



***Reliability Services & Vibration Analysis
Report
JULY 2010***

Manufacturing & Mining Incorporated



July 23, 2011

Manufacturing and Mining Incorporated
7 Plant
6385 Palmbury Rd.
Anywhere, MN 65747
(989) 753-9999

Mr. Bill Williams,

The following is the Reliability Concepts vibration and consulting services report for your facility. If you have any questions, please contact Reliability Concepts LLC at (517) 278-8057. Should you need immediate assistance contact me on mobile # (517) 914-4676.

Sincerely,

Michael A. Olszewski
Reliability Concepts LLC

Vibration Priority Summary

1. Emergency Situation

Continued operation could result in machinery damage or personal injury.

2. High Alarm

Machinery should be repaired as soon as possible.

3. Alarm

Machinery is in advanced stages of failure. Equipment should be inspected and repairs scheduled.

4. Low Alarm / Watch List

Fault is present, however levels do not require immediate attention.

5. Equipment Status OK

No action required.

6. Equipment Repaired

Equipment has been repaired since the last survey.



Reliability Services Activity Summary

Mr. Williams:

For this month's survey 15 items are noted on the reliability report. This summary will provide a brief explanation of the exceptional problems observed.

1. The Eirich Pan Drive South Motor and gearbox show an increase of gear defects/bearing defects and looseness. Monitor closely, unit should be repaired/replaced at soonest opportunity.
2. The Surge Bin Elevator Head Pulley Bearings are showing an increase of vibration due to contamination. The source of contamination, which was due to positive pressure in the elevator and surge bin, has been corrected. However the bearing seals have been compromised and the resulting bearing contamination has caused some early bearing defects. Lubricate bearings frequently and monitor this condition.
3. The West Blast Dust Collector is showing early fan bearing defects. No corrective action is necessary at this time.



Manufacturing and Mining Plant
July-10

Machine Name	Machine ID	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	Current Notes		
Disa #2 "West" UNIT #10	U010	5	5	5	5	5														5		
Disa #1 "East" UNIT #18	U018	5	5	5	5	5															5	
Disa Feedbelt "West" Unit#59	U059	5	5	5	5	5															5	
AERATOR "WEST" FOR #2 DISA	U060	4	4	4	4							3	6	5	5	5	5	5	5		5	
Disa Feedbelt "East" Unit#62	U062	5	5	5	5	5															5	
AERATOR "EAST" FOR #1 DISA	U063	3	3	5	5	5			5			5	5	5	5	5	5	5	5		4	Bearing Defects
VAC PUMP "EAST" FOR #1 DISA	EDVPE	5	5	5	5	5			5			5	5	5	5	5	5	5	5		3	Motor Bearing Defects
VAC PUMP "WEST" FOR #1 DISA	EDVPW	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
DISTRIBUTION BELT UNIT #57	U057	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
PREPARED SAND BELT UNIT #56	U056	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
MIXER DISCHARGE BELT UNIT#55	U055	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
EIRICH MIXER UNIT #42	U042	3	3	3	3	3			3			5	3	6	3	3	3	3	3		3	Sensor Defects
EIRICH PAN DR SOUTH MOTOR	U042S	4	4	4	6	3			5			5	5	5	2	2					2	Gearbox Bearing Defects
EIRICH PAN DR NORTH MOTOR	U042N	4	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
MIXER FEED CONVEYOR UNIT #41	U041	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
EAST DUST COLL. SCREW CONV.	NN1	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
EAST DUST COLL. ROTARY VALVE	NN5	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
WEST DUST COLL. SCREW CONV.	NN2	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
WEST DUST COLL. ROTARY VALVE	NN4	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
EAST 300 HP TOWER FAN	NN6	5	5	5	5	5			5			5	5	5	1	4	6				5	
WEST 300 HP TOWER FAN	NN7	3	3	3	3				2			5	5	5	5	5	5	5	5		5	
ROTARY SCREEN UNIT #38	U038	5	5	4	4				3			3	3	2	6	5	5				5	
RETURN SAND ELEVATOR UNIT#37	U037	5	5	4	6	3			5			5	2	5	5	5	5	5	5		5	
FLUIDBED COOLING BLOWER #36	U036BL	5	5	5	5	5			5			5	5	5	5	5	5	5	5		3	Early Bearing Defects
FLUID BED SAND COOLER #36	U036	5	5	5	5	5			5			4	4	4	4	4	4	4	4		4	Early Bearing Defects
DIDION ROTARY DRUM UNIT #102	U102	5	5	5	5	5			5			3	3	4	6	5	5	5	5		5	
DIDION RETURN SAND BELT #107	U107	5	5	5	5	5			5			5	5	5	5	5	5	5	5		3	Motor Bearing Defects
RETURNS INCLINE CONVEYOR100	U100	5	5	3	3	3			3			5	5	5	5	5	5	5	5		5	
SHAKE-OUT DISCHRG CONVEYOR24	U24	4	4	4	4	6			6			5	5	5	5	5	5	5	5		5	
FINISH INCLINE CONVEYOR24A	U24A	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
MAG DRUM FEED BELT UNIT #28	U028	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
MAG CROSS BELT UNIT #29	U029	6	5	5	5	5			5			5	5	5	3	6					6	Repaired
SAND COOLER AERATOR #35	U035	3	3	2	2				6			2	6	5	5	5	5	5	5		3	SE Bearing Defect
SAND COOLER FEED BELT #33	U033	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
Disa AMC #2 "West" UNIT NN24	NN24	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
Disa AMC #1 "East" UNIT NN25	NN25	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
GARDNER DENVER COMP #2	NN8	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
COOLER FAN MOTOR COMP #2	NN32	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
GARDNER DENVER COMP #1	NN9	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
COOLER FAN MOTOR COMP #1	NN33	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
SULLISCREW	NN10	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
East Melt Rapid Air Makeup	EMRAM	5	5	5	5	5			5			5	5	5	4	4	3				3	Bearing Defects
MELT CENTER DUST COLL. NN12	NN12	3	3	3	6	3			5			4	4	4	4	6	5	5	5		5	
EAST MELT DC ROTARY VALVE	NN98	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
WEST MELT DC ROTARY VALVE	NN16	5	5	5	4	6			5			5	5	5	4	4	4				4	Gear Defect
WEST MELT DC SCREW CONV.	NN14	5	5	5	5	5			5			5	5	5	4	4	4				4	Loose Gearbox
EAST MELT DC SCREW CONV.	NN15	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
MELT FURNACE PUMP #1	NN20	5	NR	5	5	NR			5	NR		5	NR	NR	5	5	NR	NR			5	
MELT FURNACE PUMP #2	NN21	5	5	5	NR	5			5	NR		5	5	NR	5	5	5	5	5		5	
MELT COOLING TOWER PUMP #1	NN18	5	5	5	NR				5	NR		5	NR	NR	NR	5	NR	NR			5	
MELT COOLING TOWER PUMP #2	NN19	5	NR	5	NR	5			5	NR		5	5	5	5	4					6	Repaired
#3 MELTER MAIN HYDR. PUMP	NN30	3	3	3	6	3			5			3	6	5	5	5	5	5	5		5	
#3 MELTER HYDR. COOL PUMP	NN31	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#2 MELTER MAIN HYDR. PUMP	NN28	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#2 MELTER HYDR. COOL PUMP	NN29	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#1 MELTER MAIN HYDR. PUMP	NN26	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#1 MELTER HYDR. COOL PUMP	NN27	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
MELTERS COOLING TOWER WEST	NN97	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
MELTERS COOLING TOWER EAST	NN96	2	3	3	3				6			5	5	5	5	5	5	5	5		5	
#1 BLAST LOWER SHOT AUGER	U083SC	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#1 BLAST BUCKET ELEVATOR	U083EL	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#2 BMD BLAST HYDR. UNIT #82	U082H	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#2 BMD BLAST North SHOT WHEEL	U082WN	5	5	5	5	5			5			5	5	5	3	3	3				3	Shot Wheel Wear/Unbalance
#2 BMD BLAST South SHOT WHEEL	U082WS	5	5	5	5	5			5			3	6	5	5	5	5	5	5		5	
#2 BMD BLAST SHOT FEED CONV	U082SC	5	5	5	3	6			5			5	5	5	5	5	5	5	5		5	
#2 BMD BLAST SHOT BKT ELEV	U082BE	5	5	5	5	5			5			5	2	6	5	5	5	5	5		5	
#3 BLAST LOWER SHOT AUGER	U070SC	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#3 BLAST BUCKET ELEVATOR	U070EL	5	5	5	5	5			5			5	5	5	3	3	3				3	Gear Wear/Defect
#4 BLAST LOWER SHOT AUGER	U071SC	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#4 BLAST BUCKET ELEVATOR	U071EL	5	5	5	5	5			5			3	3	3	5	5	5	5	5		5	
#1 BLAST SHOT WHEEL	U083W	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#3 BLAST SHOT WHEEL	U070W	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	
#4 BLAST SHOT WHEEL	U071W	5	5	5	5	5			5			5	5	5	5	5	5	5	5		5	

Area	Main Floor		
<u>Urgency</u>	<u>Equipment</u>	<u>Problem</u>	<u>Extended Description</u>
Priority 2	U042S EIRICH PAN DR SOUTH MOTOR	12-Jul-04 - Gear defects - Gear, Simple	Pan drive motor and gearbox show an increase of gear defects/bearing defects and looseness. Monitor closely, unit should be repaired/replaced at soonest opportunity.
Priority 3	EMRAM East Melt Rapid Air Make up	12-Jul-04 - Antifriction bearing defect - Air Handler (Fan),	Increase in vibration indicates early bearing defects. Monitor this condition. Inspect and schedule repairsLubricate frequently.
Priority 3	U082WN #2 BMD BLAST NORTH SHOT WHL	12-Jul-04 - Imbalance - Bearing Component	Overall vibration level increasing. Balance rotating assembly.
Priority 3	EDVPE East Disa Vac Pump East	12-Jul-04 - Antifriction bearing roller defects - Motor, AC	Motor bearing shows an increase in bearing defects and looseness. Monitor closely, lubricate frequently.
Priority 3	U070EL #3 BLAST BUCKET ELEVATOR	12-Jul-04 - Gear defects - Gear, Simple	Increased vibration levels in gearbox indicate gear wear and gear defects. Replace this gearbox within the next 30-60 days.
Priority 3	U042 EIRICH MIXER UNIT #42	12-Jul-04 - Other electrical faults - Unknown / Other - Unknown	Bad sensors detected on positions 1RW,2RW, 4RE 9RW&10RE Replace sensors.
Priority 3	U035 SAND COOLER AERATOR #35	12-Jul-04 - Antifriction bearing defect - Bearing Component	The south east aerator bearing is showing defects due to contamination. Inspect and repair as needed.
Priority 3	U036BL FLUIDBED COOLING BLOWER #36	12-Jul-04 - Antifriction bearing defect - Air Handler (Fan) - Drive	Vibration trending upwards and bearing inner race defect frequencies are showing up in the spectrum.
Priority 3	U107 DIDION RETURN SAND BELT #107	12-Jul-04 - Antifriction bearing defect - Motor, AC Induction	Vibration shows motor bearing defects, inspect motor and replace or repair as needed.
Priority 4	U036 FLUID BED SAND COOLER #36	12-Jul-04 - Antifriction bearing defect - Bearing Component -	The outboard flange bearing vibration data shows minor defect frequencies. Monitor this condition.
Priority 4	SBSE SURGE BIN SAND ELEVATOR	12-Jul-04 - Antifriction bearing defect - Bearing Component	The Surge Bin Elevator Head Pulley Bearings are showing an increase of vibration due to contamination. The source of contamination, which was due to positive pressure in the elevator and surge bin, has been corrected. However the bearing seals have been compromised and the resulting bearing contamination has caused some early bearing defects. Lubricate bearings frequently and monitor this condition.

Priority 4

NN16 WEST
MELT DC
ROTARY
VALVE

12-Jul-04 - Gear defects - Gear,
Simple

Increased vibration in the gearbox indicates early gear defects. Monitor this machine closely.

Priority 4

U063
AERATOR
"EAST" FOR #1
DISA

12-Jul-04 - Antifriction bearing
defect - Bearing Component

Vibration spectrum shows early stage bearing defects, due to contamination. Monitor this condition.

Priority 4

NN14 WEST
MELT DC
SCREW CONV.

12-Jul-04 - Hold down bolts loose
- Gear, Simple

Gearbox mounting bolt is loose. Gearbox is oscillating. Bolts should be tightened at next opportunity to avoid damage.

Priority 4

NN99 West
Blast Dust
Collector

12-Jul-04 - Antifriction bearing
defect - Air Handler (Fan)

Increase of vibration on fan bearings indicates early wear, monitor this condition. Corrective action not required as of this survey.

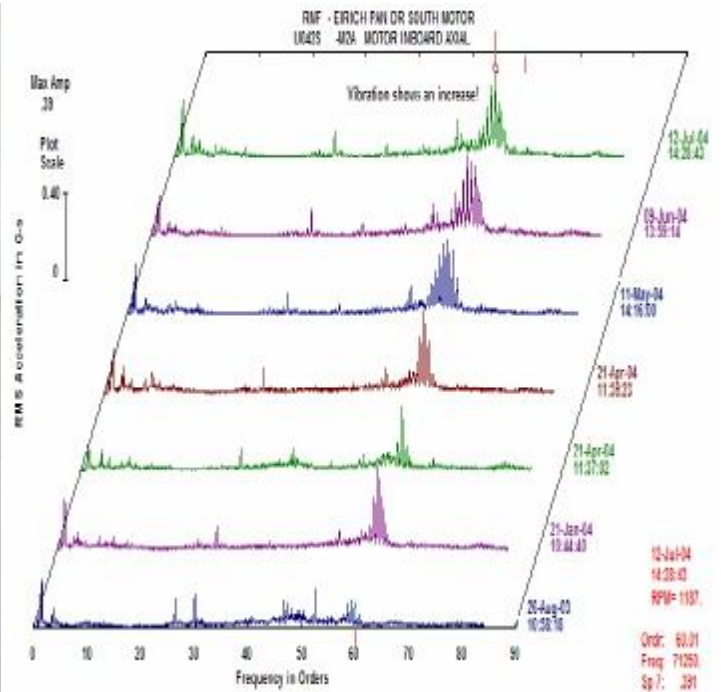
Area Main Floor
Equipment U042S EIRICH PAN DR SOUTH MOTOR

Urgency :

Priority 2

Title: 12-Jul-04 - Gear defects - Gear, Simple

Explanation: Pan drive motor and gearbox show an increase of gear defects/bearing defects and looseness. Monitor closely, unit should be repaired/replaced at soonest opportunity.



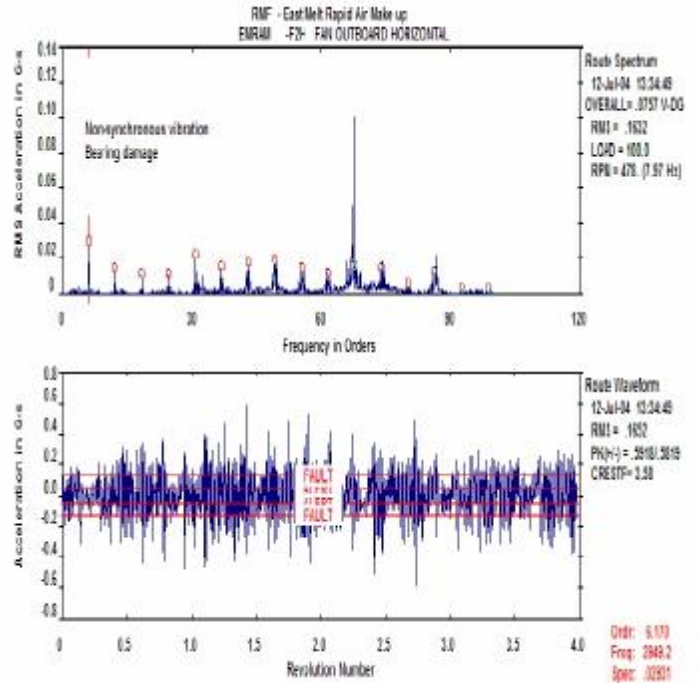
Area Main Floor
Equipment EMRAM East Melt Rapid Air Make up

Urgency :

Priority 3

Title: 12-Jul-04 - Antifriction bearing defect - Air Handler (Fan), Centrifugal

Explanation: Increase in vibration indicates early bearing defects. Monitor this condition. Inspect and schedule repairsLubricate frequently.



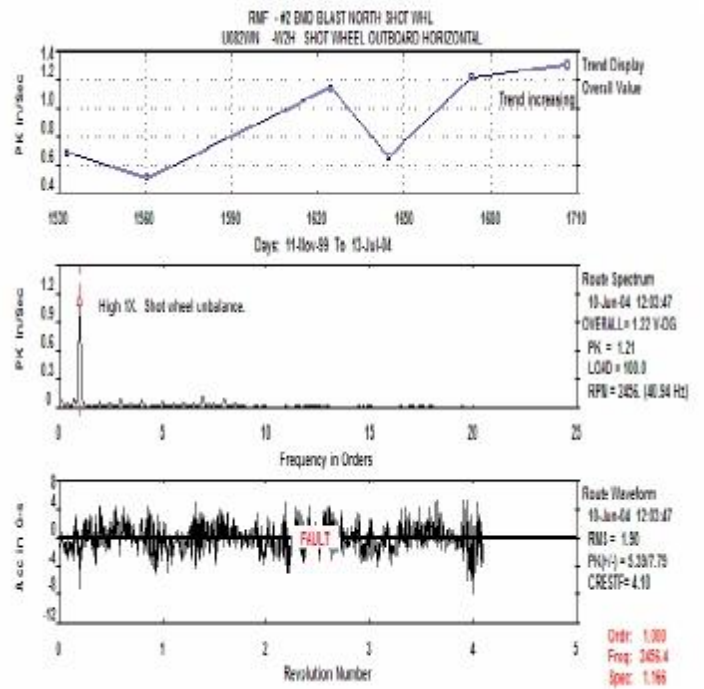
Area Main Floor
Equipment U082WN #2 BMD BLAST NORTH SHOT WHL

Urgency :

Priority 3

Title: 12-Jul-04 - Imbalance - Bearing Component

Explanation: Overall vibration level increasing. Monitor for increasing vibration.



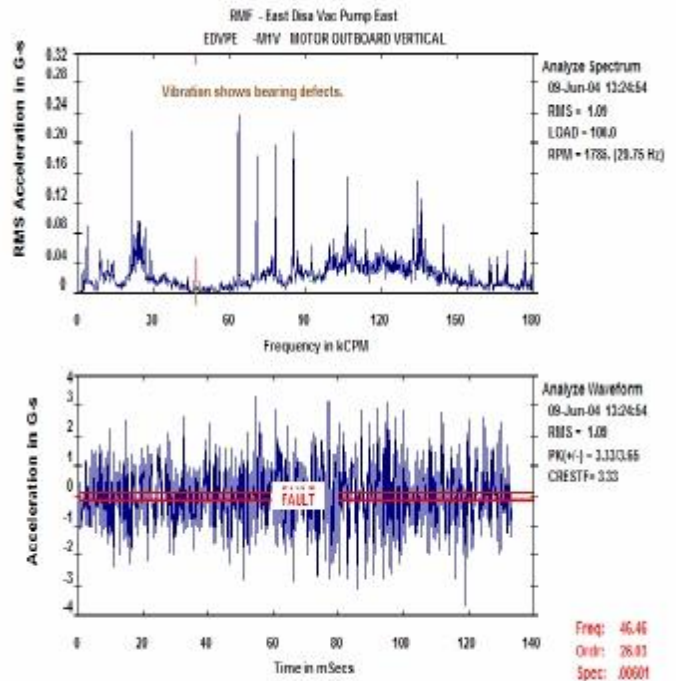
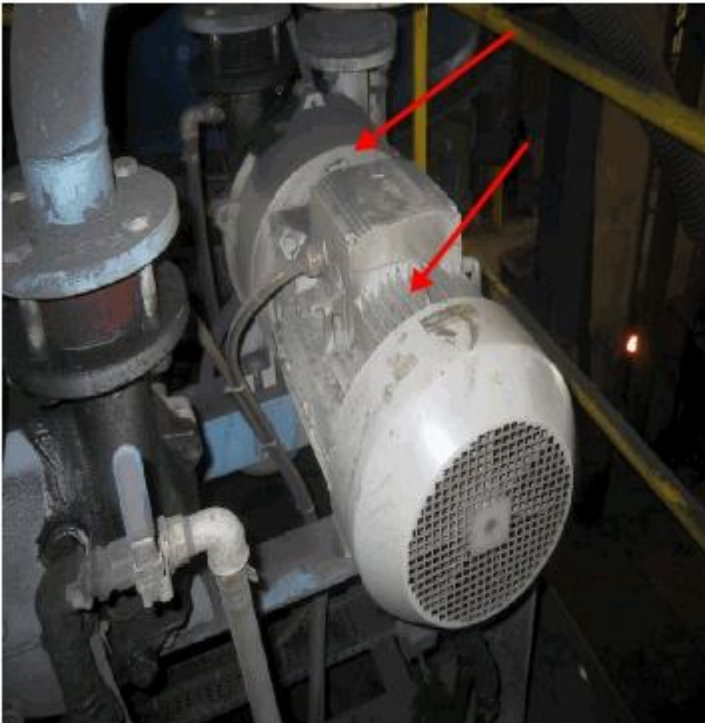
Area Main Floor
Equipment EDVPE East Disa Vac Pump East

Urgency :

Priority 3

Title: 12-Jul-04 - Antifriction bearing roller defects - Motor, AC Induction - Drive Side

Explanation: Motor bearing shows an increase in bearing defects and looseness. Monitor closely, inspect and replace/repair as needed.



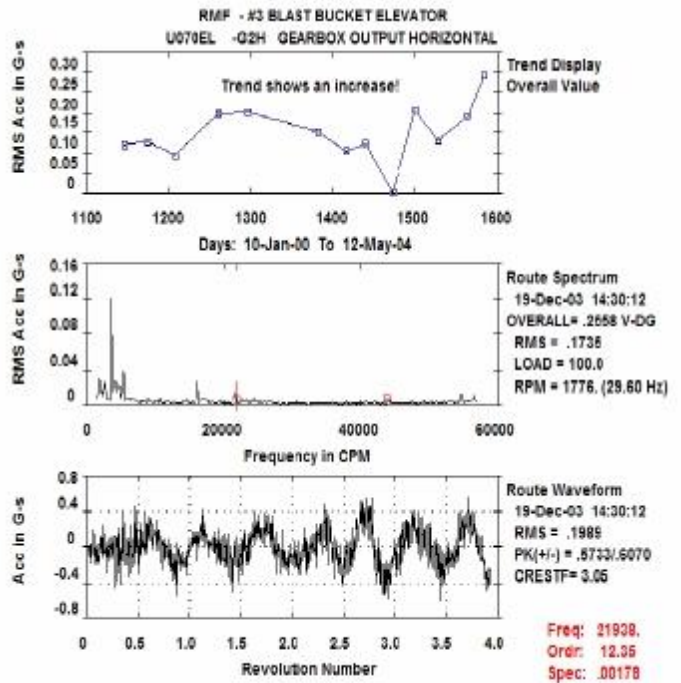
Area Main Floor
Equipment U070EL #3 BLAST BUCKET ELEVATORS

Urgency :

Priority 3

Title: 12-Jul-04 - Gear defects - Gear, Simple

Explanation: Increased vibration levels in gearbox indicate gear wear and gear defects. Monitor and inspect for shaft and gear wear. Replace/repair as needed.





Predictive Maintenance Detail Report

08/05/11
Administrator/13

Area Main Floor
Equipment U042 EIRICH MIXER UNIT #42

Urgency :

Priority 3

Title: 12-Jul-04 - Other electrical faults - Unknown / Other - Unknown

Explanation: Bad sensors detected on positions 1RW,2RW, 4RE
9RW&10RE Replace sensors.

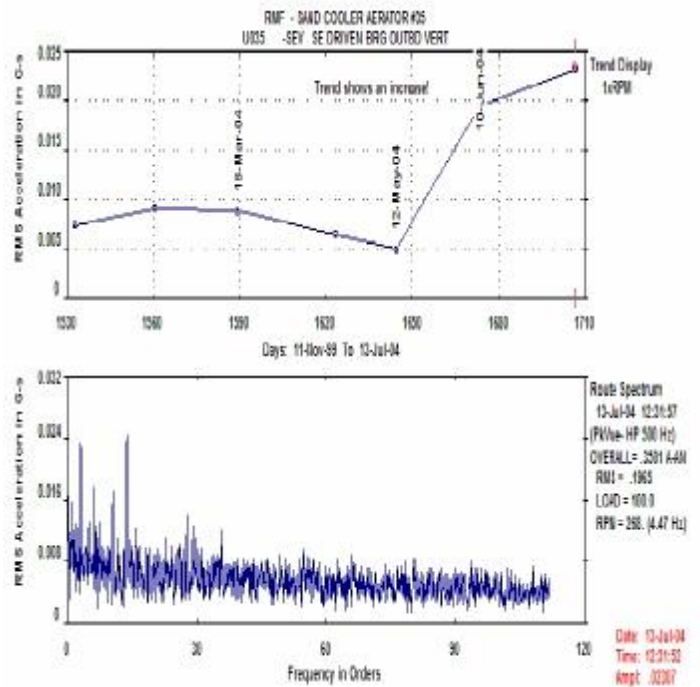
Area Main Floor
Equipment U035 SAND COOLER AERATOR #35

Urgency :

Priority 3

Title: 12-Jul-04 - Antifriction bearing defect - Bearing Component

Explanation: The south east aerator bearing is showing defects due to contamination. Inspect and repair as needed.



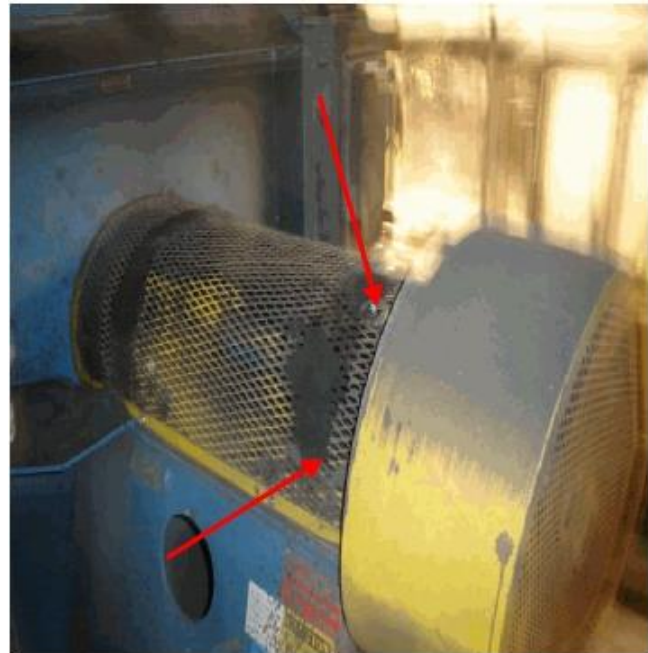
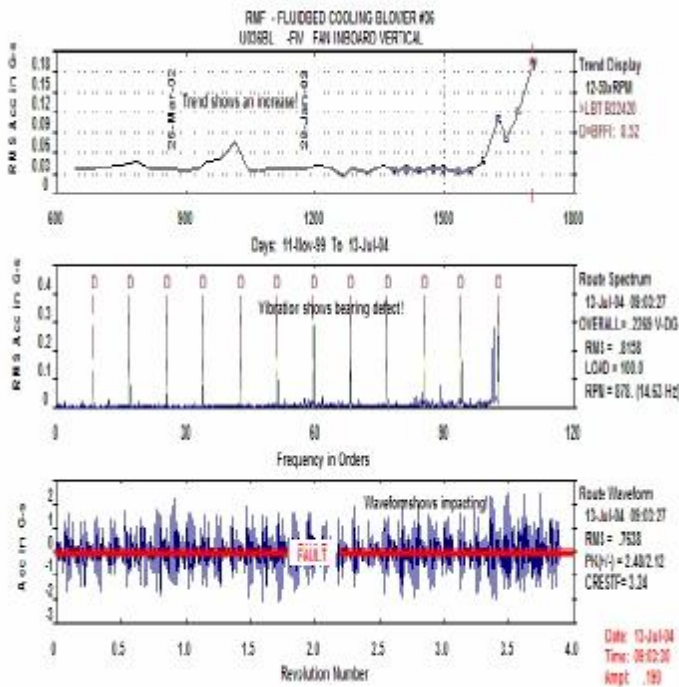
Area Main Floor
Equipment U036BL FLUIDBED COOLING BLOWER #36

Urgency :

Priority 3

Title: 12-Jul-04 - Antifriction bearing defect - Air Handler (Fan) - Drive Side

Explanation: Vibration trending upwards and bearing inner race defect frequencies are showing up in the spectrum.



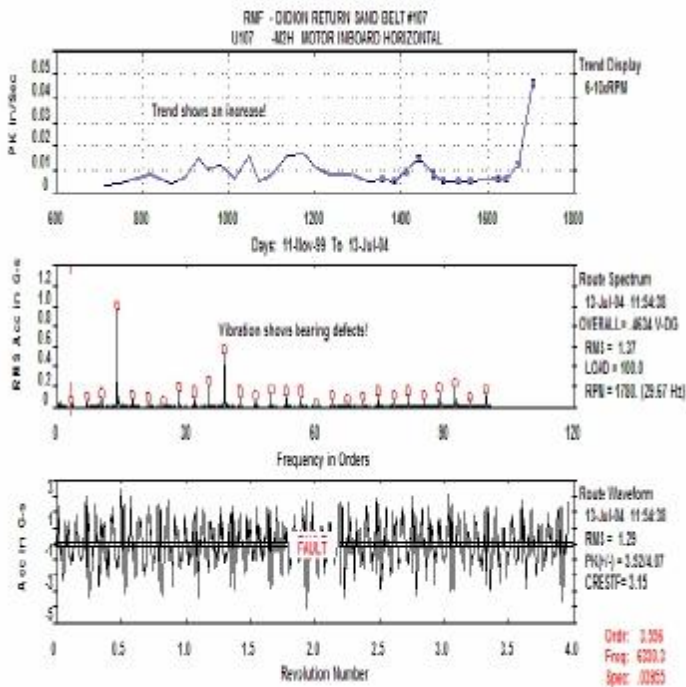
Area Main Floor
Equipment U107 DIDION RETURN SAND BELT #107

Urgency :

Priority 3

Title: 12-Jul-04 - Antifriction bearing defect - Motor, AC Induction

Explanation: Vibration shows motor bearing defects, inspect motor and replace or repair as needed.



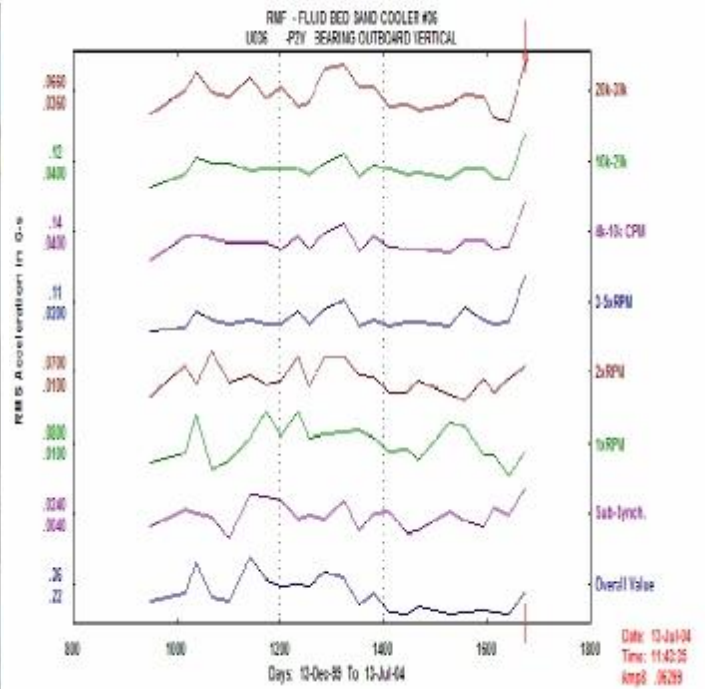
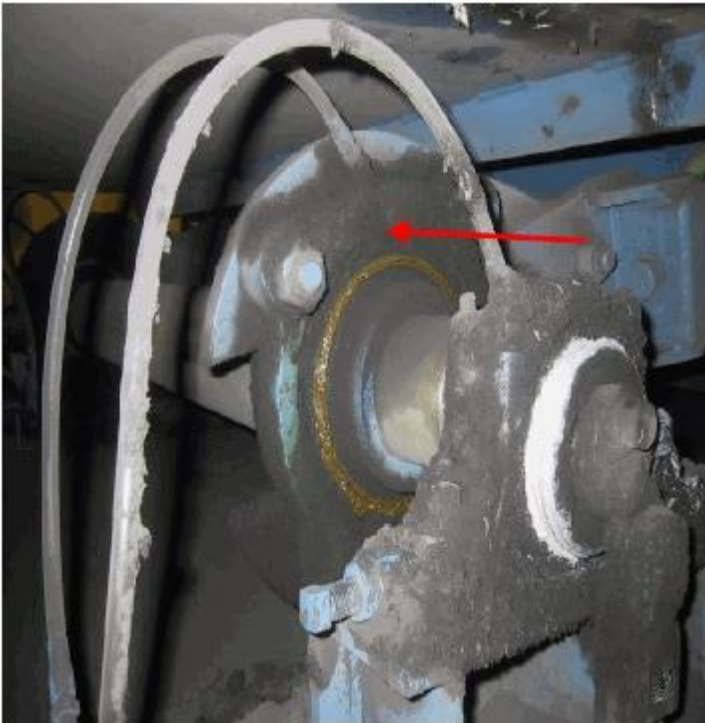
Area Main Floor
Equipment U036 FLUID BED SAND COOLER #36

Urgency :

Priority 4

Title: 12-Jul-04 - Antifriction bearing defect - Bearing Component - Outboard

Explanation: The outboard flange bearing vibration data shows minor defect frequencies. Monitor this condition.



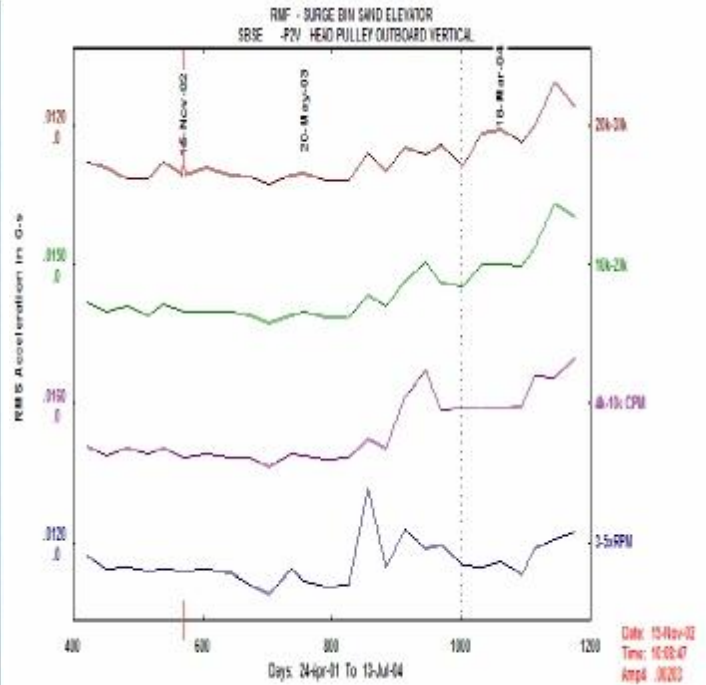
Area Main Floor
Equipment SBSE SURGE BIN SAND ELEVATOR

Urgency :

Priority 4

Title: 12-Jul-04 - Antifriction bearing defect - Bearing Component

Explanation: The Surge Bin Elevator Head Pulley Bearings are showing an increase of vibration due to contamination. The source of contamination, which was due to positive pressure in the elevator and surge bin, has been corrected. However the bearing seals have been compromised and the resulting bearing contamination has caused some early bearing defects. Lubricate bearings frequently and monitor this condition.



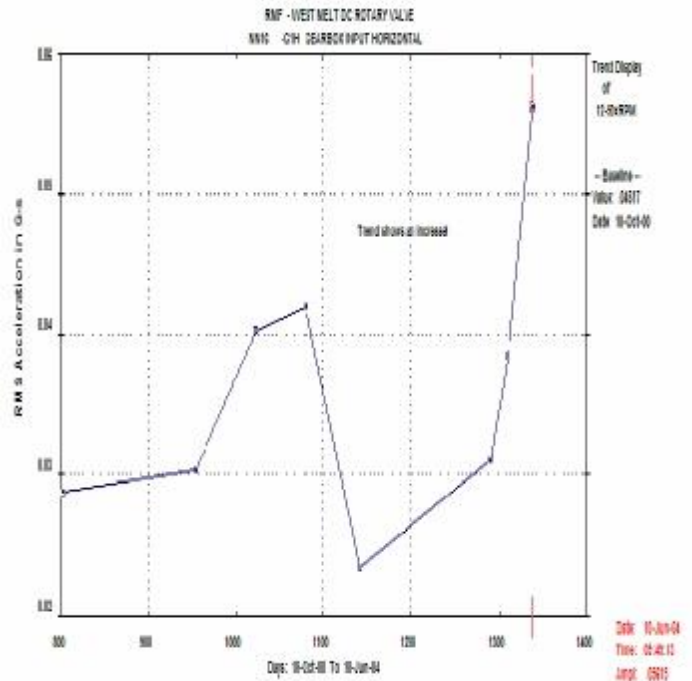
Area Main Floor
Equipment NN16 WEST MELT DC ROTARY VALVE

Urgency :

Priority 4

Title: 12-Jul-04 - Gear defects - Gear, Simple

Explanation: Increased vibration in the gearbox indicates early gear defects.
Monitor this machine closely.



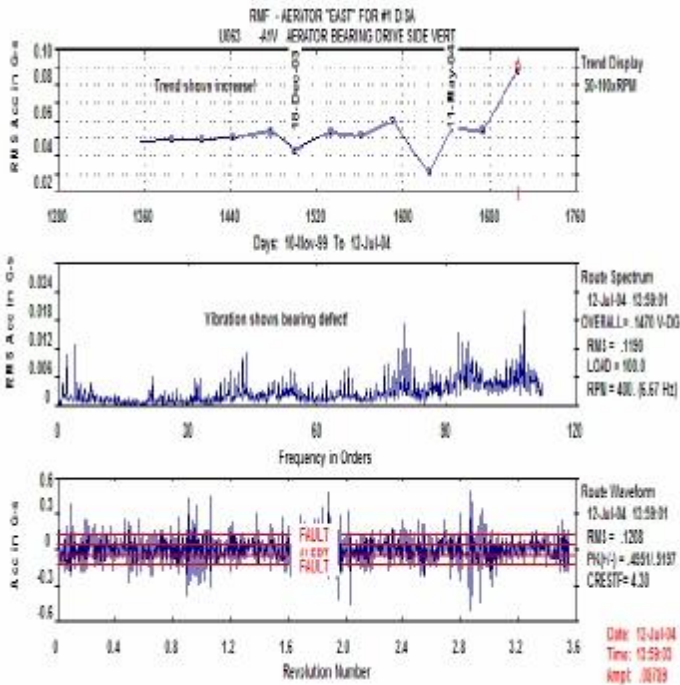
Area Main Floor
Equipment U063 AERATOR "EAST" FOR #1 DISA

Urgency :

Priority 4

Title: 12-Jul-04 - Antifriction bearing defect - Bearing Component

Explanation: Vibration spectrum shows early stage bearing defects, due to contamination. Monitor this condition.



Area Main Floor
Equipment NN14 WEST MELT DC SCREW CONV.

Urgency :

Priority 4

Title: 12-Jul-04 - Hold down bolts loose - Gear, Simple

Explanation: Gearbox mounting bolt is loose. Gearbox is oscillating. Bolts should be tightened at next opportunity to avoid damage.



Area Main Floor
Equipment NN99 West Blast Dust Collector

Urgency :

Priority 4

Title: 12-Jul-04 - Antifriction bearing defect - Air Handler (Fan)

Explanation: Increase of vibration on fan bearings indicates early wear, monitor this condition. Corrective action not required as of this survey.

