

Special Process: Heat Treat System Assessment			
Facility Name: <b>Bluewater Thermal Solutions</b>			
Address: 60 Steckle Place Kitchener, Ontario, Canada N2E 2C3			
Phone Number:		<b>Type(s) of Thermal Processing at this Facility:</b>	
Fax Number:		<b>Process Table A - Ferrous</b>	
Number of Heat Treat Employees at this Facility: 32		Carburizing	Allcase & Conveyor
Internal (Captive) Heat Treater (Y/N): No		Carbonitriding	Allcase & Conveyor
Commercial Heat Treater (Y/N): Yes		Carbon Restoration	Allcase & Conveyor
Date of Assessment: 16-Feb-12		Neutral Hardening (Quench and Temper)	Neutral
Date of Previous Assessment: 18-Feb-11		Austempering / Martempering	Allcase & Conveyor
		Tempering	Allcase, Conveyor, Draw
		Precipitation Hardening / Aging	Alumimun, RAF, SAF, Draw
		<b>Process Table B - Ferrous</b>	
		Nitriding (Gas)	Allcase
		Ferritic-Nitrocarburizing (Gas or Salt)	Allcase
		<b>Process Table C - Aluminum</b>	
		Aluminum Heat Treatment	Alumimun, RAF, SAF
		<b>Process Table D - Ferrous</b>	
		Induction Heat Treating	
		<b>Process Table E</b>	
		Annealing	Draw
		Normalizing	Draw & Allcase
		Stress-Relieving	Draw
		<b>Process Table F</b>	
		Low Pressure Carburizing	
		<b>Process Table G</b>	
		Sinter Hardening	
		<b>Process Table G</b>	
		Ion Nitriding	

Current Quality Certification(s):	ISO/TS 16949:2009
Date of Re-assessment (if necessary):	2014

Personnel Contacted:			
Name:	Title:	Phone:	Email:
Shawn Scott	General Manager	(519) 748-1952 x101	sscott@bluewaterthermal.com
Dave Flanders	Plant Manager	(519) 748-1952 x120	dflanders@bluewaterthermal.com
Erin Guo	Process Engineer	(519) 748-1952 x102	eguo@bluewaterthermal.com

Auditors/Assessors:			
Name:	Company:	Phone:	Email:
Terry Collins	Bluewater Thermal	(519) 748-1952 x104	tcollins@bluewaterthermal.com

<b>Number of "Not Satisfactory" Findings:</b>	0
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<b>Number of "Needs Immediate Action" Findings:</b>	0
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<b>Number of "Fail" Findings in the Job Audit(s):</b>	0
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**Special Process: Heat Treat System Assessment**

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Question Number	Question	Requirements and Guidance	Objective Evidence	N/A	Satisfactory	Not Satisfactory	Needs Immediate Action	
<b>Section 1 - Management Responsibility &amp; Quality Planning</b>								
1.1	Is there a dedicated and qualified heat treat person on site?	To ensure readily available expertise, there shall be a dedicated and qualified heat treat person on site. This individual shall be a full-time employee and the position shall be reflected in the organization chart. A job description shall exist identifying the qualifications for the position including metallurgical and heat treat knowledge. The qualifications shall include a minimum of 5 years experience in heat treat operations or a combination of a minimum of 5 years of formal metallurgical education and heat treat experience.	Yes, Org. Chart: Shawn Scott, GM, Dave Flanders, Plant Manager, Erin Guo, Process Engineer, Terry Collins, QA Manager		Satisfactory			
1.2	Does the heat treater perform advanced quality planning?	The organization shall incorporate a documented advance quality planning procedure. A feasibility study shall be performed and internally approved for each part. Similar parts can be grouped into part families for this effort as defined by the organization. After the part approval process is approved by the customer, no process changes are allowed unless approved by the customer. The heat treater shall contact the customer when clarification or process changes is required. This clarification of process changes shall be documented.	Yes, QA Manual Process #2 Business Planning & #3 Process Planning - APQP Meetings, PPAP Status Log, Master Work Orders, Customer Deviation Procedure		Satisfactory			
1.3	Are heat treat FMEAs up to date and reflecting current processing?	The organization shall incorporate the use of a documented Failure Mode and Effects Analysis (FMEA) procedure and ensure the FMEAs are updated to reflect current part quality status. The FMEA shall be written for each part or part family or they may be process-specific and written for each process. In any case, they shall address all process steps from part receipt to part shipment and all key heat treat process parameters as defined by the organization. A cross-functional team shall be used in the development of the FMEA. All special characteristics as defined by the organization and its customers, shall be identified, defined, and addressed in the FMEA.	Yes, QA Manual Process #3C PPAP, PPAP List, PFMEA Review Meeting, APQP Meeting Minutes, CAR Analysis, Statistical Process Control Data, PFMEA Review (FMEA)		Satisfactory			

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Assessment							
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1.4	Are heat treat process control plans up to date and reflecting current processing?	<p>The organization shall incorporate the use of a documented Control Plan procedure and ensure the Control Plans are updated to reflect current controls.</p> <p>The Control Plans shall be written for each part or part family or they may be process-specific and written for each process. In any case, they shall address all process steps from part receipt to part shipment and identify all equipment used and all key heat treat process parameters as defined by the organization.</p> <p>A cross-functional team, including a production operator, shall be used in the development of Control Plans, which shall be consistent with all associated documentation such as work instructions, shop travelers, and FMEA's. All special characteristics, as defined by the organization and its customers, shall be identified, defined, and addressed in the Control Plans. Sample sizes and frequencies for evaluation of process and product characteristics shall also be addressed consistent with the minimum requirements listed in the Process Tables, Sections 3.0 and 4.0.</p>	<p>Yes, Mipact Software, QA Manual Process #2 Business Planning &amp; #3 Process Planning, PPAP List, Work Order Travelers, Control Plans, Process Flow, PFMEA, COPS, Inspection &amp; Test Requirements, FMEA Review meeting.</p> <p>The APQP Team may consist of Shawn Scott (GM - Sales) Terry Collins (Quality Manager), Dave Flanders (Plant Manager), Erin Guo (Process Engineer) a Maintenance Mechanic and a Departmental Operators.</p>		<b>Satisfactory</b>		

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1.5	Are all heat treat related and referenced specifications current and available? For example: Industry and customer specific specifications such as SAE, AIAG, ASTM, ISO, EN, JIS, General Motors, Ford, and Chrysler.	To ensure all customer requirements are both understood and satisfied, the organization shall have all related heat treat and customer referenced standards and specifications available for use and a method to ensure that they are current. Such standards and specifications include, but are not limited to, those relevant documents published by SAE, AIAG, ASTM, ISO, EN, JIS, General Motors, Ford, and Chrysler. The organization shall have a process to ensure the timely review, distribution, and implementation of all customer and industry engineering standards specifications and changes based on customer-required schedule. Timely review should be as soon as possible and shall not exceed two working weeks. The organization shall document this process of review and implementation, and it shall address how customer and industry documents are obtained, how they are maintained within the organization, how the current status is established, and how the relevant information is cascaded to the shop floor within the two-week period. The organization shall identify who is responsible for performing these tasks.	Yes, all current customers Standards are retained electronically on network, SAE, ASTM Heat Treat Standards & AIAG Standards are reviewed monthly by Bluewater Corporate as necessary, APQP Team, Bluewater Lab Scope		<b>Satisfactory</b>		
1.6	Is there a written process specification for all active processes?	The heat treater shall have written process specifications for all active processes and identify all steps of the process including relevant operating parameters. Examples of operating parameters include process temperatures, cycle times, load rates, atmosphere or gas flow settings, belt speeds, quench agitation speeds, etc. Such parameters shall not only be defined, they shall have operating tolerances as defined by the organization in order to maintain process control. All active processes should have a written process specification. These process specifications may take the form of work instructions, job card, computer-based recipes, or other similar documents.	Yes, QA Manual, Work Order Travelers, Generic Control Plan, Process Flow, PFMEA, QA Manual Process #3, Carb Reports, COP's, etc.,		<b>Satisfactory</b>		

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1.7	Has a valid process capability study been performed initially and after process equipment has been relocated, or had a major rebuild?	To demonstrate each process is capable of yielding acceptable product the organization shall perform process capability studies for the initial validation of each process, after relocation of any process equipment, & after a major rebuild of any equipment. The organization shall define what constitutes a major rebuild. Initial process capability studies shall be conducted for all heat treat processes per furnace line defined in scope of work & in accordance with customer requirements. A furnace line may include a combination of equipment that is integrated in the performance of a heat treatment process, e.g., hardening, quenching, and tempering. Capability study techniques shall be appropriate for the heat treat product characteristics e.g., tensile strength, case depth, hardness. Any specific customer requirements shall be met. In the absence of customer requirements, the organization shall establish acceptable ranges for measures or capability. An action plan shall exist to address the steps to followed in case capability indices fall outside customer requirements or established ranges.	Yes, Bluewater - Kitchener 2012 CQI-9 Requirements Schedule, TUS Schedule, Can Runs, QA Manual Process #3, #11F, #11G, Work Order - Material & Specifications & Inspection & Certification Requirements, Departmental Process Log Charts, MSA Studies, QA Manual Process #11 B Nonconformance		<b>Satisfactory</b>		
1.8	Does the heat treater collect and analyze data over time, and react to this data?	The analysis of products and processes over time can yield vital information for defect prevention efforts. The organization shall have a system to collect, analyze, and react to product or process data over time. Methods of analysis shall include ongoing trend or historical data analysis of product or process parameters. The organization shall determine which parameters to include in such analysis.	Yes, QA Manual Process #3, #11G Statistical Analysis, MSA Studies		<b>Satisfactory</b>		

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1.9	Is management reviewing the heat treat monitoring system every 24 hours?	Management shall review the furnace monitoring systems at intervals not to exceed 24 hours. The heat treat monitoring system includes but is not limited to temperature strip charts, atmosphere strip charts, computer data logs, furnace and operator logs, etc. The management review shall include efforts to detect out-of-control conditions or alarm conditions. The process of reviewing the furnace data shall be documented and this requirement also applies to computerized data.	Yes, Bluewater Computerized Tracking, Circle Charts, Plant Manager Sign Off, Departmental Production Log Charts, Control Plan, Work Order Travelers, Furnace Log Charts, Work Instructions specific for departmental/process procedures		Satisfactory		
1.10	Are internal assessments being completed on an annual basis, at a minimum, using AIAG HTSA?	The organization shall conduct internal assessments on an annual basis, at a minimum, using the AIAG HTSA.	Yes, Bluewater Kitchener Yearly CQI-9 Assessment performed in February, QA Manual Process #11E (Internal Audit Process), Product Audits, Open Issues Log		Satisfactory		
1.11	Is the OEM customer notified when parts are reprocessed?	The OEM shall be notified when parts are reprocessed in the heat treat operation. It is preferred that the notification be on a case-by-case basis. However, it is understood that some reprocessing (such as but not limited to re-tempering operations) may be pre-approved during the APQP or PPAP phase. To be pre-approved for reprocessing, the heat treater shall meet the following requirements: <ul style="list-style-type: none"> <li>The heat treater shall submit for approval by the OEM customer the reprocessing procedure and this procedure shall be referenced in the heat treater's FMEA and process control plan</li> <li>The procedure shall describe product characteristics for which reprocessing is permissible as well as those characteristics for which reprocessing is not permissible.</li> <li>Any reprocessing activity shall require a new processing control sheet issued by qualified technical personnel denoting the necessary heat treat process modifications.</li> <li>Records shall clearly indicate when and how any material has been reprocessed.</li> <li>The Quality Manager or a designee shall authorize the release or reprocessed product.</li> </ul>	Yes, QA Manual Process #3, & #11B (Control of Nonconforming Product) as required all Automotive customers are notified or all nonconforming issues, QA Manual Process #2, QA Manual Process #3D Rework, Reject Dispositions and Quarantine Log		Satisfactory		

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1.12	Does the Quality Department review, address, and document customer and internal concerns?	The quality management system shall include a process for documenting, reviewing, and addressing customer concerns and any other concerns internal to the organization. A disciplined problem-solving approach shall be used.	Yes, QA Manual #11B (Control of Nonconforming Product) Cost of Quality Logs i.e. Customer Complaints, External CAR's, 8D Problem Solving, TS 16949 and ISO 14001 Measurables.		Satisfactory		
1.13	Is there a continual improvement plan applicable to each process defined in the scope of the assessment?	The heat treater shall define a process for continual improvement for each heat treat process identified in the scope of the HTSA. The process shall be designed to bring about continual improvement in quality and productivity. Identified actions shall be prioritized and shall include timing (estimated completion dates). The organization shall show evidence of program effectiveness.	Yes, QA Manual Process #1A Management Planning, Production, Quality & APOC Meeting, Policy, TS 16949 Objectives & Targets, Measurables (Cost of Quality)		Satisfactory		
1.14	Does the Quality Manager or designee authorize the disposition of material from quarantine status?	The Quality Manager is responsible for authorizing and documenting appropriate personnel to disposition quarantine material.	Yes, QA Manual #11B (Control of Nonconforming Product), Terry Collins (Quality Manager), Erin Guo (Blowwater Process Engineer), Reject Dispositions, CAR's, Hold Sheets, Quarantine Log, Cost of Quality Reports PPM report, Ratio \$ per Ton		Satisfactory		
1.15	Are there procedures or work instructions available to the heat treat personnel that define the heat treating process?	There shall be procedures or work instructions available to heat treat personnel covering the heat treating process. These procedures or work instructions shall include methods of addressing potential emergencies (such as power failure), equipment start-up, equipment shut-down, product segregation (See 2.8), product inspection, and general operating procedures. These procedures or work instructions shall be accessible to shop floor personnel.	Yes, QA Manual Process #5 Work Instructions for all Departments, Work Order Travelers, Process Flow, Control Plan, PFMEA, Hold Sheets (QA Manual Process #11B, Reaction Plan, COP's, QA Manual Process #5G, Lab Manual, Emergency Measures Book		Satisfactory		

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1.16	Is management providing employee training for heat treating?	The organization shall provide employee training for all heat treating operations. All employees, including backup and temporary employees, shall be trained. Documented evidence shall be maintained showing the employees trained and the evidence shall include an assessment of the effectiveness of the training. Management shall define the qualification requirements for each function, and ongoing or follow-up training shall also be addressed.	Yes, Bluewater/Kitchener Training Plan, QA Manual Process #6A Training & Orientation, Training Matrix, Employee Training Checklists		Satisfactory		



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1.17	Is there a responsibility matrix to ensure that all key management and supervisory functions are performed by qualified personnel?	The organization shall maintain a responsibility matrix identifying all key management and supervisory functions and the qualified personnel who may perform such functions. It shall identify both primary and secondary (backup) personnel for the key functions (as defined by the organization). This matrix shall be readily available to management at all times.	Yes, QA Manual Process #6A Training & Orientation, #6B Scheduling of Personnel, Training Matrix, Employee Records, Key Contact Matrix, Emergency Measures Program	N/A	Satisfactory		
1.18	Is there a preventive maintenance program for all heat treat equipment? Is maintenance data being utilized to form a predictive maintenance program?	The organization shall have a documented preventive maintenance program for all heat treat process equipment. The program shall be a closed-loop process that tracks maintenance efforts from request to completion to assessment of effectiveness. Equipment operators shall have the opportunity to report problems, and problems shall also be handled in a closed-loop manner. Company data, e.g., downtime, quality rejects, first-time-through capability, recurring maintenance work orders, and operator-reported problems, shall be used to improve the preventive maintenance program. Maintenance data shall be collected and analyzed as part of a predictive maintenance program.	Yes, Bluewater Kitchener Predictive Maintenance Analysis, Cost of Quality Reports, Monthly Measurables, Furnace Production Logs, Preventative Maintenance Logs,		Satisfactory		

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1.19	Has the Heat Treater developed a critical spare part list and are the parts available to minimize production disruptions?	The heat treater shall develop and maintain a critical spare parts list and shall ensure the availability of such parts to minimize production disruptions.	Yes, Bluewater Computerized Tracking System, Predictive Maintenance, Inventory List of Spare Parts		Satisfactory		
1.20	Is material from different steel mill heats or metals which may preclude achieving the specified metallurgical properties prevented from being processed together?	Different steel mill heats or metals which require different heat treat parameters, such as but not limited to, austenitizing, quenching, or tempering times and/or temperatures shall be processed separately in order to achieve specified metallurgical properties.	Yes, should a customer identify that there are different steel mill heats or metals which require different heat treat parameters, Bluewater will process separately to achieve the specified metallurgical properties.		Satisfactory		

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<b>Section 2 - Floor and Material Handling Responsibility</b>							
2.1	Does the facility ensure that the data entered in the receiving system matches the information on the customer's shipping documents?	It is critical that all customer requirements and lot identification be adequately transferred to internal heat treat documents. The facility shall ensure that the data entered in the receiving system match the information on the customer's shipping documents. Documented processes and evidence of compliance shall exist, e.g., shop travelers, work orders, etc. Sometimes the material received does not precisely correspond to customer shipping documents. The facility shall have a detailed process in place to resolve receiving discrepancies. The requirements stated above also apply to captive heat treat departments. This process refers to receiving and shipping the parts in and out of the heat treat department.	Yes, QA Manual Process #5G Shipping & Receiving (Receiving Inspection) QA Manual Process #4A Order Entry, Visual Software System, Work Order Travelers, In-process Tags, Hold Tags		Satisfactory		
2.2	Is product clearly identified and staged throughout the heat treat process?	Procedures for part and container identification help to avoid incorrect processing or mixing or lots. Appropriate location and staging within the facility also help to ensure that orders are not shipped until all required operations are performed. Customer product shall be clearly identified and staged throughout the heat treat process. Non-heat treated, In-process, and finished product shall be properly segregated and identified. All material shall be staged in a dedicated and clearly defined area.	Yes, Bluewater Kitchener In-Process Tag, Process #4A Order Entry, QA Manual Process #5 A, B, C, D, E, F, G, H, I, Lab Manual, Visual Software Work Order Travelers, Departmental Staging Signs		Satisfactory		
2.3	Is lot traceability and integrity maintained throughout all processes?	Outgoing lot(s) shall be traceable to the incoming lot(s). The discipline of precisely identifying lots and linking all pertinent information to them enhances the ability to do root cause analysis and continual improvement.	Yes, QA Manual Process P#4A Order Entry, QA Manual Process #5 A,B,C,D,E,F,G, H, I, In-Process Tag, Work Order Travelers		Satisfactory		

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2.4	Are procedures adequate to prevent movement of non-conforming product into the production system?	The control of suspect or non-conforming product is necessary to prevent inadvertent shipment or contamination of other lots. Procedures shall be adequate to prevent movement of non-conforming product into the production system. Procedures shall exist addressing proper disposition, product identification, and tracking of material flow in and out of the hold area. A non-conforming hold area shall be clearly designated to maintain segregation of such material.	Work Order Travelers, QA Manual Process #11B Nonconformance, Nonconforming Suspect Product Procedure, Hold Sheet, Quarantine Log, Cost of Quality Internal/External, Open Issues Log.		<b>Satisfactory</b>		
2.5	Is there a system to identify trap points in the entire heat treat process to reduce risk of mixed parts (inappropriate, non-heat treated, or improperly heat treated parts)?	Heat-treating furnaces and other processing equipment contain areas that have a risk of trapping or holding parts. Such trapping of parts can lead to damage, improperly processed parts or lot mixing/contamination. A system shall exist to identify trap points in the entire heat treat process to reduce risk of mixed parts (inappropriate, non-heat treated, or improperly heat treated parts). The heat treaters shall have documented procedures to identify and monitor trap points for each process/equipment. Monitoring or potential trap points shall occur for every part changeover.	Yes, QA Manual #5 Manufacturing Processes, Departmental Additional Work Instructions, Visual Aids, Work Order Travelers, Monitoring or potential trap points, Map of Conveyor Trap Points, Shaker Tables		<b>Satisfactory</b>		
2.6	Are containers free of inappropriate material?	Containers handling customer product shall be free of inappropriate material. After emptying and before re-using containers, containers shall be inspected to ensure that all parts and inappropriate material have been removed. The source of inappropriate material shall be identified and addressed. This is to ensure that no nonconforming heat treated parts or inappropriate material contaminate the finished lot.	Yes, QA Manual #5 Manufacturing Processes, Work Instructions, Departmental Additional Work Instructions, Visual Aids, Work Order Travelers, visual sign off where applicable		<b>Satisfactory</b>		
2.7	Is furnace loading specified, documented and controlled?	Furnace loading parameters shall be specified, documented, and controlled. Examples include feed rate, belt speed, number of parts per fixture, and load weight. Refer to Process Tables, Section 3.0, for frequency of checks.	Yes, Bluewater Kitchener Work Order Traveler (Loading & Fixtures), Control Plan, QA Manual Process #5 A, B, C, D, E, F, G, computerized weight/process monitoring, Scale Calibration Schedules (Inherweigh Systems)		<b>Satisfactory</b>		

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2.8	Are operators trained in material handling, containment action and product segregation in the event of an equipment emergency including power failure?	Unplanned or emergency downtime greatly raises the risk of improper processing. Operators shall be trained in material handling, containment action, and product segregation in the event of an equipment emergency including power failure. Training shall be documented. Work instructions specifically addressing potential types of equipment emergencies and failures shall be accessible to and understood by equipment operators. These instructions shall address containment actions related to all elements of the heat-treating process, e.g., loading, austenizing, quenching, tempering.	Yes, Bluewater Kitchener Departmental Employee Training Checklists, Emergency Measures Program, QA Manual Process #11B Nonconformance Work Order Traveler Nonconformance Reaction Plan, Hold Sheet, Customer Approved Reaction Plans, QA Manual Process #30 Rework Disposition		<b>Satisfactory</b>		
2.9	Is the handling, storage and packaging adequate to preserve product quality?	Handling, storage, and packaging shall be adequate to preserve product quality. The heat treater's turnace loading system, in-process handling, and shipping process shall be assessed for risk of part damage or other quality concerns. Some equipment includes conveyors and other moving components that may not be able to handle all part configurations. Other practices such as stacking of overloaded containers can also increase the risk of part damage.	Yes, Bluewater Kitchener APQP Records, QA Manual Process #3A Cycle Design, #3B APQP, #3C PPAP/FMEA, QA Manual Process #5H Shipping & Receiving, Work Order Traveler (Customer Orientated Processes), Additional Departmental Work Instructions, Lift Truck Operators & Hoist Operators Training Records		<b>Satisfactory</b>		
2.10	Are plant cleanliness, housekeeping, environmental and working conditions conducive to control and improved quality?	Plant cleanliness, housekeeping, environmental, and working conditions shall be conducive to controlling and improving quality. The heat treater should evaluate such conditions and their effect on quality. A housekeeping policy shall be clearly defined and executed. The facility shall be reviewed for conditions that are detrimental to quality processing such as loose parts on floor, oil around quench tanks, inadequate plant lighting, smoke, etc.	Yes, QA Manual #5 Manufacturing Processes Work Instructions, Additional Departmental Work Instructions, Work Order Traveler, Health & Safety Audits, ISO 14001 Checklists		<b>Satisfactory</b>		

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2.11	Are parts free from contaminants that would be detrimental to the heat treatment of the product?	Many heat-treated parts are subjected to surface finish or appearance operations such as plating or coating after heat treatment. Parts shall be free from contaminants that are detrimental to subsequent processes of the product. Pre-wash (if applicable) and post-wash parameters shall be monitored and documented. Oils and other contaminants or residues can be difficult to remove once subjected to the heat treatment process. Review the chemical supplier's recommendation for cleaning the system. Parts shall be free of rust, burrs, chips, detrimental amounts of drawing compound, cutting fluids, rust preventing oils, lubricants, etc., prior to heat treat. Note: Refer to the appropriate heat treater's requirements and specifications to determine acceptability. Refer to Process Table, Section 5.0, for frequency or checking washer solutions.	Yes, Wash and Rinse Concentration Checks and Logs, Control Plan, PFMEA Receiving Inspection, Supplier Recommendations		<b>Satisfactory</b>		
2.12	Is the quenching system monitored, documented, and controlled?	The quenching system shall be monitored, documented, and controlled. The temperature, agitation, level, concentration (if applicable), time in the quenchant, and additions shall be controlled to the heat treater's specifications. Refer to Process Tables, Sections 3.0 and 5.0, for frequency of checks. Computer-monitoring equipment, with alarms and alarm logs, satisfy the verification requirement. Quench delay tolerance and alarm is required for turnaces with integral quench tanks. Temper delay time shall be specified by the heat treater for parts that are quenched and tempered, e.g., carburizing, carbonitriding, neutral hardening, solution treating and aging.	Yes, Blowerwater Kitchener CQI-9 2012 Requirements Schedule, Quarterly Supplier Quench ability Testing, e.g., cooling curve, viscosity, or titration, Work Order Traveler, Computer Records, Furnace Logs, Carb Report, Quench Delay Alarm & Log, Various Alarms		<b>Satisfactory</b>		
2.13	Is soluble oil or other rust preventive monitored and controlled if applicable?	Parts are often dipped in or sprayed with rust preventive solutions immediately after the heat treating process. Soluble oil solutions or other rust preventive solutions shall be monitored and controlled, if applicable. The heat treater shall have and maintain documented tolerances for the solutions. Refer to Process Tables, Section 5.0, for frequency of checks.	Yes, no Soluble Oil and the Rust Inhibitor Concentration Test Log, Supplier Test Reports, MSDS Sheets, Lab Manual		<b>Satisfactory</b>		

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2.14	Are process control parameters monitored per frequencies specified in Process Tables?	Process control parameters shall be monitored per frequencies specified in Process Tables. Refer to Process Tables, Section 3.0. Computer monitoring equipment with alarms and alarm logs satisfy the verification requirement. A designated floor person shall verify the process parameters, e.g., by initialing a strip chart or data log. Management review is required per Question 1.9.	Yes, Computerized Furnace Monitoring, Circle Charts, Furnace Log Charts, Carb Reports, Work Order Travelers, Alarm Verification Logs		Satisfactory		
2.15	Are In-Process / Final Test Frequencies performed as specified in Process Tables?	In-Process / Final Test Frequencies shall be performed as specified in Process Tables. Refer to Process Tables, Section 4.0.	Yes, Work Order Traveler (Inspection Requirements) Customer Orientated Processes, Bluewater Kitchener Lab Manual (Scope), Various Generic Control Plans		Satisfactory		
2.16	Is product test equipment verified?	Product test equipment shall be verified. Test equipment shall be verified/calibrated per applicable customer-specific standard or per an applicable consensus standard such as those published by ASTM, DIN, EN, ISO, JIS, NIST, SAE etc. Verification/calibration results shall be internally reviewed, approved, and documented.	Yes, Bluewater Equipment Calibration Schedule, Lab Manual Scope SAE/ASTM Lab Standards, Subcontractor Records (National Calibration) (ISL) Daily Hardness Tester Verification Logs,		Satisfactory		

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<b>Section 3 - Equipment</b>							
3.1	Do furnaces, generators, and quench systems have proper process control equipment?	The heat-treat equipment including furnaces, generators, and quench systems shall have proper process controls and related equipment. Examples include temperature, carbon potential/dew point, gas flows, quench monitoring system including agitation, temperature control, etc. as listed in the applicable Process Tables, Section 1.0.	Yes, Furnace Log Charts, HI Tech System, Via Duct System, Circle Charts, Millimeter and Furnace Doctor		<b>Satisfactory</b>		
3.2	Are process equipment calibrations and/or verification certified, posted, and current?	The calibration and certification of the process equipment shall be checked at regular specified intervals. Refer to the applicable Process Tables, Sections 1.0 and 2.0, for equipment calibration or certification time tables.	Yes, Bluewater Kitchener CQI-9 2012 Requirements Schedule, Equipment Calibration Schedule, Various Subcontractor Records, Calibration Labels, (National Calibration, ISL Services, Interweigh Systems, Internal SAT,		<b>Satisfactory</b>		
3.3	Are thermocouples & protection tubes checked or replaced per Process Tables?	The thermocouples and protection tubes shall be checked or replaced in compliance to a preventive maintenance schedule. Refer to the applicable Process Tables, Section 2.0.	Yes, Equipment Calibration Schedule Subcontractor (ISL Services Certification Reports), PM Records		<b>Satisfactory</b>		
3.4	Are temperature uniformity surveys performed per requirements in Process Tables?	Temperature uniformity surveys shall be conducted per the requirements in the applicable Process Tables, Section 2.0. Certain furnace designs, e.g., rotary retorts & some continuous pusher furnaces preclude direct temperature profiles. Alternate test methods per Section 3.4.5 are acceptable for furnaces where temperature uniformity studies are not possible. TUS studies are not required for Ion Nitriding. Refer to Process Table H Item # H2.4 for specific requirements.	Yes, Bluewater Kitchener CQI-9 2012 Requirements Schedule, TUS Schedule, ISL TUS Schedule,		<b>Satisfactory</b>		
3.5	Is the variation of the furnace controlled thermocouple from set point within the requirements in the Process Table?	The variation between the furnace control thermocouple value and the set point temperature shall be within the limits defined in the applicable Process Tables, Section 2.0. For Ion nitriding refer to Process Table H item # H2.5 for specific requirements.	Yes, ISL Service Reports, Bluewater Kitchener Internal SAT Records, Various Furnace Charts		<b>Satisfactory</b>		



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Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
3.6	Are the process & equipment alarm checks being tested for proper function?	<p>The heat treater shall have a list of heat treat process and equipment alarms that, if not properly working, may have a high probability of producing non-conforming product. These alarms shall be checked quarterly at a minimum or after any repair or rebuild.</p> <p>Other alarms, including but not limited to safety-related, shall be checked per heat treater's requirement.</p> <p>These alarm checks shall be documented.</p>	<p>Yes, Bluewater Kitchener COI-9 2012 Requirements Schedule, Alicase: Software for Alarm Verification is performed automatically at each weekly startup, Conveyor manually at each startup, PM Records, Production Furnace Log Charts, Alarm Verification Logs &amp; Alarm Schedule</p>		<b>Satisfactory</b>		
3.7	Are generators and furnace atmospheres continuously monitored, automatically controlled, and documented? NOTE: This requirement is specific to Process Tables A, B, E, F, and G; Sections 1.0 and 3.0.	<p>Generator and furnace atmosphere carbon potential/dew point shall be continuously monitored, automatically controlled, and documented. Recorded carbon potential shall be controlled within +/- 0.05 of the set point. Recorded dew point shall be controlled within acceptable limits specified in the control plan or internal procedures.</p> <p>NOTE: For rotary retort and shaker furnaces that preclude in situ control and monitoring, the method described in Section 3.4.5 "Properly Surveys" shall be used.</p> <p>If generators are not used, the flow rates of the supplied atmosphere gases shall be monitored and controlled.</p> <p>The automatic and continuous atmosphere control system shall consist of sensors such as oxygen probes or on-line Infrared (IR) gas analysis. The heat treater shall also have a back-up method of checking the carbon potential/dew point. Examples are dew point, electrical wire resistance, gas analysis, shim stock, carbon bar, etc. See Process Tables, Sect. 3.0 for verification frequencies of primary and back up method.</p>	<p>Yes, Computer Software, Work Order Masters, Furnace Log Charts, Millimeter Verification, Carbon Potential Schedule</p>		<b>Satisfactory</b>		

**Special Process: Heat Treat System Assessment**

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
3.8	<p>A back up verification of the atmosphere is required. When the back-up verification check of the atmosphere does not correlate within pre-established limits with the primary control method (carbon potential/dew point reading), is correlation of the carbon-bearing atmosphere to the primary control method re-established?</p> <p>NOTE: This requirement is specific to Process Tables A, B, E, F, and G; Sections 1.0 and 3.0.</p>	<p>When the back-up verification check of the atmosphere does not correlate within pre-established limits with the primary control method (carbon potential/dew point reading), the heat treater shall resolve the out-of-limit discrepancy. The back-up atmosphere monitoring system reading and the automatically controlled atmosphere dew point/carbon potential reading shall be maintained within the correlation limits specified in the control plan or internal procedures. These range tolerances vary with the specific heat treat process and the equipment used.</p> <p>The heat treater shall make appropriate technical adjustments and then re-establish/demonstrate the correlation of the actual atmosphere carbon potential/dew point reading to the primary control and back-up atmosphere reading. The range tolerances for correlation between the two readings shall be in the control plan or internal procedures. The back-up carbon potential/dew point reading shall be established using one or more of the following methods:</p> <ul style="list-style-type: none"> <li>• Carbon bar, slug, or surface carbon of part</li> <li>• Shim stock</li> <li>• 3-gas analyzer</li> <li>• Dew point</li> <li>• Hot wire resistance</li> </ul>	<p>Yes, Furnace Log Sheet, Master Work Order Instructions 3 Hour Scheduled Burn Outs, Millimeter Readings, Carb Reports, Conveyor - automatic second Carb Verification System</p>		<b>Satisfactory</b>		
3.9	<p>Are all ammonia lines equipped with a fail-safe method to prevent ammonia leaks into the furnace?</p>	<p>The heat treater shall show evidence that ammonia lines were disconnected for non-ammonia bearing atmosphere processes.</p> <ul style="list-style-type: none"> <li>• One of these fail-safe methods shall be used to prevent ammonia to leak into the furnace:             <ul style="list-style-type: none"> <li>• A quick disconnect or physical separation of the lines</li> <li>• Three-valve ammonia "fail-safe" vent system is permitted. See the definition "Three Valve Fail-Safe Vent" and diagram in the glossary.</li> <li>• 1 manual and 2 electrical magnetic valves in series</li> </ul> </li> </ul>	<p>Yes, Allcase Furnaces: Three valve Fail Safe, Conveyor: Quick Disconnects PM Records, Furnace Log Charts, Flow Scopes, Cleaning Schedule, Cleaning &amp; Reassembly Procedure</p>		<b>Satisfactory</b>		

**Special Process: Heat Treat System Assessment**

Special Process: Heat Treat System Assessment							
Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
3.10	Is there a minimum of 3 hour purge of the furnace atmosphere when switching from an ammonia bearing atmosphere to a non-ammonia bearing?	Ammonia pick-up can be undesirable in parts and heat treat processes not specifying/requiring ammonia as an addition.  The heat treater shall perform a minimum 3 hours purge prior to processing product not requiring ammonia as an addition. Reduction of 3 hours purge requires conclusive test data of the atmosphere to show no significant amount of residual ammonia is present in the furnace atmosphere.	Yes, Bluewater Kitchener Departmental Production Schedules, Work Order Instructions (Three Hour Burn-Out), Furnace Log Charts		<b>Satisfactory</b>		
3.11	Do all atmosphere furnaces and generators have flow scopes or flow meters for all gases?	All atmosphere furnaces and generators (output trim/adjustment gas) shall have flow scopes or flow meters for all gases. Flow scopes and meters shall be periodically serviced per the heat treater's preventive maintenance program. Cleaning and proper re-assembly procedures shall be documented.	Yes, PM Schedule for Flow Scopes Furnace Log Charts, Work Order Masters,		<b>Satisfactory</b>		

**Special Process: Heat Treat System Assessment**

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment			
				N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
3.12	Is there a rigorous fail-safe at the front of the furnace to prevent non-uniform loading of parts?  In absence of a rigorous fail-safe, are all continuous belt furnaces equipped with sight glass inspection ports and infrared temperature pyrometers at discharge end of the hardening furnace?	In absence of a rigorous fail-safe at the front of the furnace to prevent non-uniform loading of parts (this includes the combustion system maintenance/adjustments to ensure proper efficiencies and physical limitation for part loading), then the heat treater shall have an infrared temperature pyrometer at the exit end.  The infrared temperature pyrometers are required at the exit end or continuous belt furnaces to monitor for under temperature parts. The temperature alarm shall be within 28°C (50°F) of the furnace set point temperature. Results shall be strip charted or continuously data logged. Infrared temperature pyrometers shall be calibrated annually at a minimum and certified. All sight glasses shall be cleaned per the preventive maintenance schedule.	To prevent non-uniform loading of parts, each conveyor furnace has a Hi-Tech feeder system at the front the furnace, each release is weighted, the scales are calibrated quarterly, the combustion system maintenance/adjustments ensure proper efficiencies and physical limitation for part loading  Results are continuously data logged. Infrared temperature pyrometers shall be calibrated annually at a minimum and certified. All sight glasses shall be cleaned per the preventive maintenance schedule.	N/A	<b>Satisfactory</b>		

**Special Process: Heat Treat System Assessment**

Special Process: Heat Treat System Assessment					Assessment			
Question Number	Question	Requirements and Guidance	Objective Evidence	N/A	Satisfactory	Not Satisfactory	Needs Immediate Action	
3.13	Is salt chemistry in the austenitizing salt bath monitored?  Note: This is applicable to salt bath heat treating processes listed in Process Tables A & B.	The heat treater shall check the salt chemistry in the austenitizing salt bath, or part decarburization, daily. Refer to the applicable Process Tables, Section 3.0, for frequency or checks.	Bluewater checks the salt chemistry in the austenitizing salt bath daily when running automotive parts.		Satisfactory			
3.14	Is the quenching medium analyzed?	The heat treater shall periodically have the quenching medium analyzed for specific quenching characteristics, e.g., cooling curve, water content, salt concentration, as specified in the applicable Process Tables, Section 5.0. This does not include Process Table G & H. <ul style="list-style-type: none"> <li>The quench media characteristic tolerances shall be specified by the quench medium supplier or the heat treater.</li> <li>Analysis shall be reviewed for conformance by the heat treater. This review shall be documented.</li> </ul>	Yes, Bluewater (Kitchener 2012 CQI-9 Requirements Schedule, semi-annual documented reports of all oil quench mediums from Idemitsu		Satisfactory			

**Special Process: Heat Treat System Assessment**

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment		
				N/A	Satisfactory	Not Satisfactory
<b>FOR INDUCTION HEAT TREATING</b>						
3.15	Is the positioning of each part being controlled?	A method to detect proper part position, such as the use of proximity switches, optical sensors, mechanical probes, etc., is required for each part.  The heat treater shall control the energy or power for each part. <ul style="list-style-type: none"> <li>A signature monitor for each machine is preferred. A signature monitor gives the energy unit (voltage, kilowatt, etc.) vs. time or distance (for scanning systems).</li> <li>An energy monitor or equivalent is acceptable if approved by the authorized customer representative.</li> </ul>	N/A	N/A		
3.16	Does the heat treater control the energy or power for each part?	The heat treater shall have a coil management system. Coil refers to the heating coil and the quench plenum. <ul style="list-style-type: none"> <li>Spare coils for each part shall be available on-site.</li> <li>Coils shall conform to the approved original design.</li> <li>Engineering change approval from the customer is required whenever the coil design is changed.</li> </ul>	N/A	N/A		
3.17	Does the supplier have a coil management system? Coil refers to the heating coil and the quench plenum.		N/A	N/A		
3.18	Is quench system automatic?	The quench system shall be an automatic operation. No manual quenching is allowed unless specifically approved by the authorized customer representative. Quenching shall be automatically initiated and controlled.	N/A	N/A		
3.19	Does each lot or parts have first piece set-up?	The heat treater shall perform first piece set-up for each lot or parts.	N/A	N/A		
3.20	Is there a procedure that addresses maintenance of the inductor and quench spray nozzle(s) (for example, quench ring, quench shower)?	Procedure shall include regular inspection and cleaning of the inductor and quench spray nozzle(s).	N/A	N/A		

**Special Process: Heat Treat System Assessment**

Question Number	Question	Requirements and Guidance	Objective Evidence	Assessment		
				N/A	Satisfactory	Not Satisfactory
3.21	Is there a procedure to purge the air pockets from the quench lines?	After downtime of the induction heating system, air pockets may form in the quench lines. These air pockets will cause interrupted quenching at start-up. The Heat Treater shall establish the time limit (of the downtime) when this procedure is to be followed. (Example: The quench lines shall be purged after induction heating system is down greater than 4 hours.) Factors such as quench line diameter, length, geometry, etc. shall be considered.	N/A	N/A		