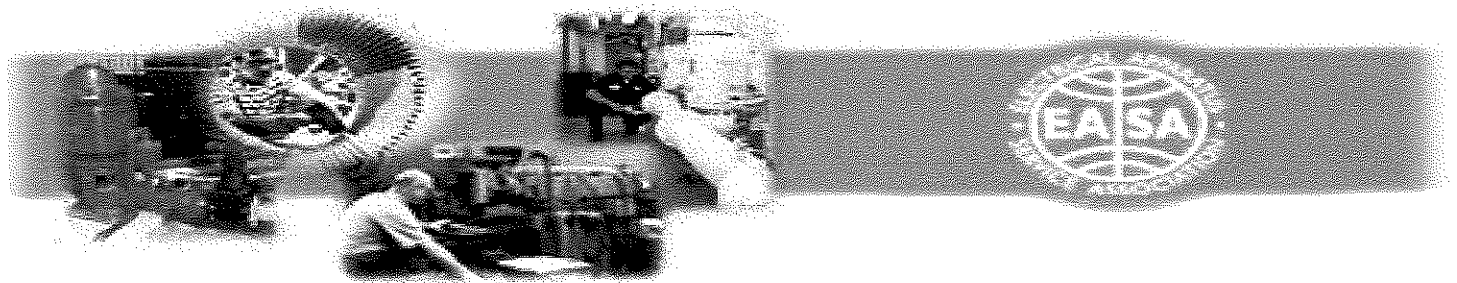
- Zone A Green: Vibration values from machines just put into operation.
- Zone B Yellow: continuous operation without any restrictions.
- Zone C Orange: condition is acceptable only for a limited period of time.
- Zone D Red: Dangerous vibration values - damage could occur at any time.

It also defines four groups of machines, according to their size, base and purpose.

Table 3. ISO 10816 Chart

Vibration Velocity IPS (RMS)	Group 4 Integrated Driver		Group 3 External Driver		Group 2 Motors 160 < H < 315 mm		Group 1 Motors H > 315 mm	
	Rigid	Flexible	Rigid	Flexible	Rigid	Flexible	Rigid	Flexible
0.71	Dark	Dark	Dark	Dark	Dark	Dark	Dark	Dark
0.43	Dark	Dark	Dark	Light	Dark	Dark	Dark	Light
0.28	Dark	Light	Dark	Light	Dark	Light	Dark	Light
0.18	Light	Light	Dark	Light	Light	Light	Dark	Light
0.14	Light	Light	Dark	Dark	Light	Light	Dark	Dark
0.11	Light	Light	Dark	Dark	Light	Dark	Dark	Dark
0.09	Light	Dark	Dark	Dark	Light	Dark	Dark	Dark
0.06	Dark	Dark	Dark	Dark	Dark	Dark	Dark	Dark
0.03	Dark	Dark	Dark	Dark	Dark	Dark	Dark	Dark

Disclaimer: Under no circumstances including but not limited to negligence, shall Mader Electric Motors. be held liable for any direct, indirect, special, incidental, or consequential damages whatsoever from the use of this information.



MADER ELECTRIC MOTORS

18161 N. Tamiami Trail

N. Ft. Myers, Fl. 33903

Ph.239-731-5455 Fax 239-731-8165

WARRANTIES

On labor & materials: 12 months

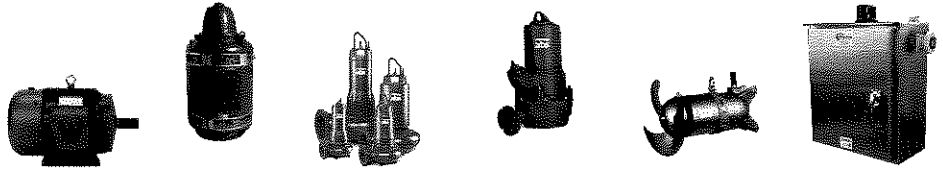
On rebuild of repaired equipment: 90 days

On new equipment, manufacturer's warranty period

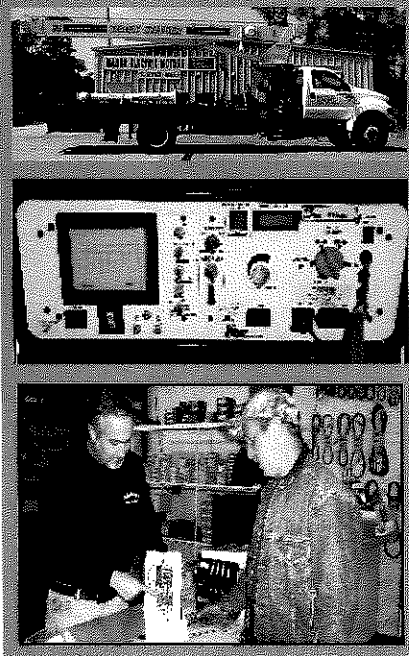
3. ADDITIONAL INFORMATION

Mader

Electric Motors



Mader Electric Motors offers a wide range of new motors, pumps, VFD's, controls, and electrical equipment to the Municipal & Industrial Market. We also service and repair most any brand of motor, pump, & other rotating equipment. Our EASA membership assures that your equipment will be repaired to the highest standards using the latest equipment & technology.

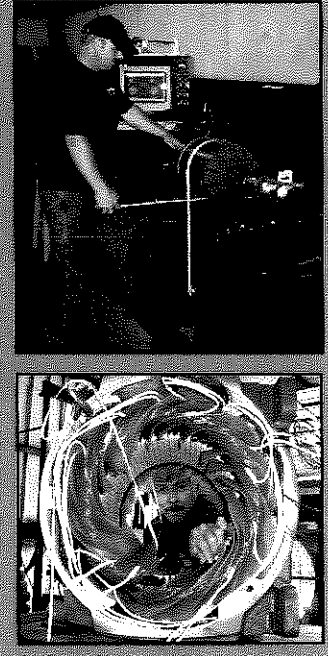


▶ **Products & Services**

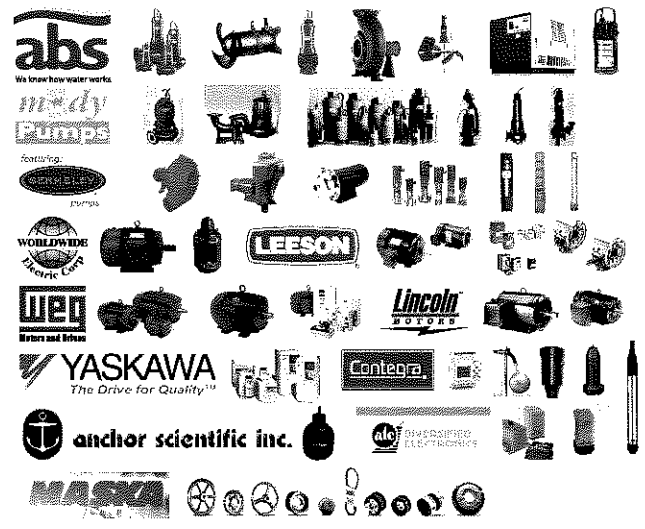
- Motor Rewinding from 1/10 - 1000 HP
- New Motor & Pump Sales & Service
- New Fan & Blower Sales & Service
- Lift Station Packages & Equipment
- Control Panels & Pump Controls
- Floats & Pressure Transducers
- VFD's, Soft Starts & Motor Starters
- Hoist Repairs
- Machine Shop Capabilities

▶ **Tools to do the Job Right!**

- A Fleet of Service Vehicles for Carrying Techs & Tools to the Job Site
- A Crane Truck Capable of Lifting 17 Tons and a Reach of 85 feet
- Computerized Dynamic Balancing
- Vibration Analysis & Laser Alignment
- Diagnostic Reports



We are a Stocking Distributor for the following Manufacturers:



We Repair Most Major Brands of Electric Motors & Pumps Including the Brands Listed Below:



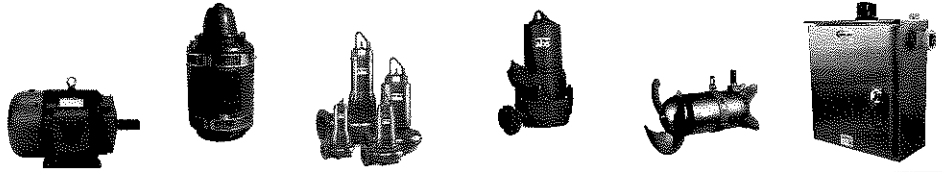
Mader Electric Motors is a Member of the "Southwest Florida Utility Contractors Association" Web Site: www.uucf.com

Mader Electric Motors has provided quality service & repairs for electric motors & pumps to the southwest Florida area for more than 25 years. We are committed to serving you promptly, efficiently & honestly. We will work with you to meet deadlines & solve emergency shut down problems. Our long history with major manufacturers of pumps & motors allows us to provide competitive pricing to our valued customers. Mader Electric Motors looks forward to doing business with you today!

Mader Electric Motors is how to get the most from your electric motors!

Mader

Electric Motors



Mader Electric Motors Provides the Following Service & Products:

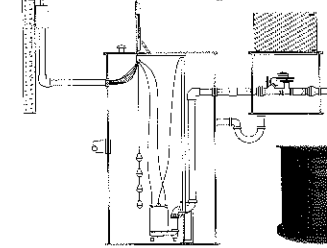


Motor Rewinds & Pump Repairs

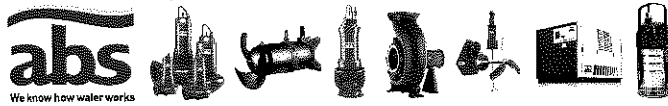


- Motor Rewinding from 1/10 - 1000 HP
- No Pump too Small or Large
- We Service All Major Brands & Models
- New Motor & Pump Sales & Service
- New Fan & Blower Sales & Service
- Computerized Dynamic Balancing
- Vibration Analysis & Laser Alignment
- Diagnostic Reports
- Crane Truck Service Capable of Lifting 17 Tons and a Reach of 85 feet

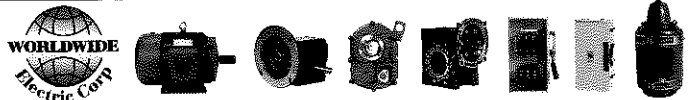
Pump Station Packages



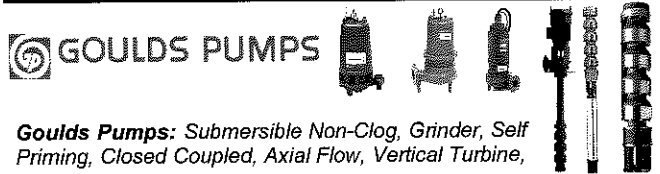
- Low Pressure Sewer Package
- Effluent & Grinder PS Package
- Non-Clog PS Package or Kits
- Fiberglass Basins & Valve Box
- Private & Municipal Specs
- DEP or Custom Control Panels



ABS Pumps: Submersible & Dry Pit Non-Clog, Grinder, Mixers, Mixed & Axial Flow, Flow Booster, Agitator, End Suction, High Speed Turbo Compressors, Aerators, Diffusers & Dewatering Pumps-



WorldWide: Electric Motors, Motor Controls, Soft Starts, Across-Line Starters, Contactors, O/L & Alternating Relays, Pressure Switches, Transfer Switches, Pilot Devices, Shaft Mount Reducers, Right Angle Worm Gear Reducers & Aluminum Worm Gear Reducers



Goulds Pumps: Submersible Non-Clog, Grinder, Self Priming, Closed Coupled, Axial Flow, Vertical Turbine,



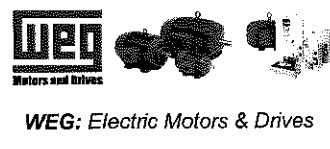
Motors, VFD's, & Gearboxes



Lincoln: Electric Motors



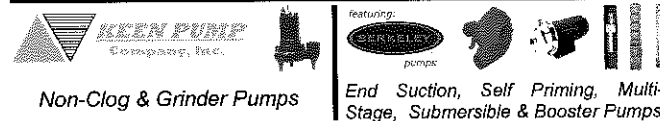
Mody Pumps: Submersible Non-Clog, Grinder, Chopper, Manhole, MHC Hi Chrome Slurry, Sludge & Slimline Dewatering Pumps



WEG: Electric Motors & Drives



Yaskawa: VFD's



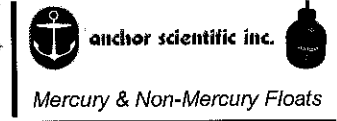
Non-Clog & Grinder Pumps



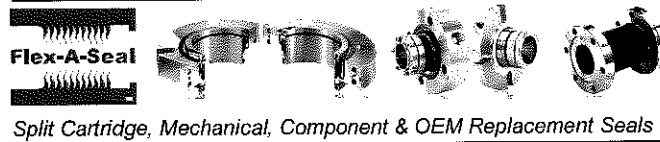
End Suction, Self Priming, Multi-Stage, Submersible & Booster Pumps



Pump Controls, Alternators, Phase, Voltage, & Current Monitors



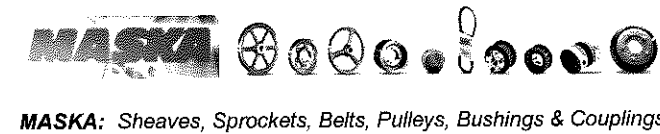
Mercury & Non-Mercury Floats



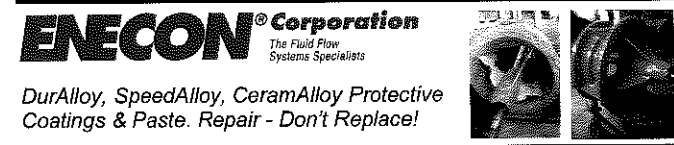
Split Cartridge, Mechanical, Component & OEM Replacement Seals



Contegra: Pump Controls, Mercury & Mechanical SS Floats, Submersible Transducers & Ultrasonic Level Transmitters



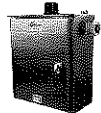
MASKA: Sheaves, Sprockets, Belts, Pulleys, Bushings & Couplings



DurAlloy, SpeedAlloy, CeramAlloy Protective Coatings & Paste. Repair - Don't Replace!



Pump Control Panels: DEP or Custom Design Per Specifications. Simplex, Duplex, Triplex, or Quad Pumps. Fiberglass, Stainless, or Aluminum Enclosures, with or without J-Boxes. Float or Analog Based Controls, Cross the Line Starters, Reduced Voltage Starters or VFD's. Pump Down, Pump Up, or Pressure Booster Applications. Quotes in 24 to 48 Hours, Submittals in 2 Weeks, Delivery in 4-6 Weeks or Less.



North Fort Myers Shop
18161 N. Tamiami Trail
N. Ft. Myers, FL 33903
Office (239) 731-5455
Fax (239) 731-8165

Locations in North Fort Myers & Tampa
24 Hour Emergency (239) 823-5039
Website: www.maderelectricmotors.com

Tampa Shop
7401 Adamo Drive
Tampa, FL 33619
Office (813) 626-2000
Fax (813) 626-2002

ATTACHMENT A
LOCAL VENDOR PREFERENCE QUESTIONNAIRE
(LEE COUNTY ORDINANCE NO. 08-26)

Instructions: Please complete either Part A or B whichever is applicable to your firm

PART A: VENDOR'S PRINCIPAL PLACE OF BUSINESS IS LOCATED WITHIN LEE/COLLIER COUNTY (Only complete Part A if your principal place of business is located within the boundaries of Lee/Collier County)

1. What is the physical location of your principal place of business that is located within the boundaries of Lee/Collier County, Florida?

18161 N. Tamiami Tr.
N. Ft. Myers, FL 33903

2. What is the size of this facility (i.e. sales area size, warehouse, storage yard, etc.)

10,000 square ft.

PART B: VENDOR'S PRINCIPAL PLACE OF BUSINESS IS NOT LOCATED WITHIN LEE/COLLIER COUNTY OR DOES NOT HAVE A PHYSICAL LOCATION WITHIN LEE/COLLIER COUNTY (Please complete this section.)

1. How many employees are available to service this contract? _____
2. Describe the types, amount and location of equipment you have available to service this contract.

LOCAL VENDOR PREFERENCE QUESTIONNAIRE CONTINUED

3. Describe the types, amount and location of material stock that you have available to service this contract.

All of the types and amounts of material listed in this bid as well as our "Project Approach" form are in stock in our N. Ft. Myers facility. Including new motors and all motor repair material.

4. Have you provided goods or services to Lee County on a regular basis for the preceding, consecutive three years?

Yes No

If yes, please provide your contractual history with Lee County for the past three, consecutive years. Attach additional pages if necessary.

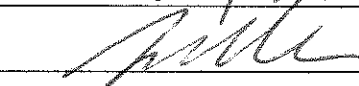
We were the secondary vendor for this bid until it recently expired. We are also the primary vendor for the County's pump repair and replacement bid for more than the past three years.

ANTI-COLLUSION STATEMENT

THE BELOW SIGNED BIDDER HAS NOT DIVULGED TO, DISCUSSED OR COMPARED HIS BID WITH OTHER BIDDERS AND HAS NOT COLLUDED WITH ANY OTHER BIDDER OR PARTIES TO A BID WHATSOEVER. NOTE: NO PREMIUMS, REBATES OR GRATUITIES TO ANY EMPLOYEE OR AGENT ARE PERMITTED EITHER WITH, PRIOR TO, OR AFTER ANY DELIVERY OF MATERIALS. ANY SUCH VIOLATION WILL RESULT IN THE CANCELLATION AND/OR RETURN OF MATERIAL (AS APPLICABLE).

FIRM NAME Mader Electric Motors

BY (Printed): Jeremy Mader

BY (Signature): 

TITLE: VP

FEDERAL ID # OR S.S.# 65-0048538

ADDRESS: 18161 N. Tamiami Tr.
N. Ft. Myers, FL 33903

PHONE NO.: 239-731-5455

FAX NO.: 239-731-8165

CELLULAR PHONE/PAGER NO.: 239-823-5039

DUNS #: 06-024-3268

LEE COUNTY LOCAL BUSINESS TAX ACCOUNT NUMBER:
7807977

E-MAIL ADDRESS: mader-electricmotors@msn.com

DISADVANTAGED BUSINESS ENTERPRISE (DBE): _____ Yes No



LEE COUNTY

SOUTHWEST FLORIDA

Lee County Ordinance No. 08-26

Local Bidder's Preference

AFFIDAVIT PRINCIPAL PLACE OF BUSINESS

Principal place of business is located within the boundaries of Lee County.

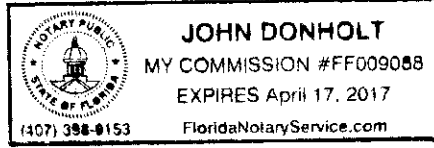
Company Name: Mader Electric Motors
Signature: [Signature] Date: 7-25-13

STATE OF FL
COUNTY OF Lee

The foregoing instrument was signed and acknowledged before me this 25 day of July, 2013, by Jeremy Mader who has produced

(Print or Type Name) Driver License as identification.
(Type of Identification and Number)

Notary Public Signature: [Signature]
Printed Name of Notary Public: John Donholt



Notary Commission Number/Expiration: FF009088 April 17 2017

The signee of this Affidavit guarantees, as evidenced by the sworn affidavit required herein, the truth and accuracy of this affidavit to interrogatories hereinafter made. **LEE COUNTY RESERVES THE RIGHT TO REQUEST SUPPORTING DOCUMENTATION, AS EVIDENCE OF SERVICES PROVIDED, AT ANY TIME.**



AFFIDAVIT CERTIFICATION
IMMIGRATION LAWS

SOLICITATION NO.: B-130513 PROJECT NAME: Electric Motor Repair and Replacement Services

LEE COUNTY WILL NOT INTENTIONALLY AWARD COUNTY CONTRACTS TO ANY CONTRACTOR WHO KNOWINGLY EMPLOYS UNAUTHORIZED ALIEN WORKERS, CONSTITUTING A VIOLATION OF THE EMPLOYMENT PROVISIONS CONTAINED IN 8 U.S.C. SECTION 1324 a(e) {SECTION 274A(e) OF THE IMMIGRATION AND NATIONALITY ACT ("INA").

LEE COUNTY MAY CONSIDER THE EMPLOYMENT BY ANY CONTRACTOR OF UNAUTHORIZED ALIENS A VIOLATION OF SECTION 274A(e) OF THE INA. **SUCH VIOLATION BY THE RECIPIENT OF THE EMPLOYMENT PROVISIONS CONTAINED IN SECTION 274A(e) OF THE INA SHALL BE GROUNDS FOR UNILATERAL CANCELLATION OF THE CONTRACT BY LEE COUNTY.**

BIDDER ATTESTS THAT THEY ARE FULLY COMPLIANT WITH ALL APPLICABLE IMMIGRATION LAWS (SPECIFICALLY TO THE 1986 IMMIGRATION ACT AND SUBSEQUENT AMENDMENTS).

Company Name: Mader Electric Motors
Signature: [Signature] Title: VP Date: 7-25-13

STATE OF FL
COUNTY OF Lee

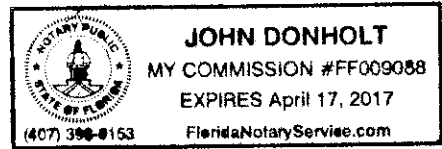
The foregoing instrument was signed and acknowledged before me this 25 day of July 20 13, by Jeremy Mader who has produced
(Print or Type Name)
driver license as identification.

(Type of Identification and Number)

[Signature]
Notary Public Signature

John Donholt
Printed Name of Notary Public

#FF09088 April 17th 2017
Notary Commission Number/Expiration



The signee of this Affidavit guarantee, as evidenced by the sworn affidavit required herein, the truth and accuracy of this affidavit to interrogatories hereinafter made. **LEE COUNTY RESERVES THE RIGHT TO REQUEST SUPPORTING DOCUMENTATION, AS EVIDENCE OF SERVICES PROVIDED, AT ANY TIME.**

- 2. **Project Approach** (maximum 25 pages)
Describe, in detail, the proposed strategy for providing the services as listed. Include emergency and non-emergency response times, estimates of typical repair times for motors and pumps, a sample predictive maintenance proposal, and your warranty policy.
- 3. **Additional Information (optional)** (maximum 10 pages)
Provide any additional information that may assist in the evaluation of the quotation.

VENDOR REQUIREMENTS

Lee County shall require that the vendor provide the following services in conjunction with their motor repair capabilities. Vendors must indicate below for each numbered statement whether you can comply (yes) or cannot comply (no) and should submit this page with your quotation. If your answer is no, please briefly explain why you cannot comply.

- 1. **Field Service Capabilities** – provide trained personnel and service vehicles to Lee County in the removing and re-installing of all rotating equipment if required.
Yes X No _____
- 2. **Predictive Maintenance** – provide trained personnel and service vehicles to Lee County for vibration analyses, field balancing, and laser alignment of all equipment pulled out of service and reinstalled where applicable. Vendor must own and maintain an IRD Data Pac 1500 and a Fixture Laser or equivalent to perform these services. A hard copy of results will be furnished with each repair.
Yes X No _____
- 3. **U.L. 508 Control Panel Builder** – Vendor will supply to Lee County the ability to design, engineer, fabricate and install a U.L. Listed Control Panel. It is not necessary for the vendor to fabricate or engineer these panels in-house; panels not built on the vendor’s premises but are built to County specifications in a U.L. 508 panel facility will be acceptable
Yes X No _____
- 4. **Inventory** – Vendor will maintain a motor inventory of high efficiency motors from fractional up to and including 150HP, 460-volt, TEFC, 1800RPM at his repair facility. A copy of his current inventory will be required prior to ratifying contract.
Yes X No _____

INSURANCE REQUIREMENTS (MINIMUM):

The company submitting the RFQ must be able to provide a copy of their current Certificate of Insurance or a letter from their insurance company evidencing the fact that the Vendor is able to be insured pertaining to Electric Motor Repair & Replacement Services as per the insurance requirements detailed in these specifications. The certificate or letter should be included with your quote response.

Yes X No _____

1. Introduction

1.1 OVERVIEW

This Model Repair Specification lists the suggested minimum requirements for the repair and overhaul of low-voltage random-wound three-phase AC squirrel cage induction motors, which are sent for repair. It pertains to motors with anti-friction bearings (ball and roller) only.

1.2 INTENT

The intent of this Model Repair Specification is to achieve a consistent, high quality diagnosis, repair and/or overhaul of a motor, and to return it to good operating condition with a minimum of delay and cost. Not all repair situations can be covered in this Model Repair Specification. In the absence of specific instructions, the requirement shall be to restore the motor to as-manufactured condition.

1.3 REFERENCE DOCUMENTS

The references to be used in conjunction with these Model Repair Specifications are the latest editions of the following:

- UL** UL674 Electric Motors and Generators For Use In Hazardous Locations
- EASA** AR100-1998 Recommended Practice For The Repair of Rotating Electrical Apparatus
- IEEE** IEEE Std. 43, Recommended Practice for Testing Insulation Resistance of Rotating Machinery
IEEE Std. 112, IEEE Standard Test Procedure for Polyphase Induction Motors and Generators
- ISO** ISO Std 1940-1, Mechanical Vibration—Balance Quality Requirements of Rigid Rotors
- NEMA** NEMA Std. MG-1, Motors and Generators
- ABMAANSI/ABMA** Std. 7, Shaft and Housing Fits for Metric Radial Ball and Roller Bearings

Vendors should indicate for each numbered statement whether they can comply (yes) or cannot comply (no) and submit these pages with their quotation. If your answer is no, please briefly explain why you cannot comply.

1.4 HAZARDOUS LOCATIONS

Motors intended for use in hazardous locations will have a nameplate to that effect. The repair work shall be done in a facility that has been certified by the Underwriters Laboratories to meet the requirements of UL674 Qualification of Facilities Engaged in the Repair of Electric Motors and Generators for use in Hazardous Locations. Subcontracting these services will be acceptable. If the explosion-proof characteristics of the motor are not to be maintained, then the nameplate shall be altered to reflect this, and the motor will no longer be considered suitable for use in hazardous areas.

Yes X No

1.5 GENERAL

1.5.1 Unavoidable Degradation

During the course of repair, if any damage is found which cannot be fully repaired, the County's approval is required before proceeding. Likewise, if any repair is indicated which may result in a permanent degradation of efficiency or other performance parameters, the County's approval is required before proceeding.

Yes X No

1.5.2 Operating Environment

If this motor operates in severe environmental conditions, it will be indicated on the accompanying motor repair form. No repair methods or materials may be used which make the motor more vulnerable to these conditions than it was as originally built.

Yes X No

1.5.3 If Powered by an Inverter

If "Powered by ASD" is checked on the accompanying Motor Repair Form, this motor is powered by a pulse-width-modulated inverter. The windings shall be sufficiently insulated and supported to withstand this type of power supply. Magnet wire must be of a design intended for inverter duty. The wire manufacturer and specification shall be reported to the County. Quad wire rated for inverter duty will only be accepted.

Yes No

1.5.4 Subcontracted Work

Motor repair vendor will be responsible for performing all work. Absolutely no subcontracting of any repair work will be allowed. All winding will be performed at vendor's facility. The purchasing of form wound coils will be allowed.

Yes No

2. Repair Procedures

2.1 DOCUMENTATION

2.1.1 Repair Forms

The motor will be accompanied by a Motor Repair Form from the County which will list the perceived problems, the operating environment, the urgency of the repair, past problems where applicable, the required repair, cost constraints, missing parts and the person within the Utilities to be contacted about the repair. This form shall be used as a guide for the repair. A sample is included in Section 4 of these specifications.

During repair, actions and findings will be recorded on a Repairer's Tracking Form. It shall contain records of all the work done, problems noted, checks and measurements taken during the work, repairs carried out and the final tests conducted prior to shipping. Requirements for the work, checks and tests are listed in the following sections.

Yes No

2.1.2 Expanded Work Scope

If tests and inspection indicate problems beyond the initial scope of the listed repair, then the designated person shall be contacted and given a description of the problems, plus an estimate of their effect on delivery and costs.

Yes No

2.1.3 File

The repairer will keep a copy of the Motor Repair Form in their file for the particular job for up to three years from the date of delivery.

Yes No

2.2 INCOMING INSPECTION

On receipt of the motor and after reading the Motor Repair Form, the repairer shall do the initial tests set out below, plus any other tests indicated by the form.

2.2.1 Intent

The intent of the initial tests shall be to determine and record the probable cause of failure, if any, to document certain pre-repair parameters, and to determine what work is required.

Yes No

2.2.2 Visual

A visual inspection shall be made to assess the general condition of the outside of the motor for cracks, broken welds and missing parts.

Yes No

2.2.3 Insulation to Ground

An insulation resistance test to ground shall be performed, at a voltage suitable for the motor's voltage rating and the apparent condition of the motor. The testing shall be as follows:

- The initial test voltage shall be 500 volts DC.
- For motors where there is more than one winding, the insulation shall also be tested between windings, at the test voltage appropriate to the lower voltage winding, with other windings grounded.
- The duration of the insulation test shall be one minute. The temperature shall be recorded.

Yes No

2.2.4 Bearings

The shaft shall be manually rotated to check for any obvious problems with the bearings or shaft.

Yes No

2.2.5 No Load Run

If possible, the motor shall be run on no load, at nameplate voltage and checked for balanced currents and vibration. The readings shall be noted on the Repairer's Tracking Form.

Yes No

2.3 DISMANTLING

2.3.1 Identify Problem

After the incoming inspection, the motor shall be dismantled to the extent needed to either fully identify or repair the problem, or to do the specified overhaul.

Yes No

2.3.2 Markings

End brackets and frames shall be clearly match-marked with numerals or letters.

Yes No

2.3.3 Parts Storage

Bolts and small parts shall be stored in dedicated containers and parts from other jobs shall not be kept with them.

Yes No

2.3.4 Insulated Bearings

If the motor has insulated bearings, note which, if any have the insulation deliberately bridged. The insulation resistance of each insulated bearing shall be at least 10-megohms with a 500-volt DC test.

Yes No

2.3.5 Dowels

If dowels or fitted bolts are used to ensure accurate fits, the location of these pieces shall be identified.

Yes X No _____

2.3.6 Explosion Proof

Repairer or repairer's subcontractor must be certified by UL for repair of explosion-proof motors. For motors certified for hazardous locations, extra care shall be taken to ensure that joints and flame paths are not damaged during the work. If damage requiring other than normal repair is found, Utilities shall be notified before proceeding with repair.

Yes X No _____

2.3.7 Rotor Removal

For horizontal motors where the shaft rotor assembly is too heavy to be removed easily by hand, one or two cranes shall be used to move the shaft, with a close fitting pipe installed over one end of the shaft to act as a shaft extension. Attention shall be paid to the following:

- Care shall be taken that the slings do not damage the bearing surfaces or the rotor.
- Under no circumstances shall the stator windings be touched by any of the parts being moved.

Yes X No _____

2.4 VERTICAL MOTORS

Vertical motors shall be dismantled according to the manufacturer's instruction book. The assembly of vertical motors is critical. Particular attention shall be paid to, and records kept of:

- The amount of rotor lift (end play);
- The make and types of bearings, particularly the thrust bearings including orientation of thrust bearings;
- The arrangement of the thrust and guide bearings, including specially ground mating surfaces;
- The axial and radial clearances (fit) to the shaft and housing;
- The method of lubrication of both upper and lower bearings;
- The method of bearing insulation, if any; and
- Any other particular features of the motor configuration.

Yes X No _____

2.5 WINDING REMOVAL

2.5.1 General

For motors that are to be rewound, the core shall be stripped, cleaned, tested and repaired.

Yes X No _____

2.5.2 Take Data

Winding data shall be recorded so as to permit replicating original configuration.

Yes X No _____

2.5.3 Core Loss

A core loss test shall be done on all stators both before and after stripping and iron repair, to check for damaged interlaminar insulation. The tests shall be done at a flux density of 85,000 lines per square inch rms. Exciting current and watts loss shall be recorded each time, as well as a physical check carried out for hot spots. If data from previous tests are available, the results shall be compared. Testing at other flux densities may be done if previous data is available.

If hot spots exceed 15°C above the average temperature after 10 minutes, or losses are excessive overall either before or after stripping, the situation shall be discussed with Utilities before proceeding further. For a core without any hot spots, the losses after stripping shall not be more than 10% higher than the pre-strip losses. To avoid misleading results, the second core loss test should not be done until the core has been cleaned and dried.

Vendor will own and maintain a core loss tester equivalent to or better than a Phenix Core Loss Tester.

Yes X No _____

2.5.4 Burn Out

The winding shall be burned out in a controlled temperature burnout oven where the part temperature is limited by means of fuel control and supplementary (water spray) cooling to 360°C (680°F) for organic (C3) or 400°C (750°F) for inorganic (CS) interlaminar insulation. If a higher temperature is deemed necessary, repairer shall reference communication or documentation from the motor manufacturer indicating that the core iron can safely withstand the temperature.

Yes X No _____

2.5.5 Aluminum Frame

Frames may be chemically stripped if burnout facilities are not available. Other methods of stripping may only be used with Utilities' approval.

Yes X No _____

2.6 CORE PREPARATION

2.6.1 Cleaning

The stripped core shall be cleaned of all foreign material, such as insulation debris, and dried.

Yes X No _____

2.6.2 Iron Damage

All obvious iron damage, plus any problems indicated by the core loss tests, and significant frame damage, shall be reported to Utilities before proceeding further.

Yes X No _____

2.6.3 Method of Repair

The method of repair to damaged cores shall be discussed with Utilities and shall be chosen from the following:

- **Grinding.** Selective grinding with a small sharp power tool.
- **Spray between laminates.** Separating laminations and re-insulating with spray-on inter-laminar insulation.
- **Mica between laminations.** Inserting split mica between the laminations.

- **Restacking.** Restacking, with deburred laminations and new interlaminar insulation.

Yes X No _____

2.6.4 Core Loss Test

A final core loss test shall be done as described in sub-section 2.5.3.

Yes X No _____

2.7 REWINDS

2.7.1 Winding Details

The total cross sectional area of a turn, the turns per coil, the span and connection of the coils shall not be changed without authorization from Utilities.

Yes X No _____

2.7.2 Thermal Class

Class H or higher system materials shall be used throughout. Windings which were originally Class F or lower shall be rewound with Class H magnet wire and materials.

Yes X No _____

2.7.3 Sensors

Temperature sensing devices shall be replaced with devices comparable to those previously used.

Yes X No _____

2.7.4 Explosion Proof

If the temperature class of the insulation of an explosion-proof motor has been increased, a temperature sensor shall be installed to monitor and limit the motor surface temperature to the original maximum external temperature. The motor shall be tagged with a warning to the operator that to maintain the hazardous area classification, the sensor must be connected to shut down the motor.

Yes X No _____

2.7.5 Insulation Materials

Insulation shall include, as a minimum, the following components:

- **Turn insulation.** Multiple build coating turn insulation of polyamide, polyimide or a combination of both over polyester, or equivalent;
- **Slot Liner.** Slot liner extending at least one-quarter inch past each end of the slot;
- **Separator.** Center strip or separator between the top and bottom coil sides in a slot;
- **Wedge.** A top piece to hold the coils in the slot (where needed, a bottom filling piece shall be used to make up any extra space in the slot); and,
- **Phase Barriers.** Phase barriers between end turns of different phases (these shall be trimmed to permit clear airflow).

Yes X No _____

2.7.6 End Turns

The end turns shall be fully compacted so that there are no loose wires. Both sets of end turns, plus leads and jumpers, shall be laced tightly together so that each coil is tied securely to the two adjacent coils.

Yes No

2.7.7 Connections

All connections shall be brazed with materials that will not be subject to corrosion in the specified operating environment. They shall have no sharp edges and shall be insulated.

Yes No

2.7.8 Winding Test

Before impregnation, the winding shall be tested to verify that there are no wrong connections or shorted turns. This will include a surge comparison test, a high potential test, and winding resistance test using a Baker D12000 Hi-Pot and a Baker DLRO Tester or equivalent. Voltage used shall be as indicated in EASA Recommended Practices for the Repair of Rotating Electrical Apparatus or other standards approved by Utilities. Any defects shall be corrected and retested before impregnating. Test results shall be recorded in the Repairer's Tracking Form.

Yes No

2.7.9 Impregnation

The rewound stator shall be impregnated in one of the following ways:

Dip-and-Bake. Double dip-and-bake cycle using resin or varnish and a temperature controlled bake oven (baking times and temperatures shall be recorded in the Repairer's Tracking Form.)

Trickle. A trickle epoxy or polyester treatment where the resin is poured into the end turns and slots of a vertically inclined stator, which has been heated with controlled electric current to assist in curing the resin.

Yes No

2.8 ROUTINE OVERHAULS

2.8.1 Testing

After dismantling, the following procedure shall be followed:

- Winding and cooling ducts shall be cleaned, dried and inspected.
- Winding insulation resistance shall be tested at 500 volts DC.
- The duration of the test shall be one minute. The minimum acceptable level after one minute, corrected to a 40°C reference temperature per IEEE 43, is 20 megohms. Levels less than 20 megohms shall be discussed with Utilities.
- If satisfactory levels are not attained, the winding shall be re-cleaned and dried thoroughly at a temperature not exceeding 90°C (195°F), and then retested.
- After successful insulation resistance to ground has been achieved, the winding shall be given a high potential or surge comparison test. Voltage level used shall be as indicated in EASA Recommended Practice for the Repair of Rotating Electrical Apparatus or other standards approved by Utilities.

Yes No

2.8.2 Cleaning

The components, including the stator windings, shall be cleaned with hot water and a suitable detergent after heavy deposits of dirt and grease have been removed by scraping and wiping.

If necessary, brushes shall be used to clean small passages in components.

Solvents shall not be used to clean insulation, but may be used on mechanical components of the motor.

All components shall be thoroughly dried at a temperature less than 90°C (195°F), for as long as it takes to remove all signs of moisture. For windings, this will be indicated by the insulation resistance stabilizing after some hours of drying.

Yes No

2.8.3 Repairs

After satisfactory insulation resistance has been attained, all loose or damaged wedges, slot sticks, coil supports etc., shall be replaced or repaired.

The winding shall then be given a minimum of two dip-and-bakes using a Class H or higher-grade varnish. Immersion and baking times shall be sufficient to penetrate any cracks and give a sealed durable finish to the insulation. The repairer shall notify Utilities if a dip-and-bake is undesirable.

Yes No

2.8.4 Other

The routine overhaul of other parts of the motor shall return the parts to good condition.

Yes No

2.8.5 Reassembly

The assembly of the motor after overhaul is covered in sub-section 2.15.

Yes No

2.9 ROTOR TEST AND REPAIR

2.9.1 Testing

All rotors shall be given a test for damaged bars, whether the motor is suspect in this area or not. This test shall apply a stable single-phase voltage to the stator of the assembled motor while the shaft is slowly turned through at least one revolution. Any fluctuations of stator current in excess of 3 percent shall be investigated further.

Other methods may be used if the stator winding is faulty and it can be shown that they have a good record of detecting faults.

For motors where electrical or mechanical problems with the rotor are suspected, more sophisticated tests shall be used. These include one or more of the following:

- Growler tests;
- Current analysis or vibration analysis of a loaded motor;
- Physical examination;
- Ultrasonic examination of the bars and end rings; and,
- Core loss tests (axial current thorough shaft).

Yes No

2.9.2 Fabricated Cage Repair

Since repair of squirrel cages can be expensive, no work shall be done in this area without Utilities' approval.

Yes X No _____

2.9.3 Cage Replacement

For cage replacement, the conductive, metallurgical and strength characteristics of both the bar and end ring materials shall be determined and duplicated. Since changing the rotor resistance or density has major effects on the motor performance, no change in these is permitted without Utilities' approval.

Any parts that are to be reused shall be cleaned and examined for defects.

Yes X No _____

2.9.4 Testing

After fabrication, the joints shall be examined and tested by ultrasonic or comparable means.

Yes X No _____

2.9.5 Balance

The rotor shall be dynamically balanced to the tolerances listed in sub-section 2.14 of these specifications.

Yes X No _____

2.9.6 Cast Rotor Repair

A defective cast cage shall not be repaired without prior authorization from Utilities.

The method of repair shall be to remove the old cage by chemical means, without damaging the laminations, followed by re-barring with extruded, aluminum bars and duplicate cast aluminum end rings to give the same cage resistance as before.

Yes X No _____

2.9.7 Iron Repairs

Because of the costs involved, this work shall not be done without prior approval from Utilities. If tests or observation indicate that the laminations have been damaged, they shall be repaired or replaced with new laminations. Care shall be taken to ensure a consistent air gap.

Yes X No _____

2.10 SHAFT REPAIR

2.10.1 General

If information on the Motor Repair Form or any tests indicates that there may be a shaft problem, it shall be tested and repaired or replaced. If there is any risk or uncertainty in the proposed repair method, this shall be discussed with Utilities prior to proceeding.

Yes X No _____

2.10.2 Requirements

When the work is completed, the shaft shall meet the following criteria:

- **Total Indicated Runout.** It shall be straight, with a Total Indicated Runout (TIR) when measured in V blocks, of no more than 0.051 mm (0.002 inch) for up to 41.3 mm (1.625 inch) shaft diameter and no more than 0.003 inch for larger diameters.
- **No Cracks.** The shaft shall have no cracks. If ultrasonic, magnetic particle, dye penetrant or other testing methods are needed to verify this; they shall be documented

in repair records.

- **Straightness.** The shaft shall be straight, parallel and undamaged at the bearing areas. If any measurable but acceptable deviation from this is noted, it shall be documented in repair records.
- **Journal Repairs.** Make journal repairs by welding or plating, followed by machining and grinding, with fit as specified in section 2.11.4.
- **Fit To Rotor.** The shaft shall be a tight fit to the rotor iron. If there is looseness, the shaft shall be built up and turned for proper interference fit, or shall be replaced.
- **Shaft Material.** New shafts shall be machined from AISI Gr. C1045 hot rolled steel or better. For special applications, the service center shall consult with the manufacturer and report recommendations to Utilities.
- **Tolerances.** Shaft extension dimension tolerances shall be within the limits specified in NEMA MG-1, Motors and Generators sections.

Yes X No _____

2.11 ANTI-FRICTION BEARINGS

2.11.1 New Bearings

Anti-friction bearings shall always be replaced. New bearings shall be SKF brand, unless otherwise approved by Utilities. If the bearing type, size, sealing, shielding or configuration is changed, this shall be noted on a supplemental nameplate. If the original bearing race showed pitting from shaft current, the causes and remedy for this shall be discussed with Utilities.

Yes X No _____

2.11.2 Shielding, Sealing

If the method of shielding, sealing or lubricating is to be changed, it shall be approved by Utilities.

Yes X No _____

2.11.3 Clearance

Unless otherwise specified by the manufacturer or Utilities, C3 clearance bearings shall be used for all bearings.

Yes X No _____

2.11.4 Tolerances

Fitting tolerances to the journals and housings shall be per manufacturer's specifications. Out of tolerance fits shall be restored. (Reference ANSI/ABMA Std. 7-1995 as a guide.)

Yes X No _____

2.11.5 Heating

The bearing shall be heated, without use of direct flame, to approximately 94°C (200°F) to permit it to be slid easily onto the shaft up to the shoulder. Bearings with bores under 45mm may be press fit.

Yes X No _____

2.11.6 Grease

Greaseable bearings shall be lubricated as specified in the EASA Recommended Practice for the Repair of Rotating Electrical Apparatus or other standards approved by Utilities.

Lubrication shall be in accordance with the motor manufacturer's recommendations if available. Otherwise fill the cavity to 1/3 capacity. The lubricant shall be compatible with both Utilities' lubricant and the lubricant packed by the bearing manufacturer.

Yes No

2.11.7 Insulated Bearings

Insulated bearing resistance shall be at least 10 megohms. Voltage applied from the megohmmeter should not exceed 500 VDC. Alternately a 1 15VAC test lamp may be used. No light should be visible from the lamp filament. (Reference IEEE 112-1996, section 9.4.3. or EASA AR100-1998)

Yes No

2.12 END BRACKETS

2.12.1 Requirements

End brackets shall fit snugly to the stator frame. Worn dowel holes and rabbet fits shall be repaired.

Yes No

2.12.2 Tolerances

See section 2.11.4 for the fit of the outer diameter of anti-friction bearings to housings.

Yes No

2.12.3 Repairs

Repairs to end bracket-bearing housings shall be by building up the metal and machining to size. Welding, plating and sleeving are the accepted methods.

Epoxies and other compounds shall not be used for locking bearings.

Yes No

2.13 OTHER DEVICES

2.13.1 Fans

Fans shall be checked for cracks and fit to the shaft or rotor.

Fans shall be firmly fixed to the shaft or rotor by the original factory method, unless there has been corrosion between dissimilar metals, in which case a new method shall be proposed to Utilities. Welding to the shaft is not permitted.

Repairs to fans shall only be done after discussion with Utilities.

New fans shall be as supplied by the original manufacturer if available.

Fans used in motors for use in hazardous locations shall be made of material that will not cause sparking; either by impact or by build-up of static electricity.

Yes No

2.13.2 Temperature Sensors

Temperature sensors shall be installed in the motor as originally found or as otherwise specified by Utilities.

- **Bearing.** Bearing sensors shall be of the same type as those removed and shall be located to sense, as nearly as possible, the highest bearing temperature. If the original bearing sensor was insulated, the replacement shall also be insulated.

- **Winding.** Sensor type shall be the same as the original and will usually be located in the end turns.

Yes No

2.13.3 Leads

Leads shall be flexible and multi-stranded, and have at least the same cross sectional area as the original leads. Temperature class must be the same as original or better.

Main power and accessory leads shall be indelibly marked using the same marking systems as the incoming motor. If this is illegible, then the system described in NEMA MG-1, Motors and Generators, Section 2 shall be used and a notice describing the system attached to the terminal box. Every effort shall be made to keep the original direction of rotation.

Lugs, if used, shall be suited for the application and have all cable strands in the lug. No cable strands may be cut off or bent back to facilitate insertion in the lug.

If crimp lugs are used, the correct make and style of die shall be used for the particular lug, and the correct compression applied.

Yes No

2.13.4 Terminal Boxes

Terminal boxes shall be returned to original condition. In particular, the following items must be confirmed.

- Missing bolts and gaskets for both the cover and the motor-to-box joint shall be replaced.
- On motors certified for hazardous environments, the junction boxes shall be sealed off from the main body of the motor by a sealing compound approved by UL for this application.
- Damaged flanges shall be repaired. No paint or gaskets shall be left on the flanges of boxes for explosion-proof motors.

Yes No

2.13.5 Space Heaters

Space heaters shall be tested for insulation resistance for one minute at 500 volts. A 10-megohm minimum resistance is acceptable.

They shall be tested for correct functioning.

Yes No

2.13.6 Vibration Sensors

Vibration sensors shall be replaced in their original locations.

Yes No

2.14 BALANCING

The motor rotor shall be dynamically balanced in a balance stand before assembly of the motor. An IRD 5000 pound dynamic balancer or equal will be used for every motor repair and recorded on repairer's tracking card. Balance criteria include the following:

- **Half key.** It shall be balanced with a half key in the keyway.
- **Tolerance G2.5 (ISO 1940-1).** Generally, the permitted total imbalance is $i5W/N/2 = \text{oz in/plane}$ where W is weight of rotor in pounds and N is operating speed in RPM. (426 $W/N/2 \text{ gin. in/plane}$)

- **Tolerance G1.0 (ISO 1940-1).** Two Pole rotors should be balanced to $6W/n/2 =$ oz.in./plane. (170.4 W/n/2 gin. in./plane)
- **Material removal.** If material is removed, structural integrity and fan capacity shall be maintained.
- **Added material.** Added material shall be able to withstand the centrifugal forces and be positioned either in the manufacturer's designated positions and locked in place, or positioned in a location where centrifugal force will tend to keep the material in place. Weights may be attached to metallic parts only.

Yes No

2.15 REASSEMBLY

The assembly of the motor is the reverse of the disassembly process and the following points shall be observed:

- Match marks shall line up.
- On reinsertion of the rotor, take care not to damage the journals or the stator windings. Cranes, slings and extension pipes shall be used on heavy rotors. Check axial alignment of stator and rotor cores.
- Dowels and fitted bolts shall go back into the same holes that they came from.
- Where they can be measured, all air gaps shall be within 10 percent of the average.
- On motors with insulated bearings, the insulation shall be checked and noted. (See 2.11.7)
- On vertical motors, the lift on the shaft shall be the same as the original manufacturer's setting, unless Utilities and the repairer agree that a modified setting would give better performance.
- Motors for use in hazardous environments shall have all the explosion-proof features maintained and verified in accord with UL674.

Yes No

2.16 FINAL TESTS

2.16.1 Insulation

Prior to running, the motor shall be given an insulation resistance test to ground in the following manner:

For rewound motors, a DC high potential test shall be conducted at 1700 VDC for motors to be powered by less than 250VAC service voltage. Motors to be powered between 250VAC and 600VAC service voltage shall be tested at 1700VDC plus 3.4 times the machine's voltage rating, e.g. 3264VDC for a 460VAC machine. Readings corrected to 40°C, which are less than 20 megohms, shall be discussed with Utilities. Vendor will own and maintain a Baker D12000 Hi-Pot Tester or equivalent to perform these tests and shall print out results and attach to each job tracker.

Yes No

2.16.2 Running Test

After the insulation tests, the motor shall be run at no load at full terminal voltage, with either a half key or a half coupling, on the shaft. If the motor uses an external oil supply and removal

system in normal use, a similar system shall be arranged for the test. The test shall determine that:

- **No Load Amps.** No load current unbalance at balanced rated voltage shall be less than 2 percent.
- **Vibration.** Horizontal, vertical and axial readings shall be taken at each bearing and results recorded for Utilities' review. Repairer shall record vibration of motor with motor bolted down to an isolated test stand installed in repairers shop for accurate readings.
- **Temperature Rise.** Temperature rise after levels stabilize shall be within normal limits on the frame and bearings.
- **Shipment** At the completion of the test, the motor shall be painted as specified by the Utilities, and prepared for shipment. Any lubricant and coolant inlets and outlets shall be plugged and masked before painting and shipping. Any special precautions or preparations that should be noted before powering the motor shall be indicated on a tag.
- **Testing** of all motors shall be done with a Hubbell Hipotronics Motor Tester or equivalent and be capable of printing out no-load running amps, voltage, vibration, and bearing temperature for each motor repair. Tester shall be able to run AC motors up to 4160-volts and DC up to 600-volts
 Yes No

3. Quality Control

3.1 MEASURING INSTRUMENTS

3.1.1 Calibration

All measuring instruments shall be calibrated regularly. The calibration records shall be available for Utilities' inspection. Minimum frequency of calibration shall be annually, except:

- **Insulation Testers.** Insulation resistance testers—every six months to a known resistance;
- **Dimension Meters.** Micrometers, vernier calipers and other dimension measuring devices—every six months against a minimum grade AA gauge block set; and,
- **Bore Gauges.** Bore gauges shall be calibrated to a certified standard before and after each use.
 Yes No

3.1.2 Storage

All measuring equipment shall be stored in a clean dry environment.
 Yes No

3.2 MATERIALS

3.2.1 Anti-Friction Bearings

Anti-friction bearings shall be replaced with new SKF brand or equal, upon authorization from Utilities department. Bearings shall be stored in their factory packaging in a clean, dry, location. The location shall be isolated from any vibration strong enough to be felt by hand.

Yes No

3.2.2 Solid Insulation

Insulating materials such as slot liners, tapes and phase insulation shall be used and shall meet or exceed the temperature class H rating and shall be compatible with the resins used.

Specifications for the materials shall be obtained from the material supplier and kept for checking their suitability for the application.

Yes X No _____

3.2.3 Resins And Varnishes

The manufacturer's material specifications for resins and varnishes shall be kept on file, to permit checking for correct storage, handling and usage.

A sample shall have been taken and analyzed to be satisfactory within three months of its being used on a motor.

Yes X No _____

3.2.4 Other Materials

Other materials shall be new and of good quality. In particular the following shall be confirmed:

- **Lead Wires.** Lead wires shall be multi-stranded and flexible with insulation meeting or exceeding the temperature and voltage class of the motor.
- **Magnet Wire.** Magnet wire for random-wound motors shall be compatible with the other insulation system components and shall be insulated with a polyamide, polyimide or a combination of both, over a polyester base coat, or equivalent. Any wire damaged in storage or working shall be replaced. The manufacturer's specifications for the insulation shall be kept on file for reference. Inverter grade wire rated 1600-volts shall be used on all motors regardless if the motor is run off of a variable frequency drive or not.

Yes X No _____

3.3 TESTS AND INSPECTION DURING WORK

3.3.1 Records

Records shall be kept of all tests and inspections carried out during the work. Signed copies of these records shall be shipped in original form, at the same time as the motor, to the designated contact person. Vendor shall keep all records for a period of not less than 3 years from date of repair.

Yes X No _____

3.3.2 Access

Lee County Personnel shall have access to the repair facilities at all times that work is being done, for the purposes of checking progress and inspecting the work. Due to emergency response time and the need for shop inspections, vendor's repair facility shall be no more than 90 miles from Detar Warehouse at 5180 Tice Street, Fort Myers, FL. NO EXEPTIONS.

Yes Y No _____

3.4 FINAL INSPECTION AND TEST

For all motors over 100 HP, or when Utilities specifies, Utilities shall be informed when the final inspection and testing of the motor is to take place. Utilities shall have the right to be present for tests on any motors.

In emergency cases, tests will not be held up waiting for Utilities representatives, but every effort shall be made to keep Utilities informed so that they can be present if possible.

All final inspection and test results shall be sent, in their original form, to the designated contact person.

Yes X No _____

4. Motor Repair Form

Repairer:			Date:	
Motor	Facility	Dept.	Process	Description
Designation:				
Manufacturer:		Type:	Power:	
Volts:	Amperes:	Speed:	Frame:	
Serial #:		Bearings:	Lubricant Grade:	
		Replace w/bearing		
		by (mfg):		
Other:				
Service:			<input type="checkbox"/> Powered by ASD	<input type="checkbox"/> Contamination
Explain:			<input type="checkbox"/> High Altitude	<input type="checkbox"/> High Ambient Temp
Reason sent for repair:				
Required work:				
Past problems with machine:				
Missing parts:				
Urgency: (check one)		Cost limitations:		
<input checked="" type="checkbox"/> Rush, full O.T.		<input type="checkbox"/> Contact with price before work		
<input type="checkbox"/> Rush, limited O.T.		<input type="checkbox"/> Go ahead, advise price		
<input type="checkbox"/> ASAP, no O.T.		<input type="checkbox"/> Other		
<input type="checkbox"/> Routine (specify time)				
<input type="checkbox"/> Hold points if required				
Special instructions				
Contact:			Phone:	
Reference:				