

Company XYZ Anywhere, USA Inspection Date: February 13, 2016

INSPECTION REPORT

Contact: Joe Plant	Tech: MDI Tech
Company: Company XYZ	MCA Testing: Motor Rechecks

General:

MCA data were collected on motors showing potential problems during the initial testing done on February 6-7, 2016. Data collected included: Resistance, Impedance, Inductance, Phase Angle and I/F (Current / Frequency). Data were collected on all 3 phases of the winding for comparative purposes. The MCA Tolerances in Table 1 below were used as a reference for assessing motor condition. The motors are listed in order of priority for action to be taken.

Inspection Findings:

1. Anomalies still indicated in the Head Rig Band Mill Motor and Sharp Chain #2 Chip Head Motor. See Notes for specific action required.

Recommendations:

- 1. Refer to the "Notes" section of each motor for specific action required.
- 2. Monitor motors every 6 months to establish on-going trends.

"Your Partners in Pro-Active Maintenance"

118 Industrial Blvd Americus, Georgia 229-924-3030 Three Phase Motor Troubleshooting Desk Guidebook

Test Result	Tolerance	Detail
Resistance (R)	<5%1	Used for detecting loose connections, broken wires, direct shorts and diff wire sizes
Impedance (Z) and Inductance (L)	Similar Patterns ²	Changes to impedance that cause it's phase to phase pattern to appear different from inductance is normally the result in the change to the material condition of the insulation system. Used for detecting
	ĸ	winding contamination, burned windings (overheated), very large phase unbalances or very poor rotor bar condition.
Phase Angle (Fi)	+/- 1 digit from average	Indicates a winding short: 74, 75, 76 OK; 74, 74, 76 suspect; 73, 73, 76 failed
I/F	+/- 2 digits from average	Indicates a winding short: -44, -45, -46 OK; -44, -46, -46 suspect; -42, -45, -45 failed
Insulation Resistance (MegOhm)	>5 MegOhm ³ >100 MegOhm ⁴	Indicates poor insulation to ground (ie: ground fault)

Table 1: MCA Tolerances (Assembled Motor - All sizes)

When a motor does not have a rotor in place, such as in a motor repair shop with a stator only, the tolerances change:

Test Result	Tolerance		
Resistance (R)	<5%		
Impedance (Z)	<3%		
Inductance (Z)	<5%		
Phase Angle (Fi)	+/- 0		
I/F	+/- 0		
Insulation Resistance (MegOhm)	> 5 MegOhms ³ / > 100 MegOhms ⁴		

Table 2: MCA Tolerances (Disassembled Motor - All sizes)

Fault Detected Procedure

If a fault is detected when testing from an MCC or Disconnect, the next step is to take readings at the motor, itself. If the fault 'goes away', then a fault exists in the cable. If the fault does not 'go away', then the fault exists in the motor.

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Above 0.250 Ohms. Otherwise look for significant differences such as 0.080 Ohms, 0.082 Ohms and 0.400 Ohms would indicate a problem.

² A motor with an inductance of 10, 11, 12 (Low reading, medium reading, high reading) should have a similar pattern of impedance, such as 20, 23, 25 (Low, medium and high). If they are not similar, for instance if impedance showed as 20, 15, 19 (high, low, medium), on the same motor, a fault has been detected.

³ For motors with a voltage rating less than 600 Volts

^{*} For motors with a voltage rating greater than 600 Volts

Equipment Findings

Equipment	HeadRigBand		Type: 3PhaseAC	Phases 3 Ti: 6
Name :	HeadRig Band	d Mill	9.0	
Model:				
Manufacturer				
Serial No:				
Frame:			Enclosure:	
Size HP:	250.0		Size KW: 186.0	Amps: 305
RPM:	1200		Efficiency:	Voltage: 460
kVA Code:			Power Fact:	Temp Rise:
Ins. Class:			Service Fact:	
Baseline: 20	16 02 06 - 13:4	15		
	72			Impedance x
	T1-T2	T1-T3	T2-T3	Inductance
Resistance:	0.017	0.022	0.027 23.80	
Impedance:	8.0	6.0	8.0 18.18	575 g
Inductance:	1.0	1.0	1.0 0.00	
Phase Angle: I/F:	63 42	59	62 4	·]
I/F: No insulation	16 NGS)	43	42 1	x x x
	 Comparison of the second s	taminated o	tions. or overheated winding, d Inductance Pattern match.	
Notes	evaluate Imp - Shorted Win - No insulation	taminated o edance and ding. n resistance	or overheated winding, d Inductance Pattern match. tested.	motor. Replace if winding checks bad at
Notes	evaluate Imp - Shorted Win - No insulation	taminated o edance and ding. n resistance	or overheated winding, d Inductance Pattern match. tested.	motor. Replace if winding checks bad at
	evaluate Imp - Shorted Win - No insulation Phase angle it	itaminated o redance and ding. n resistance ndicates a s	or overheated winding, d Inductance Pattern match. tested. shorted winding. Recheck at r	
	evaluate Imp - Shorted Win - No insulation Phase angle in motor.	itaminated o redance and ding. n resistance ndicates a s	or overheated winding, d Inductance Pattern match. tested. shorted winding. Recheck at r	motor. Replace if winding checks bad at
	evaluate Imp Shorted Win No insulation Phase angle in motor.	itaminated o vedance and ding. n resistance ndicates a s 16 02 13 - 1	or overheated winding, d Inductance Pattern match. tested. shorted winding. Recheck at r 3:53	Impedance • *
Compare to	evaluate Imp - Shorted Win - No insulation Phase angle in motor. Test Date: 201 T1-T2	itaminated o vedance and ding. n resistance ndicates a s 16 02 13 - 1 T1-T3	or overheated winding, d Inductance Pattern match. tested. shorted winding. Recheck at r 3:53	Impedance • *
Compare to Resistance:	evaluate Imp - Shorted Win - No insulation Phase angle in motor. Test Date: 201 T1-T2 0.020	itaminated o edance and ding. n resistance ndicates a s 16 02 13 - 1 T1-T3 0.018	or overheated winding, d Inductance Pattern match. etested. shorted winding. Recheck at r 3:53 T2-T3 0.018 7.55	Impedance • *
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Compare to Resistance: Impedance: Inductance: Phase Angle: I/F:	evaluate Imp Shorted Win No insulation Phase angle in motor. Test Date: 201 T1-T2 0.020 9.0 1.0 63 42	taminated o redance and ding. n resistance ndicates a s 16 02 13 - 1 T1-T3 0.018 8.0 1.0 62	or overheated winding. d Inductance Pattern match. tested. shorted winding. Recheck at r 3:53 T2-T3 0.018 7.55 6.0 21.74 1.0 0.00 59 4	Impedance Inductance
Resistance: Impedance: Inductance: Phase Angle:	evaluate Imp Shorted Win No insulation Phase angle in motor. Test Date: 201 T1-T2 0.020 9.0 1.0 63 42 tested - Check for loc - Possible con	taminated over the second seco	or overheated winding. d Inductance Pattern match. tested. shorted winding. Recheck at r 3:53 72-T3 0.018 7.55 6.0 21.74 1.0 0.00 59 44 2 tions. or overheated winding. d Inductance Pattern match.	Impedance Inductance

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Photos of Head Rig Band Mill Motor Showing Shorted Motor Lead



Equipment Findings

Equipment	SCChiphd2		Type: 3P	haseAC	Phases 3 Ti: 6
Name :	SharpchainCh	nipHd2	90		_
Model:					
Manufacturer	5				
Serial No:					
Frame:			Enclosure	e:	
Size HP:			Size KW:		Amps:
RPM:			Efficiency	r.	Voltage: 460
VA Code:		Power Fact:		act	Temp Rise:
ns. Class:			Service F	act	
Roceline: 20	16 02 06 - 15:4	5			
basenne. zv	72		33		Impedance 🖘 🛼
	T1-T2	T1-T3	T2-T3		Inductance ,,
Resistance:	0.035	0.040	0.047	15.76	
mpedance:	7.0	12.0	15.0	38.24	
nductance:	2.0	2.0	3.0	28.57	
Phase Angle:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	68	69	1	as ==*
VF:	43	43	42	1	
			1 . T. (7-	
2012/2012/2028/2	 Check for loc Possible con evaluate Imp No insulation 	taminated o edance and resistance	or overheat d Inductanc tested.	ed winding, se Pattern match. ed from MCC.	7-4 võ vit
Findings	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an	taminated o edance and resistance I check at m d Impedance	or overheat d Inductanc tested. notor if teste ce patterns	e Pattern match. ed from MCC. do not match indica	ting a potential fault. Likely contaminated connections at MCC.
Findings Notes	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an	ataminated o vedance and n resistance I check at m d Impedanc heck at mot	or overheat d Inductanc tested. notor if teste ce patterns or. Check t	e Pattern match. ed from MCC. do not match indica	
Findings Notes	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Rech	taminated o vedance and n resistance I check at m d Impedanc heck at mot	or overheat d Inductance tested. hotor if teste ce patterns or. Check f 5:22	e Pattern match. ed from MCC. do not match indica	Impedance
Findings Notes Compare to	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Reco Test Date: 201 T1-T2	itaminated o vedance and n resistance I check at m id Impedanc heck at mot 16 02 13 - 1 T1-T3	or overheat d Inductance tested. hotor if teste ce patterns or. Check f 5:22 T2-T3	e Pattern match. ed from MCC. do not match indica for loose / dirty wire	Impedance Inductance
Findings Notes Compare to Resistance:	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Reco Test Date: 201 T1-T2 0.027	taminated o vedance and n resistance I check at m id Impedanc heck at mot 16 02 13 - 1 T1-T3 0.026	or overheat d Inductance tested. totor if teste ce patterns or. Check t 5:22 T2-T3 0.027	e Pattern match. ed from MCC. do not match indica for loose / dirty wire 3.82	Impedance
Findings Notes Compare to Resistance: Impedance:	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Recl Test Date: 201 T1-T2 0.027 14.0	taminated o edance and n resistance I check at m id Impedanc heck at mot 16 02 13 - 1 11-T3 0.026 7.0	or overheat d Inductance tested. notor if teste ce patterns or. Check i 5:22 T2-T3 0.027 11.0	e Pattern match. ed from MCC. do not match indica for loose / dirty wire 3.82 34.37	Impedance Inductance
Findings Notes Compare to Resistance: Impedance: Inductance:	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Reco Test Date: 201 T1-T2 0.027 14.0 2.0	taminated o vedance and n resistance I check at m id Impedanc heck at mot 16 02 13 - 1 T1-T3 0.026	or overheat d Inductance tested. totor if teste ce patterns or. Check t 5:22 T2-T3 0.027	e Pattern match. ed from MCC. do not match indica for loose / dirty wire 3.82	Impedance Inductance
Findings Notes Compare to Resistance: Impedance: Inductance: Phase Angle:	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Reco Test Date: 201 T1-T2 0.027 14.0 2.0	taminated o edance and n resistance I check at m id Impedank heck at mot 16 02 13 - 1 T1-T3 0.026 7.0 3.0	5:22 T2-T3 0.027 11.0 2.0	e Pattern match. ed from MCC. do not match indica for loose / dirty wire 3.82 34.37 28.57	Impedance Inductance
Findings	Check for loc Possible con evaluate Imp No insulatior Recommend Inductance an winding. Reci Test Date: 201 T1-T2 0.027 14.0 2.0 69 42	taminated o resistance l check at m d Impedanc heck at mot 16 02 13 - 1 T1-T3 0.026 7.0 3.0 69	5:22 T2-T3 0.027 11.0 68	e Pattern match. ed from MCC. do not match indica for loose / dirty wire 3.82 34.37 28.57 1	Impedance Inductance
Findings	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Rec Test Date: 201 T1-T2 0.027 14.0 2.0 69 42 tested	taminated o redance and n resistance I check at m d Impedance heck at mot 16 02 13 - 1 T1-T3 0.026 7.0 3.0 69 42	5:22 T2-T3 0.027 11.0 68	e Pattern match. ed from MCC. do not match indica for loose / dirty wire 3.82 34.37 28.57 1	Impedance Inductance
No insulation Findings Notes Compare to Resistance: Impedance: Inductance: Phase Angle: I/F: No insulation Findings:	Check for loc Possible con evaluate Imp No insulation Recommend Inductance an winding. Reci Test Date: 201 T1-T2 0.027 14.0 2.0 69 42 tested - Check Resis - Possible con evaluate Imp - No insulation	taminated over the second over	5:22 T2-T3 0.027 11.0 2.0 68 43	e Pattern match. ed from MCC. do not match indica for loose / dirty wire 3.82 34.37 28.57 1 1 1	Impedance Inductance

guest1

February 17, 2016



Equipment	BuckMainHyd		Type: 3F	PhaseAC	Phases 3	Ti: 6
Name :	BucksawMain	Hyd				
Model:		-				
Manufacturer	:					
Serial No:						
Frame:			Enclosur	re:		
Size HP:	200.0		Size KW	: 149.0	Amps: 235	
RPM:	1785		Efficienc	y:	Voltage: 460	
kVA Code:			Power F	act:	Temp Rise:	
Ins. Class:			Service	Fact: 1.15		
Baseline: 20	16 02 06 - 14:5	8				
	T1-T2	T1-T3	T2-T3		Impedance of Inductance	
Resistance:	0.011	0.013	0.018	30.09		
Impedance:	19.0	21.0	18.0	8.62	20	
Inductance:	3.0	4.0	3.0	20.00	37 G	
Phase Angle:	68	67	68	1	75 36	
I/F:	41	40	41	1	»· •	
No insulation	tested					
Findings	- No insulation	taminated edance an resistance	or overhea d Inductan e tested.	ted winding, ce Pattern match. ted from MCC.		
Notes	Inductance an Recheck in 6		ce patterns	s match. Check M	CC wires for loose / dirty conne	ctions.

C ompare to Test Date: Not Sele

	T1-T2	T1-T3	T2-T3	
Resistance:				
Impedance:				
Inductance:				
Phase Angle:				
I/F:				

Findings:	
Notes:	

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February 09, 2016

Equipment Findings

8			Equipm	ent Findings	
Equipment	SawdustBlwr		Type: 3	PhaseAC	Phases 3 Ti: 6
Name :	SawdustBlower	r			
Model:					
Manufacturer	:				
Serial No:					
Frame:			Enclosu	re:	
Size HP:	150.0		Size KW	/: 112.0	Amps: 171
RPM:	1765		Efficienc	cy:	Voltage: 460
VA Code:			Power F	act	Temp Rise:
ns. Class:			Service	Fact: 1.15	
Baseline: 20	16 02 06 - 14:31				
	T1-T2	T1-T3	T2-T3		Impedance inductance
Resistance:	0.044	0.043	0.043	1.02	· · · ·
mpedance:	15.0	13.0	14.0	7.14	0- 13
nductance:	3.0	2.0	2.0	28.57	12
Phase Angle:	69	69	69	0	
/F:	43	44	43	1	
No insulation	tested				
	- No insulation		e tested.		
	- Recommend o	check at n	notor if test	ted from MCC.	
Notes					ding. Recheck in 6 months.
		I Inductan	ce pattern:		ding. Recheck in 6 months.
	Impedance and	I Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to	Impedance and Test Date: Not S	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance:	Impedance and Test Date: Not S	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance: Phase Angle:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance: Phase Angle:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance: Phase Angle: I/F:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance: Phase Angle: I/F:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance: Phase Angle: I/F:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Resistance: Impedance: Inductance: Phase Angle: I/F: Findings:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance: Phase Angle: I/F:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.
Compare to Resistance: Impedance: Inductance: Phase Angle: I/F: Findings:	Impedance and Test Date: Not : T1-T2	l Inductan	ce pattern:		ding. Recheck in 6 months.

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