



TMMW Heat Treat Cooling Tower System

TMMW AT Maintenance Jishuken Activity Quench Tank

RCM Maintenance Activity Predictive, Preventative, and Reactive Maintenance	Process Flow	Maintenance		Preventative Maintenance		React	
		Normal	Emergency	Normal	Emergency	Normal	Emergency
1 Type	Totally enclosed elevator system	10 Oil Level Control	Oil level is detected with a float at three positions. Proximity switches are used to detect the float. This oil level control system is mounted to one side of the oil tank shoulder.				
2 Tank Design	Thick steel welded structure air tight. The outside surface of the tank is covered with 50 mm thick insulation material.		Upper Limit: Overflow				
3 Oil Tank Specifications	Tank contains approximately 7,360 L (MAX at 150 °C). About 6,800 L is supplied to the tank at ordinary temperature	11 Thermo-couples	Lower Limit: Oil supply request				
4 Operating Temperature	130° C		Lowest Limit: Heater shutdown and hardening failure				
5 Heating Power	(72 kW, 460 VAC) at 6 kW per element. There are 12 heating elements.	12 Oil Filter	There are two sets of double-pair type thermocouples mounted to the oil tank shoulder used to control the oil temperature.				
OPERATING CONTEXT							
6 Agitator Type	3-Blade propeller, 400 mm in diameter, 2 each per motor shaft. This is a 2.2 kW, inverter controlled 50-450 rpm motor speed	Process	Description				
		7 Heat Exchanger Type	Spiral Type, Cooling water is released to the atmosphere at the outlet at square millimeter	1	The tray inside the furnace is moved from the hardening position to the area above the oil tank and the chain elevator moves down.		
8 Pump	Mechanical seal type, 3.7 kW, 0.8 cubic meters/minute	2	The tray is unloaded from the oil tank through the simultaneous operation of elevator chain and oil tank exit conveyor chains.				
9 Elevator Positions	The geared motor which is on top of the oil tank, is directly connected to the rack. The driving force is transmitted through the chain to the bevel gear. The slide shaft assembly is driven by the external geared motor.	3	The propellers mounted to the right and left sides of the oil tank stir and blow up the quenching oil against the workpieces from the bottom through the duct.				
Position Detection System	4 positions (up, down, oil dipping, original)	4	Partition plates are mounted to the elevator and propellers, and flow regulating plates are mounted to the propellers.				
Furnace Outlet Door	Elevator	5	The oil temperature is controlled through the on-off control of heater and heat exchanger cooling water.				
This door prevents oil contaminates from getting into the furnace coming from the oil reservoir zone	Drop trays into the oil tank	Oil Reservoir Outlet Door		Information On Network (Backup)		Machine Drawings	
		Machine #	Process	Parts list	PM Plans	Instruction Manual	
The door also keeps the mixture of gases and generated heat inside the airtight furnace compartment	Raise trays out of the oil tank	JH-FH-001	Carburizing Furnace	Y	Y	Y	
		JH-FH-002	Carburizing Furnace	Y	Y	Y	
Inspection and Maintenance Repair of:	Inspection and Maintenance Repair of:	VIN#	Spare Parts Listed In Stores	Order Lot	Qty	Lead Time	
		A00028885	Elevator Up/Down/Slow/Down/Original Position	1	1	35	
Inspect Coupling, Locks, Locking Device	Elevator Stoppers	A00028885	Oil Tank Exit Door Closed/Open/Passage Position	1	1	35	
		A00028885	Oil Tank Exit Door Opened and Closed	1	1	35	
Inspect Contactors	Drive Mechanism	7000LX	Oil Tank Exit Door Curtain Flame	2	2	40	
		7000LX	Entrance Door Curtain Flame	2	2	40	
Verify operation of Drive Motor	Limit Switch Mechanism	7000LX	Oil Tank Exit Door Pilot Gas	1	1	25	
		7000LX	Oil Tank Exhaust Pilot Gas	1	1	25	
Monthly Samples Taken of Oil Drain Oil to Inspect Tank 1 in 10 years	Check Electrical Connections of Heaters	7000LX	Oil Tank Exhaust Motor	2	2	60	
		7000LX	Oil Tank Exit Conveyor	1	1	45	
Verify the Operation of the Agitators	Check Motor Contactor	7000LX	Oil Tank Elevator/East Floor	1	1	35	
		A004393	Oil Tank Upper/Lowell/Lowest Limit	1	1	35	
	Check Motor Contactor	A004392	Exit Door/Pilot Flame Detection	3	3	20	

TMMW AT Maintenance Jishukan Activity RX Generator		Process Flow						
ITEM#	RX GENERATOR ACTIVITY	TRNG	NEK	TRNL	TEK	THC		
ITEM#	0	SPARE PARTS LISTED IN STORES	0 or Last	QTY	Led Time			
ITEM#	0	TRNG ATTACHMENT	OPERATING CONTEXT					
ITEM#	0	Top Zone Temperature(Controll)	3	3	45			
ITEM#	0	Bottom Zone Temperature(Controll)	3	3	45			
ITEM#	0	Overheating Temperature(Alarm)	3	3	45			
ITEM#	0	Back-Fire Check Valve	1	1	25			
ITEM#	0	Base Gas Pressure Upper Limit	1	1	25			
ITEM#	0	Base Gas Pressure Lower Limit	1	1	25			
ITEM#	0	RX Generator Definitions						
ITEM#	0	RX Generator						
ITEM#	0	RX Gas Introduction in Carburing Furnace						
ITEM#	0	INFORMATION ON NETWORK (BACKUP)						
ITEM#	0	Machine #	Process	Li Parts	Pm Schedule	Instruction Manual	Machine Drawings	
ITEM#	0	JFH-H-0006	RX Gas Generation	✓	✓	✓	✓	
ITEM#	0	JFH-H-0007	RX Gas Generation	✓	✓	✓	✓	
ITEM#	0	Process Description						
ITEM#	0	4. Carburation						
ITEM#	0	4-1 <Structure and Heat Pattern of Continuous Gas Carburation/Quenching>						
ITEM#	0	4-2 <RX Gas>						
ITEM#	0	Purpose/ Function						
ITEM#	0	The RX generator uses Butane and Air mixture to create RX gas that will be used in the Carburation and Diffusion zones. The Primary Cooler cools the produced gaseous solution under 350 degrees Celsius to prevent soot deposition.						
ITEM#	0	Inspection and Maintenance Repair of:						
ITEM#	0	Fire Protection Safety Valve	1st/2nd Cooler					
ITEM#	0	Refractory/Refractory Support	Compensating wire	Blower				
ITEM#	0	Refractory/Refractory Plug	Core Pipe	Inside Brick				
ITEM#	0	Flow Meter	RX Gas Piping	Nickel Catalyst				
ITEM#	0	Cooling Water Piping	SarFelt Belt Ring	Top/Bottom Zone Heater				
ITEM#	0	Brass/Slate Packing	Heater Cable	TIC				
ITEM#	0	YK Terminal	Call for Core Pipe					
ITEM#	0	Top/Bottom Temp Controller	Temp Alarm Device	1st/2nd Regulator				
ITEM#	0	Top/Bottom MC for Heater	Electrical Current Balance	Air Cleaner				
ITEM#	0	Part of the RX Gas will be sent through a filter valve and valve to a CO2 Analyzer.						
ITEM#	0	RX Gas that is not used will be sent through a relief valve that will be burnt off						
ITEM#	0	Reaction between a single gas and metal	(O2 + 2Hg) (1)					
ITEM#	0	Reaction of heat decomposition CH4	CH4 (10)					
ITEM#	0	Boudard reaction	CO + O2 (10)					
ITEM#	0	Reaction of heat decomposition CO	CO (10)					
ITEM#	0	Reaction of heat decomposition H2	H2 (10)					
ITEM#	0	Reaction of heat decomposition N2	N2 (10)					
ITEM#	0	Reaction of heat decomposition Ar	Ar (10)					
ITEM#	0	Reaction of heat decomposition He	He (10)					
ITEM#	0	Reaction of heat decomposition Ne	Ne (10)					
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ITEM#	0	Reaction of heat decomposition X						

TMMWV-AT HEAT TREAT CONVEYANCE-PROCESS FLOW MAP																	
Before Heat Treat Conveyer	Pre-Wash	Pre-Heat	Furnace	Post Wash	Tempering Furnace	After Heat Treat Conveyer	RM Name	Heat Treat Conveyance	Time								
JMFC-0001	JHFH-0003	JHFH-0004	JHFH-0001, JHFH-0002	JZE-0005	JHFH-0005	JHFH-0002	Revision Q	TRAVEL AT MEDIUM SPEED									
Conveyance Movement	Chains, Sprockets, Bearings, Anti-Back, See- saw Stopper	Doors Cylinder, switches Conveyor motor	Doors Cylinder, switches Conveyor Motor, Sprockets, Chain	Doors Cylinder, switches Doors Cylinder, switches Doors Cylinder, switches Doors Elevator Rail	Sprockets and Chain Driver Bearings, Doors Elevator Roller, Contact Point	Sprocket and Chain Driver Bearings, Doors Elevator Cylinder Driver, Guides, Rollers	Spooler and Chain Conveyance	Chains, Sprockets, Bearings	OPERATING CONTEXT:								
Power	Motors, Inverter	Control	Control	Control	Pusher	Roller, Contact Point	Rollers	Bearings, Sprockets									
Control	Rail	Rail	Rail	Rail	Lifter		Guides	Power									
Process Flow																	
BEFORE HEAT TREAT		PREWASH		PREHEAT		FURNACE		POST WASH									
1 Control and stage parts coming from the machining lines.		2 Move parts closer to Pre-Heat process		3		4		5									
1 Control and stage parts coming from the machining lines.		1 Clean recently machined parts by removing contaminants		1 Preheat parts in two stages		1 Blister off gears		1 Toughen gears									
2 Move parts closer to Pre-Heat process		2 Dip Parts		2 Remove contaminants using the afterburner		2 Wash parts with WI5 detergent		2 Adds clear resist properties to gears									
3		3 Diffusion stage is pulling together the composition of the gears with the added carbon 93% content from furnace		3 Ret-preventive detergent added		3 Harden surface of gears and prevent chattering		3 Before heat treat conveyor is used to move parts closer to furnace processes									
4 Gears are rolled into two stages of hardening		5 The oil quenching zone quickly cools gears		4 After heat treat conveyor is used to move parts closer to furnace processes		4 Before heat treat conveyor is used to move parts closer to furnace processes		4 After heat treat conveyor is used to move parts closer to furnace processes									
Purpose/Function																	
Move Gears coming from BH1 processes through Heat Treatment																	
After Heat Treat Process, move parts to BH1 machining lines																	
INFORMATION ON NETWORK (BACK UP)																	
JMFC-0001																	
Maintenance Repair of: Chain Sprockets, Adjust and Lube																	
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