Special Process: Heat Treat System Assessment

Facility Name: ***Induction Services, Inc.***			
Address: ***24800 Mound Road, Warren, MI. 48091***			
Phone Number: ***586-754-1640***		Fax Number: ***586-754-5402***	
Date of Assessment:	***6-Jan-2026***	Date of Previous Assessment:	***7-Jan-2025***
Internal (Captive) Heat Treater (Y/N):	***No***	Commercial Heat Treater (Y/N):	***Yes***

Type(s) of Thermal Processing at this Facility:

Process Table A		**Process Table D**	
Carburizing		Induction Heat Treating	X
Carbonitriding		**Process Table E**	
Carbon Restoration		Annealing	
Neutral Hardening (Quench and Temper)		Normalizing	
Austempering / Martempering		Stress-Relieving	X
Tempering		**Process Table F**	
Precipitation Hardening / Aging		Low Pressure Processing (Carburizing / Carbonitriding / Neutral Hardening)	
Process Table B		**Process Table G**	
Nitriding (Gas)		Sinter Hardening	
Ferritic-Nitrocarburizing (Gas or Salt)		**Process Table H**	
Process Table C		Ion Nitriding	
Aluminum Heat Treatment		**Process Table I**	
		Hot Stamping	

Current Quality Certification(s): ***ISO 9001:2015***

Date of Re-assessment (if necessary):

Personnel Contacted:

Name:	**Title:**	**Phone:**	**Email:**
John Conway	***General Manager***	***586-754-1640***	***jconway.inductionservicesinc.com***
Carolyn Czech	***Quality Systems Analyst***	***586-754-1640***	***cczech.inductionservicesinc.com***

Auditors/Assessors:

Name:	**Company:**	**Phone:**	**Email:**
Michael Miles	***Induction Services, Inc.***	***586-754-1640***	***mmiles.inductionservicesinc.com***

Number of "Not Satisfactory" Findings: 0

Number of "Needs Immediate Action" Findings: 0

Number of "Fail" Findings in the Job Audit(s): 0

Section 1 - Management Responsibility and Quality Planning

Please describe Objective Evidence for each Requirement

1.1 Is there a dedicated and qualified heat treat person on-site?

To ensure readily available expertise the following requirements shall be met.

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
There shall be a dedicated and qualified full-time heat treat person on site.	Our General Manager is our qualified Heat Treat person.		X		
The position shall be reflected in the organization chart.	Reference: General Manager on our Org Chart.		X		
A job description shall exist identifying the qualifications for the positions including appropriate metallurgical and heat treat knowledge for the individuals.	Reference Specific Job description for this.		X		
Evidence shall be available regarding the qualifications with a minimum of 5 years experience in heat treat operations or as a combination of a minimum of 5 years of formal metallurgical education and heat treat experience.	John has over 20 years of hands on heat treating experence.		X		

Comments:

1.2 Does the heat treater perform advanced quality planning?

The organization shall incorporate a documented advance quality planning process. A structured system for such process with the APQP elements is recommended, samples are available in the AIAG APQP manual or other equivalent national automotive industry standards. Similar parts can be grouped into part families for this effort as defined by the organization.

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
There shall be documented advance quality planning procedure available.	Our Advance Quality planning procedure is PRDV-P-01		X		
Feasibility studies shall be performed and internally approved for each part or group of similar parts.	These are completed by our Quality and General Manager using procedure PRDV-P-01 on form PRDV-F-02		X		
There shall be a documented system for process changes with approval by the customer.	Procedure QMGT-P-01, form QLTY-F-13		X		

Comments:

1.3 Are heat treat FMEAs up to date and reflecting current processing?

Failure Mode and Effects Analysis (FMEA) for processes (PFMEA) is mandatory for the prevention of product/process failure modes and final product concerns. Examples of appropriate methods and standards include SAE J1739, AIAG & VDA FMEA Handbook.

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
There shall be a documented Failure Mode and Effects Analysis (FMEA) procedure with the present FMEAs updated and reflecting the current part quality status.	The requirement for a process FMEA is evaluated on a job to job basis, when a PFMEA is needed it is identified during the APQP process, procedure PRDV-P-02.		X		
FMEAs shall address all process steps from part receipt to part shipment and all the key heat treat process parameters as defined by the organization.	Our PFMEA's are written according to the AIAG guide lines and customer specific requirements, they include all relevent processes that are performed. *Reference QLTY-F-06 PFMEA document.*		X		
All special characteristics, as defined by the organization and its customers, shall be identified, defined, and addressed in the FMEA.	Special charictoristics are either dictated by the customer on the drawings, customer specific requirements or those that IS feels necessary to assure quality.		X		
A cross-functional team shall be used in the development of the FMEA and shall be consistent with all associated documentation such as Control Plans, work instructions and shop travelers.	We use a cross functional team to develop and review FMEA. This team consists of: operators, setup, supervisors, managers, quality and engineers.		X		

Comments:

1.4	**Are heat treat process control plans up to date and reflecting current processing?**

Reference automotive industry Control Plan guidelines. The Control Plan may be specific for each part or part family or it can be process specific and written for each process. In any case it describes required controls and actions for each process step as well as periodic requirements to assure process is in control.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall incorporate the use of a documented Control Plan reflecting the current process.	We incorporate Control Plans, per procedure PRDV-P-01, our manuafacturing process development procedure.		**X**		
Control Plans 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.	Our Control Plans are written according to the AIAG guidelines and customer specific requirements, they include all relevent processes that are performed. *Reference QLTY-F-03 CP document.*		**X**		
A cross-functional team shall be used in the development of the Control Plan and shall be consistent with all associated documentation such as FMEAs, work instructions and shop travelers.	We use a cross functional team to develop and review Control Plans. This team consists of: operators, setup, supervisors, managers, quality and engineers.		**X**		
All special characteristics as defined by the organization or its customers shall be identified, defined, and addressed in the applicable control plan.	Special characteristics are either dictated by the customer on the drawings, customer specific requirements or those that IS feels necessary to assure quality. These characteristics are identified in the appropriate places on the Control Plan.		**X**		
Sample sizes and frequencies for evaluation of process and product characteristics shall be addressed and shall be consistent with the minimum requirements listed in the applicable Process Table.	Sample sizes and frequencies are defined on the Control Plans and are consistant with the minimum requirements listed in the applicable process tables. Reference QLTY-F-03 CP document.		**X**		

Comments:

1.5	**Are all heat treat related and referenced specifications current and available? For example: Material standards, SAE, AIAG, ASTM, General Motors, Ford, and FCA.**

A document control system is pertinent for the handling and internal distribution of received customer specifications and to keep up to date with national or global standards related or close to heat treat processes.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall have a procedure and process to ensure the timely review, distribution and implementation of all customer and industry engineering standards/specifications and changes based on customer-required schedule.	Procedure QMGT-P-01 identifies the method for handling external specifications and standards. These documents are tracked and on a log (QMGT-F-10) and stored in a central loocation.		**X**		
The organization shall have all related heat treat and customer referenced standards and specifications available for use, like but not limited to SAE, AIAG, ASTM, ISO, EN, JIS, General Motors, Ford, and FCA.	The general OEM standards are verified current by our Quality Systems Administrator on a monthly bases by checking IATF websites. SAE, AIAG, ASTM, ISO, EN and JIS are also reveiwed monthly.		**X**		
The procedure shall include a 2-week distribution limit for cascading newly received and reviewed documents.	Review is completed immediatly upon receiving the newly revised specifications or standards. Reference Specification and Process Standard books: QMGT-F-01, QMGT-F-02 and QMGT-F-10.		**X**		

Comments:

1.6	Is there a documented system to create process specifications for all active processes?

A documented system for creating process specifications is necessary for operating the heat treat process within the desired, requested process parameters to reach the final product specifications. Examples of process parameters include process temperatures, cycle times, load rates, atmosphere or gas flow settings, belt speeds, quench agitation speeds, etc.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Authorization shall be defined to a responsible person (see 1.1) for establishing process specification for the heat treatment of the products with the available equipment.	Our General Manager, Quality Manager, Shift Supervisors and Set-up people are responsible. *Reference Org Chart.*		X		
The heat treater shall have written process specifications for all active processes and identify all steps of the process including relevant process parameters.	We have process specifications for all active processes; Reference Setup cards-SET-F-**, Inspection Sheets-INSP-F-01, Job Cards-ORDP-F-02a , Quot-F-02-Quotation Sheet & PPAP docs…		X		
Parameters shall have operating tolerances as defined by the organization in order to maintain process control.	Process parameters are defined on our Master Card, set-up sheet, to maintain process control. Reference Master Card SETP-F-**		X		
Process specifications shall be available in the form of work instructions, job card, computer-based recipes, or other similar documents.	We use Job Cards, Work Instructions, Set-up Sheets and Inspection Sheets.		X		
All process specification changes shall be reviewed to the extent necessary to ensure continued conformity with customer requirements for process changes.	Process specification changes are verified through physical inspection to customer part specifications & documented.		X		
All process specification changes shall be documented to include the date the process specification change was implemented and the person(s) approving the change.	These changes are made through our Master Set-up sheets, dated and approved by management personnel.		X		
Comments:					

1.7	Has the heat treat process been validated initially and after process equipment has been relocated, or had a major rebuild or modification?

To demonstrate each heat treat process is capable of yielding acceptable product, the organization shall perform process validation as part of the initial validation of each process, after relocation of any process equipment or heat treat location change, and after a major rebuild of any equipment. Each process line may include a combination of equipment that is integrated in the performance of a heat treat process, e.g. hardening, quenching and tempering.
(Heat treat process validation consists of robust heat treat equipment, rigorous process controlling and monitoring requirements and calibrations, appropriate test equipment calibrations, and strategic product sampling techniques.)

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall define what constitutes a major rebuild or modification that may impact product characteristics.	Our General Manager defines the impact to characteristics and setup, quality inspectors varify characteristics to ensure compliance, after Rebuild or Mod.		X		
Process validation shall be performed on full production load, or production run, with production intended fixturing and load configuration.	Tempering process was verified using a full load of THK Parts, *reference Capability Study. (L28HS8006)*		X		
An action plan shall exist if process control parameters or any of the product characteristics fall outside of the control tolerance limits or the heat treater does not conform to the respective Process Table.	Action plans are generated by our General Manager, when process control parameters or characteristics fall from tolerance limits.		X		
The heat treater shall demonstrate that all parts in the heat treat process (heat treat batch or production run) will meet customer specifications. Samples for these tests shall be selected that best represent the entire production load population. • An acceptable guideline for test sample locations is to use those loading locations prescribed for temperature uniformity surveys. • An acceptable guideline for induction hardening is to show a representative number of parts produced at the extremes of process parameter's tolerances meet customer specifications. Standard process capability indices may also be used to show compliance.	Most processes are verified during First, Middle & Last piece Inspections. Capability Studies, can be performed at the time of PPAP during the first run, these studies could be for Surface Hardness or Case Depth, before or after Tempering Operations.		X		
Comments:					

1.8	Does the heat treater collect and analyze data over time, and react to this data?

The analysis of product characteristics (e.g. tensile strength) and processes parameters (e.g. temperature) over time can yield vital information for defect prevention efforts. Examples include but are not limited to product property trend charts, scrap trends, and variation in process parameter recordings.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall have a system to collect, analyze, and react to product or process data over time.	Product is inspected for analysis, every time that parts are processed.		X		
Methods of analysis shall include ongoing trend or historical data analysis of product characteristics or process parameters.	Inspection data from every process run, is saved for trend analysis, historical data can be analyzed as needed.		X		
The organization shall determine which parameters are included in such analysis.	Parameters are defined in set-up cards, which include: Temperature, Time…		X		

Comments:

1.9	Is the heat treat monitoring system reviewed by Qualified Personnel?

This review is intended to be a second level review in addition to those performed by the heat treat operators. This review would be performed by qualified personnel as defined per question 1.17. 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.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Qualified Personnel shall review the furnace monitoring systems at intervals not to exceed 24 hours.	Our tempering leader is responsible to review the furnace charting for every job, logs are kept to define what jobs are processed on each furnace. Reference: TMPR-F-02		X		
The process of reviewing the furnace data shall be documented. This requirement also applies to computerized data.	Sign offs are made after each batch that is processed through the furnace. Reference circular chart recordings.		X		
This second level review shall include detection and reaction to out of control conditions or alarms. This reaction shall be documented.	Our Quality Manager, or when not present, the Assistant Quality Manager is responsible to review the furnace monitoring system each day, minimum. Reference: TMPR-F-02 and the Chart Recordings.		X		

Comments:

1.10	Are internal assessments being completed on an annual basis, at a minimum, using AIAG HTSA?

The internal assessment includes a completed job audit and process table for each applicable process.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall conduct internal assessments on an annual basis, at a minimum, using the current revision of the AIAG HTSA.	CQI-9 assessments are made annually by the Quality Manager and confirmed by a 3rd party auditor who also completes a CQI-9 assessment. This has been done since 2011.		X		

Comments:

1.11	Does the heat treater have a documented procedure for the rework/reprocessing of parts?

Rework/Reprocessing of heat treated components can have a significant impact on the performance of the component. Reworking/Reprocessing in some cases is an acceptable practice. A rework/reprocessing procedure is key to identifying the rework/reprocessing practice. To be approved for rework/reprocessing, either on a case by case basis or pre-approved in the PPAP, the heat treater shall meet the following requirements.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Any change or addition to the rework/reprocessing procedure shall require notification and approval in accordance with the AIAG PPAP process. Any rework/reprocessing not previously approved and identified in the rework/reprocessing procedure is not allowed.	Rework is never done without prior approval from our customer. All changes to our rework / reprocessing procedure are documented and communicated with our customer.		X		
The OEM shall be notified by the Tier 1 supplier prior to rework/reprocessing product utilizing an unapproved process. If not Tier 1, the customer shall be notified.	We have no tier 1 customers and all rework or reprocessing is prior appvoved by our customer.		X		
The rework/reprocessing procedure shall be referenced in the heat treater's PPAP approved PFMEA and process control plan.	Reference in our Rework Reprocessing Procedure, QLTY-P-04		X		
The rework/reprocessing procedure shall include the following: • A description of product characteristics for which rework/reprocessing is allowed and those characteristics for which rework/reprocessing is not permissible. • A requirement that all rework/reprocessing activity have a new process control sheet issued by qualified personnel; this new process control sheet shall include the heat treat parameter modifications. • A requirement that there is a record or log of all rework/reprocessing work. • A description of the sampling plan. • A requirement that the Quality Manager or a designee shall authorize the release of rework/reprocessed product.	Reference our procedure for rework or reprocessing (QLTY-P-04) and our log for Jobs Reworked QLTY-F-20, the quality manager releases reworked or reprocessed parts in conjunction with the approval of the customer.		X		
Comments:					

1.12	Does the Quality Department review, address, and document customer and internal concerns?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The quality management system shall include a process for documenting, reviewing, and addressing customer concerns and any other concerns internal to the organization.	Internal and external concerns are handled through the Corrective & Preventative Actions procedure QMGT-P-03.		X		
A disciplined problem-solving approach shall be used.	We utilize a 8D problem solving approach. (QMGT-F-05 NCR Log)		X		
Comments:					

1.13	Does the organization have a Continual Improvement Plan (CIP)?

Continual improvement is an ongoing effort in the organization to improve processes, services, or products. These efforts may seek incremental improvement over time or breakthrough improvement all at once. A CIP identifies specific continual improvement items, responsibilities and estimated completion dates. Downtime reports, scrap reports, preventive maintenance reports, energy consumption, use of medias, etc., may be used to develop a CIP.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall have continual improvement plan(s).	Our continual improvement plans are identified in procedure MNGT-P-04.		X		
The CIP shall have specific action items, identify responsibilities and target completion dates for each action item.	Action Items, resposibilities, target completion dates are all documented on continual Improvement form MNGT-F-04.		X		
The organization shall show evidence of program execution.	Reference our Continual Improvements log book stored in the Quality Office. Reference MNGT-F-04		X		

Comments:

1.14	Does the organization have a documented procedure for the control of nonconforming material?

This practice is the responsibility of the manufacturers' quality management organization and their included personnel. The procedure should best describe the complete process with the handling of nonconforming or suspect products, beginning with detection and the authorization/obligation to quarantine those products up to the final decision and disposition in quarantine status.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The documented procedure shall specify the responsibilities for handling segregation and disposition of suspect or non-conforming products.	Procedure QLTY-P-02 details the responsibilities when dealing with Non-conforming products.		X		
The organization shall keep records showing evidence of process being followed.	All evidence is recorded on form QLTY-F-12.		X		

Comments:

1.15	Are there procedures or work instructions available to the heat treat personnel that define the heat treating process?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
There shall be procedures or work instructions available to all employees involved in heat treating and inspection of heat treated product.	All procedures and work instructions are in place at their point of use on the production floor. The main procedures are: Production (PROD-P-01), Quality Inspection (QLTY-P-01)… and Work Instructions are also available at the appropriate area's.		X		
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.	We have a Contingency Plan, it is posted at all nessesary point of use locations within the company.		X		

Comments:

1.16	Is management providing employee training for heat treating?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall provide employee training (including follow up and ongoing training) for all heat treating and inspection operations, including backup and temporary employees.	All operators are trained, Reference our employee training matrix form QMGT-F-07		X		
Management shall define the qualification requirements for each function.	The qualifications for each function are detailed in the specific job descriptions. *Reference form QMGT-F-06*		X		
Documented evidence of training and training effectiveness shall be maintained.	Reference our employee training matrix form QMGT-F-07		X		
Operators shall be trained in material handling, containment action, and product segregation in the event of an equipment emergency including power failure.	All operators are trained in containment and segregation. Reference our contingency plan.		X		
Comments:					

1.17	Are all key management and supervisory functions (in regards to Heat Treatment) performed by qualified personnel?

Key management and supervisory functions, in regards to heat treatment, are critical to ensure both process stability and product quality. This can be accomplished in several different ways. Some examples to consider are a responsibility matrix, the organizational chart, job descriptions, or incorporation into other similar system documentation.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall define and document, key management and supervisory functions in regards to heat treatment.	Reference our "Responsibility Matrix's". MNGT-F-05 (Overall Responsibility Matrix) and MNGT-F-06 (CQI-9 Specific Responsibility Matrix)		X		
This documentation shall clearly identify both primary and secondary (backup) personnel.	Our Responsibility Matrix's identify our Primary and Secondary contact for each department and includes all critical functions.		X		
This information shall be readily available to appropriate personnel.	This information is kept in the Quality and Human Resource managers offices.		X		
Comments:					

1.18	Is there a preventive maintenance program? Is maintenance data being utilized to form a predictive maintenance program?

Preventive maintenance is essential to ensure equipment, machines and tools are kept in appropriate condition for the manufacturing of products at desired quality and capacity levels. The organization shall comply with the following requirements.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The organization shall have a documented preventive maintenance program for all heat treat process equipment.	Reference our Machine and Process Fluids Control Log MAIN-F-11		X		
The program shall be a closed-loop process that tracks maintenance efforts from request to completion to assessment of effectiveness.	Reference Predictive Maintenance evaluation Log MAIN-F-08 and Predictive Maintenance Log MAIN-F-07		X		
Equipment operators shall have the opportunity to report problems, and the problems shall be handled in a closed-loop manner.	Reference our Predictive Maintenance Data log MAIN-F-09		X		
The 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.	Un Scheduled down time remains below our goal of less than 3%. Reference Procedure MAIN-P-02.		X		
Maintenance data shall be collected and analyzed as part of the defined predictive maintenance program.	Reference Maintenance and Housekeeping procedure MAIN-P-01 and Form MAIN-F-11 Machine and Process fluids Control Log.		X		
Comments:					

1.19	Has the Heat Treater developed a critical spare part list and are the parts available to minimize production disruptions?

The critical spare parts list and available inventory is typically comprised of long lead time components such as (but not limited to) burners, fans, rolls, belts and other alloy parts. Availability of spare parts may be maintained on-site or off-site (for example, consignment) as identified by the heat treater.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat treater shall develop and maintain a critical spare parts list.	Our critical spare parts list is documented on forms MAIN-F-06.		X		
The heat treater shall ensure the availability of critical spare parts to minimize production disruptions.	This inventory is verified periodically as appropriate ranging from weekly to quarterly.		X		

Comments:

1.20	Is material from different heat lots which may preclude achieving the specified metallurgical properties prevented from being processed together?

Batch to batch variation may have an adverse effect on metallurgical properties. This variation may require that batches be processed separately.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Where appropriate, the heat treater shall have a material product flow management system to prevent the processing of mixed batches.	Each bin of parts (Lot) that is processed has a job card, which has a unique number for identification and each requires a full inspection. Each lot is kept separate at all times.		X		

Comments:

Section 2 - Floor and Material Handling Responsibility

Please describe Objective Evidence for each Requirement

2.1	Does the heat treat responsible organization ensure that customer data entered in the process tracking system matches the customer order?

It is critical that all customer requirements and lot identification be adequately transferred to internal heat treat documents. This also applies to captive heat treaters and their internal material flow.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat treater shall establish a documented product tracking system (e.g. shop travelers, work orders, etc.) which supports the heat treatment with relevant product and process information.	We use job cards (ORDP-F-02) to track and control each bin of parts, these cards contain the relevant product and process information.		X		
The heat treat organization shall establish a system to detect and resolve discrepancies on received products and corresponding customer information.	Contract review is conducted for every shipment of parts before issuing job cards for production. In this review, the purchase orders and current requirements that are on file, are reviewed.		X		
Comments:					

2.2	Is product clearly identified and staged throughout the heat treat process?

Product identification, process status and location of products with their process status are important to prevent incorrect processing or mixing of lots.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
There shall be a procedure for part and container identification to avoid incorrect processing or mixing of lots.	All containers are identified using our Job card (ORDP-F-02) as well, all process stages utilize different colored tags for Identification.		X		
Non-heat treated, in-process, and finished product shall be properly segregated in clearly identified locations.	Separate locations exsist for each *(with overhead signs)* and are clearly identified.		X		
Comments:					

2.3	Is lot traceability and integrity maintained throughout all processes?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Lot traceability shall be maintained throughout the entire process.	Every container has a job card which establishes lot traceability, through-out all processes. *(ORDP-F-02)*		X		
Comments:					

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.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Procedures shall exist addressing proper disposition, product identification, and tracking of material flow in and out of the hold area.	Reference our Procedure QLTY-P-02, Work Instruction QLTY-W-03, Verification Log QLTY-F-15 and Tag QF.4.13.03.		X		
A non-conforming hold area shall be clearly designated to maintain segregation of such material.	We have a limited access hold cage that is well seperated from the production floor, in another building.		X		

Comments:

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 (including but not limited to baskets, conveyors, chutes, etc.) 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.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat treater shall have procedures to identify and monitor trap points for each process/equipment.	Our F.M.E.A identifies trap points, specific tasks are identified in job descriptions for stock handlers, Furnace tenders, and others to minimize the risk of part entrapment.		X		
Monitoring of potential trap points shall occur for every lot changeover.	Stock handlers are responsible to ensure that all parts are removed from containers, during changeover, and no lot mixing occures.		X		

Comments:

2.6	Are containers free of inappropriate material or free of heat treated parts mixed with non-heat treated parts?

The purpose of the requirement is to reduce the risk of contaminating the finished lot with nonconforming parts or inappropriate material. Containers used for the transport of parts to be heat treated are often used for the same material after completion of the heat treat process. It is critical that the finished lot is not contaminated with non-heat treated parts or other inappropriate material remaining in the container.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
There shall be a procedure that addresses the inspection of containers used for transporting non-heat treated and heat treated parts.	Stock handling procedure STCK-P-01 requires that stock handlers verify containers.		X		
The procedure shall include the inspection of containers after emptying and immediately before re-using to ensure that all parts and inappropriate material have been removed.	Stock handlers are responsible to inspect containers, to ensure that all parts and inappropriate materials are removed.		X		
The source of inappropriate material shall be identified and addressed.	Stock Handlers ensure that inappropriate materials are identified, addressed, and removed.		X		

Comments:

2.7	Is furnace loading specified, documented and controlled?

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
Furnace loading parameters shall be specified, documented, and controlled (including but not limited to the following examples: feed rate, belt speed, number of parts per fixture, load weight, etc.).	We utilize batch furnaces with no atmosphere reqiurements,for stress relieve only. Parts per batch, temperature and time at temperature are all specified, controlled, and documented. Reference our qualification, capability study.		X		
Comments:					

2.8	Is there a procedure for material handling, containment action, and product segregation in the event of an equipment emergency including power failure?

Unplanned or emergency downtime greatly increases the risk of improper processing.

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
There shall be a procedure for material handling, containment action, and product segregation in the event of an equipment emergency including power failure.	Operators contact their supervisor or set-up person and they are trained in Material Handling, Containment and Segregation. (Reference Contingency Plan)		X		
The procedure shall address containment actions related to all elements of the heat-treating process, e.g. loading, austenitizing, quenching, tempering.	Our contingency plan addresses containment actions for all of our heat treating processes.		X		
The procedure shall define when this emergency plan is to be implemented.	The plan is implemented immediately upon the failure of any of our services, processes…		X		
Comments:					

2.9	Is the handling, storage and packaging adequate to preserve product quality?

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.

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
Handling, storage, and packaging shall be adequate to preserve product quality.	All dunage, containers & packaging is supplied by our customers, parts are processed and packaged within these prescribed materials, to ensure product preservation.		X		
The heat treater's furnace loading system, in-process handling, and shipping process shall be assessed for risk of part damage or other quality concerns.	All steps are taken to preserve the quality of our customers parts, we have conducted Risk Assessments to ensure that parts are handled in a manner to prevent damage, throughout every process within Induction Services. *Reference QMGT-F-21*		X		
Comments:					

2.10	Are plant cleanliness, housekeeping, environmental, and working conditions conducive to control and improve quality?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Plant cleanliness, housekeeping, environmental, and working conditions shall be conducive to controlling and improving quality.	Our plant cleanliness is conducive to the type of work that is performed.		X		
A housekeeping policy shall be clearly defined and executed.	Reference our maintenance and housekeeping procedure MAIN-P-01.		X		
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.	Housekeeping surveys are conducted by management and maintenance, results of surveys are recorded on form (MAIN-F-05) Housekeeping Survey.		X		
Comments:					

2.11	Are parts free from contaminants that would be detrimental to the heat treatment process?

Oils, coatings and other contaminants or residues may adversely affect the heat treatment process or subsequent processes. Pre/Post wash or other methods of contamination removal may be required by customer or mandatory for process function.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
If applicable, cleaning parameters shall be monitored and documented.	All product is reviewed upon receiving, for cleanliness, before starting any processing, any concerns are reveiwed and resolved with the customer.		X		
The frequency for checking the cleaning parameters shall conform to applicable Process Table, Section 5.0	Cleaning parameters are reveiwed hour by hour to ensure that planned output is achieved.		X		
Comments:					

2.12	Is the quenching system monitored, documented, and controlled?

Refer to Process Tables, Sections 3.0 and 5.0, for details and frequency of checks.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The quenching system shall be monitored, documented, and controlled. (Computer-monitoring equipment, with alarms and alarm logs, satisfy the verification requirement.)	The quench systems are monitored and controlled for polymer concentration, each shift, and results are maintained on form MAIN-F-11.		X		
Quench delay time with alarm is required. Not applicable for belt, shaker, or pusher furnaces where parts free-fall into the quench.	Quench is only used during our induction heat treat process, no product is processed that requires quench after furnace processing.		X		
Temper delay time shall be specified by the heat treater for parts that are quenched and tempered (e.g. carburizing, carbonitriding, neutral hardening, induction hardening).	Temper delay times in our Induction processes are documented on our setup cards and are monitored with alarms during processing.		X		
Comments:					

2.13	Are soluble oil or other rust preventive solutions monitored and controlled if applicable?

Parts are often dipped in or sprayed with rust preventive solutions immediately after the heat treating process. Refer to Process Tables, Section 5.0, for frequency of checks.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Soluble oil solutions or other rust preventive solutions shall be monitored and controlled, if applicable.	All of our corrosion dip tanks are monitored on a daily basis, for level, concentration and contamination. These results are documented on form MAIN-F-10. *(Dip Tank Logs)*		X		
The heat treater shall have and maintain documented tolerances for the solutions.	Most rust prevention dips are maintained at 6%, with a few defined jobs that are at 10%.		X		
Comments:					

2.14	Are process control parameters monitored per frequencies specified in Process Tables?

Refer to Process Tables, Section 3.0.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Process control parameters shall be monitored per frequencies specified in Process Tables.	All process control variables are verified by setup person through First piece inspection, on-going monitoring is done by inspectors every 4 hours minimum and at last piece inspection.		X		
A designated floor person shall verify the process parameters, e.g. by initialing a strip chart or data log. (Computer monitoring equipment with alarms and alarm logs satisfy the verification requirement.)	All process control variables are continuously monitored by the machines computer, as faults occur, the machine will stop until the parameters are brought back into specification.		X		
Comments:					

2.15	Are In-Process/Final Test Frequencies performed as specified in Process Tables?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
In-Process/Final Test Frequencies shall be performed as specified in Process Tables.	Our In-Process and Final test frequencies, meet the requirement within the process tables.		X		
Any exceptions to test frequencies specified in the process tables shall be approved by the Customer in writing.	Any variations from the process tables are approved by our customers.		X		
Comments:					

2.16	Is product test equipment calibrated and verified?

Refer to Process Tables, Section 1.0, for frequency of checks.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Test equipment shall be calibrated and verified per applicable customer-specific standards or per an applicable consensus standard such as those published by ASTM, DIN, EN, ISO, JIS, NIST, SAE etc.	All hardness testers and brinell scopes are 3rd party calibrated every 3 months. All hardness testers are verified every day and results are recorded on form QLTY-F-22.		X		
Calibration and verification results shall be internally reviewed, approved, and documented.	Reference our gage recall log, QLTY-F-23 for all calibration status and due dates.		X		
Comments:					

Section 3 - Equipment

Please describe Objective Evidence for each Requirement

3.1	Do furnaces, generators, and quench systems have proper process control 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

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat-treat equipment including furnaces, generators, and quench systems shall have proper process controls.	All of our furnaces are ambient atmosphere, operated below 700 degree's. All use temperature recorders and have alarm sets for over and under temp.		X		
Comments:					

3.2	Are process equipment calibrations, verifications and certifications current?

Refer to the applicable Process Tables, Sections 1.0 and 2.0, for equipment calibration, verification and certification frequencies.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The calibrations, verifications and certifications of the process equipment shall be performed at regular intervals as specified in the applicable Process Table(s).	All of our furnaces are 3rd party calibrated every 3 months. Stickers are placed at each unit to display there status.		X		
Non-contact thermometry devices shall be calibrated as specified in the applicable Process Tables.	Our non-contact thermometry devices are calibrated every 3 months.		X		
A documented offset procedure as defined in Section P3.2.3 shall exist.	We do not utilize the temperature offsets.	X	X		
The documented offset procedure shall indicate who has the authority to approve the use of offsets and how this approval is documented.	We do not utilize the temperature offsets.	X	X		
Offset or bias applied for the instrumentation calibration adjustment shall comply with P3.2.3.	We do not utilize the temperature offsets.	X	X		
Calibration labels shall meet the requirements established in Section P3.2.5.1.	All calibration labels are maintained by our 3rd party calibration source and meet the established requirements.		X		
Calibration reports shall meet the requirements established in Section P3.2.5.2.	All calibration reports are maintained by our 3rd party calibration source and meet the established requirements.		X		
Comments:					

3.3	Are thermocouples and protection tubes checked or replaced per Process Tables?

The accuracy of thermocouples is essential for good temperature control, the collection of accurate process data and the protection of furnace equipment.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Thermocouples shall be calibrated before first use, within the temperature range in which they will be used and meet the accuracy requirements of the Section P3.1 Tables.	Type K Thermocouples are replaced every 2 years minimum and are calibrated before use.		X		
Control, monitoring and recording thermocouples shall be SAT checked as per the applicable Process Table(s) and Section P3.3.	SAT studies are performed every 3 months by a certified 3rd party.		X		
The insertion depth of Type K and Type E test thermocouples shall be documented when the thermocouple is reused as per Section P3.1.3.3.	We do not reuse thermocouples, they are replaced with new ones and insertion depths are maintained.		X		
System Accuracy Test records shall meet the requirements established in Section P3.3.5.	All system accuracy test records meet requirements, and are performed every 3 months.		X		
Protection tubes shall be checked or replaced in compliance to a documented preventive maintenance schedule.	Every 3 months our protection tubes are inspected and if nessesary replaced.		X		

Comments:

3.4	Are temperature uniformity surveys performed per requirements in Process Tables?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Temperature uniformity surveys shall be conducted per the requirements in the applicable Process Tables, Section 2.0.	We require an annual temperature uniformity study on each furnace, conducted by a 3rd party.		X		
Actions that alter the temperature uniformity characteristics of a furnace shall be documented per section P3.4.1.2.	No actions that alter the temperature uniformity charicteristics were used.		X		
If used, alternate temperature uniformity test methods shall meet the requirements of Section P3.4.8.	Not used.	X	X		
The upper temperature tolerance shall not be exceeded at any time. Exceptions may exist in systems where multiple process temperatures exist in a single process cycle per section P 3.4.5.1.	The upper temperature tolerance, was not exceeded.		X		
The organization's internal process specification shall define suitable soak time at temperature requirements for pass/fail determination as per Section P3.4.5.1.	Our process specifications are documented in our individual part inspection sheets and are logged on the furnace log. (TMPR-F-02).		X		
Temperature uniformity survey reporting shall meet the requirements established in Section P3.4.7.	Our temperature uniformity surveys meet specifications and are reported by a 3rd party.		X		

Comments:

3.5	Is the variation of the furnace control thermocouple from set point within the requirements in the Process Table?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
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.	Yes, this is verified during quarterly calibrations by our 3rd party. (Cal-Tech)		X		

Comments:

3.6	Are the process and equipment alarm checks being tested quarterly or after any repair or rebuild?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat treater shall have a list of alarms that, if not properly working, may have a high probability of producing non-conforming product.	Our over / under temperature alarms on our furnaces are verified every quarter, all alarms on our induction machines are verified annually. Reference (MAIN-F-04) Fault monitor verification log.		X		
The listed alarms shall be checked quarterly at a minimum or after any repair or rebuild.	These are checked quarterly by a 3rd party. If any repairs or re-builds occur, alarms are verified before use.		X		
Other alarms, including but not limited to safety-related, shall be checked per the heat treater's requirement.	We have an annual requirement for all other alarms. They are verified and recorded on our fault monitoring verification log. (MAIN-F-04)		X		
These alarm checks shall be documented.	Documented on Form MAIN-F-04.		X		
Comments:					

3.7	Are generators and furnace atmospheres continuously monitored, automatically controlled, and documented?

For furnaces that preclude in-situ control and monitoring, use the method described in Section 3.4.5 "Property Surveys".

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Generator and furnace atmosphere carbon potential/dew point shall be continuously monitored, automatically controlled, and documented.	None	X			
The recorded furnace carbon potential shall be controlled within ±0.05 of the set point.	None	X			
The recorded dew point shall be controlled within acceptable limits as specified in the control plan or internal procedures.	None	X			
If generators are not used, the flow rates of the supplied atmosphere gases shall be monitored and controlled.	None	X			
The automatic and continuous atmosphere control system shall consist of sensors such as oxygen probes or on-line infrared (IR) gas analysis.	None	X			
The heat treater shall also have a back-up method of checking carbon potential/dew point.	None	X			
Back up method verification frequencies shall be conducted according to the applicable process tables.	None	X			
Comments:					

3.8	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?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The back-up atmosphere monitoring system reading and the primary control method atmosphere dew point/carbon potential reading shall be maintained within the correlation limits specified in the control plan or internal procedures.	None	**X**			
The back-up carbon potential/dew point reading shall be established using one or more of the following methods: • Direct measurement of surface carbon of sample • Shim Stock • Gas Analyzer • Dew Point • Wire Resistance • Redundant Oxygen Probe	None	**X**			
When a discrepancy has been detected, the correlation shall be re-established between the back-up and primary method and documented.	None	**X**			
The range tolerances for correlation between the two readings shall be in the control plan or internal procedures.	None	**X**			
Comments:					

3.9	Are all ammonia lines equipped with a fail-safe method to prevent the inadvertent introduction of ammonia into the furnace?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
One of the following fail-safe methods shall be used to prevent inadvertent introduction of ammonia into the furnace. • A quick disconnect or physical separation of the lines • Three-valve ammonia "fail-safe" vent system is permitted. See the definition “Three Valve Fail-Safe Vent” and diagram in the glossary. • 1 manual and 2 electrical magnetic valves in series	None	**X**			
The disconnecting of ammonia atmosphere from non-ammonia bearing atmosphere shall be documented.	None	**X**			
Comments:					

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.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat treater shall perform a minimum 3 hours purge prior to processing product not requiring ammonia as an addition.	None	X			
Any reduction of the 3 hour purge shall require conclusive test data of the atmosphere to show no significant amount of residual ammonia is present in the furnace atmosphere.	None	X			
Log book, data logger, or other records shall document the actual purge time and that sufficient time has been allocated to remove ammonia from the furnace prior to processing parts in heat treat processes not specifying ammonia.	None	X			
Comments:					

3.11	Do all atmosphere furnaces and generators have flow scopes or flow meters for all gases?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
All atmosphere furnaces and generators (output trim/adjustment gas) shall have flow scopes or flow meters for all gases.	None	X			
Flow scopes and meters shall be periodically serviced per the heat treater's preventive maintenance program.	None	X			
Cleaning and proper re-assembly procedures shall be documented.	None	X			
Comments:					

3.12	Is there a fail-safe system at the front of continuous belt furnaces for austenitizing to prevent non-uniform loading of parts?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
Sight glass inspection ports shall exist for the visual evaluation of load distribution.	None	X			
Sight glass inspection ports shall be cleaned per the preventive maintenance schedule.	None	X			
There shall be a fail-safe system implemented on continuous belt furnaces to prevent non uniform loading of the parts.	None	X			
In the absence of a fail-safe system, a non-contact thermometry device shall be employed with the following requirements met: • A non-contact thermometry device shall be aimed at the center of product mass from the discharge end of the furnace (i.e. bulk head portal) in order to acquire part temperature immediately prior to quenching. • A non-contact thermometry device temperature alarm shall be -28°C (-50°F) maximum of the final zone set point temperature. • Non-contact thermometry device temperature data shall be continuously recorded.	None	X			
Comments:					

3.13	Is salt chemistry in the austenitizing salt bath monitored?

This is applicable to salt bath heat treating processes listed in Process Tables A and B.

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
The heat treater shall check the salt chemistry in the austenitizing salt bath, or part decarburization.	None	X			
The heat treater shall conform to the frequency of checks defined in the applicable Process Table Sections 3.	None	X			

Comments:

3.14	Is the quenching medium analyzed?

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
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.	The polymer quench media is maintained by utilizing a 30 day purge cycle for each machine. Concentrations are verified twice daily with refracometer.		X		
The quench medium characteristic tolerances shall be specified by the quench medium supplier or the heat treater.	Quench media concentrations are posted at every machine, by part number. Concentration is also documented in the Setup Card. Reference SETP-F-**		X		
Test results shall be reviewed for conformance and documented by the heat treater.	Concentrations are documented twice daily on form MAIN-F-11 and conformance is verified through full inspection of the product, recorded on form QLTY-F-01.		X		

Comments:

FOR INDUCTION HEAT TREATING

3.15	Is the positioning of each part being controlled?

Requirements	Objective Evidence	Assessment			
		N/A	Satisfactory	Not Satisfactory	Needs Immediate Action
There shall be a method to ensure proper part position such as the use of proximity switches, optical sensors or mechanical Poka-Yoke system.	Our approach is to utilize unique part holders that are Poke-Yoked.		X		

Comments:

3.16	Does the heat treater control the energy or power for each part?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat treater shall control the energy or power for each part.	Our energy is 100% monitored, with fault alarms.		X		
Signature monitor or energy monitor shall be used to monitor energy or power to the part and record all out of control events.	Energy monitors are used to detect out of control power input conditions, fault monitor will stop the process when this occures.		X		
Any alternative method shall be approved by the Customer.	If alternative methods are used, they are approved by our customer.		X		
Comments:					

3.17	Does the supplier have a coil management system?

Coil refers to the heating coil and the quench plenum.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The heat treater shall have a coil management system.	We have a coil management system in place.		X		
Spare coils for each part shall be available on-site.	We maintain spare coils for all high volume production parts.		X		
Coils shall conform to the customer approved design.	Induction Services maintains responsibility for coil design.		X		
Comments:					

3.18	Is quench system automatic?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
The quench system shall be automatically initiated and controlled.	Most quench systems are automatically controlled with timers for start time and duration. Additional controls for temperature are in place and operating.		X		
Comments:					

3.19	Is there a procedure that addresses maintenance of the inductor and quench spray nozzle(s) (e.g. quench ring, quench shower)?

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
There shall be a procedure that includes regular inspection and cleaning of the inductor and quench spray nozzle(s).	At each set-up the quench nozzles are verified to be free of any blockage, After each job the coil and spray nozzles are cleaned and replaced as needed.		X		
Comments:					

3.20	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. Factors such as quench line diameter, length, geometry, etc., should be considered when establishing the time limit of the downtime.

		Assessment			
Requirements	**Objective Evidence**	**N/A**	**Satisfactory**	**Not Satisfactory**	**Needs Immediate Action**
There shall be a procedure to purge the quench lines after downtime.	In most machines, there is an automatic purge after 20 minutes of idle time. This is defined in procedure SETP-P-01.		X		
The Heat treater shall establish the time limit (of the downtime) when this procedure is to be followed.	Machines without automatic purge systems, requires our setup person to run the cycle without heat and verify the function of quench lines.		X		
Comments:					

PROCESS TABLE D – Induction Heat Treating

All requirements given below are subordinate to customer specific requirements.

The Customer may have additional requirements, e.g. inspection, testing, greater frequencies. When performing the job audit, the auditor shall verify heat treater is conforming to the Customer's requirements.

OK - Complies to requirement
NOK - Does not comply to requirement (Explain noncompliance in 'Related HTSA Question #')
NA - Requirement not applicable

Item #	Related HTSA Question #	Category/Process Steps		
1.0		**PROCESS AND TEST EQUIPMENT REQUIREMENTS**		**OK / NOK / NA**
D1.1	2.16	Laboratory and Test equipment used for product and process testing shall be calibrated annually at a minimum, per the applicable national standard (e.g. ASTM, EN, JIS) or approved equivalent standard, and verified per internal procedure if not specified in the applicable standard.		**OK**
D1.2	2.16	Files for testing hardness shall be verified per the Customer requirement.		**N/A**
D1.3	3.2	Refractometers typically used to check polymer quenchants and washer solutions shall be verified prior to use with distilled water.		**OK**
2.0		**PYROMETRY**		**OK / NOK / NA**
D2.1	3.2 3.3	Thermocouples and calibration of thermocouples shall conform to Section P3.1.		**OK**
D2.2	3.2 3.3	Calibration of instrumentation shall conform to Section P3.2.		**OK**
D2.3	3.2	Non-contact thermometry devices used for temperature monitoring (e.g. infrared pyrometer, thermal imaging camera) shall be calibrated annually at a minimum in the temperature range to be used utilizing a blackbody device or per the manufacturer's recommended procedure.		**N/A**
3.0		**PROCESS MONITORING PARAMETERS**	**REQUIREMENTS / FREQUENCY**	**OK / NOK / NA**
All process parameters shall be checked at the beginning of every shift, tool change, or any equipment repair. In absence of process parameter alarms, also check process parameters at end of shift or lot (whichever is the greater frequency).				
D3.1	1.4 2.14	Monitor cycle time.	Check cycle time at start of production, every 8 hours, and after any process change.	**OK**
D3.2	1.4 2.14 3.16	Monitor energy/power.	An energy monitor or signature monitor is required and shall be equipped with alarms set at acceptable limits. This requirement applies to each power supply (not per coil).	**OK**
D3.3	1.4 3.12	Monitor part temperature (when specified). Note: This does not replace the requirement for energy or signature monitors.	Check at start of production, every 4 hours, and after any process change. 100% of parts monitored and alarmed set to limits specified in the control plan satisfies this requirement.	**OK**

PROCESS TABLE D – Induction Heat Treating

All requirements given below are subordinate to customer specific requirements.

The Customer may have additional requirements, e.g. inspection, testing, greater frequencies. When performing the job audit, the auditor shall verify heat treater is conforming to the Customer's requirements.

OK - Complies to requirement
NOK - Does not comply to requirement (Explain noncompliance in 'Related HTSA Question #')
NA - Requirement not applicable

Item #	Related HTSA Question #	Category/Process Steps		
D3.4	1.4 2.12	Quench Temperature	Alarm system for high and low temperature is required.	**OK**
		Quench Media Level	Continuous monitor with alarm or daily verification.	**OK**
		Quench Pressure and Flow	Alarm system for quench pressure and flow rate for high and low limits is required. In the absence of an alarm, the quench pressure and flow shall be checked at start of production run and every 8 hours.	**OK**
D3.5	1.4 2.12	Temper Delay Time - The maximum delay time between quenching and tempering shall be specified on the control plan and monitored.	Each batch.	**OK**
4.0		**IN-PROCESS/FINAL TEST PARAMETERS**	**REQUIREMENTS / FREQUENCY (PER COIL)**	**OK / NOK / NA**
D4.1	1.4 2.15	Induction pattern	1 part at start of production run, end of production run, and every 4 hours minimum, and 1 part pre- and 1 part post- tool change, equipment repair, station alarm (shutdown greater than 4 hours, malfunction, etc.).	**OK**
D4.2	1.4 2.15	Total or Effective Case depth	1 part at start of production run, end of production run, and 1 part per 8 hours minimum, and 1 part pre- and 1 part post- tool change, equipment repair, station alarm (shutdown greater than 4 hours, malfunction, etc.).	**OK**
D4.3	1.4 2.15	Surface hardness	1 part at start of production run, end of production run, and every 4 hours minimum, and 1 part pre- and 1 part post- tool change, equipment repair, station alarm (shutdown greater than 4 hours, malfunction, etc.).	**OK**
D4.4	1.4 2.15	Core hardness (when specified)	1 part at start of production run, end of production run, and every 8 hours minimum, and 1 part pre- and 1 part post- tool change, equipment repair, station alarm (shutdown greater than 4 hours, malfunction, etc.).	**OK**
D4.5	1.4 2.15	Microstructure shall be checked at a low magnification of 100X and a high magnification of 400X or above. Microstructure visual references shall be available.	1 part at start of production run, end of production run, and 1 part per 8 hours minimum, and 1 part pre- and 1 part post- tool change, equipment repair, station alarm (shutdown greater than 4 hours, malfunction, etc.).	**OK**

PROCESS TABLE D – Induction Heat Treating

All requirements given below are subordinate to customer specific requirements.

The Customer may have additional requirements, e.g. inspection, testing, greater frequencies. When performing the job audit, the auditor shall verify heat treater is conforming to the Customer's requirements.

OK - Complies to requirement
NOK - Does not comply to requirement (Explain noncompliance in 'Related HTSA Question #')
NA - Requirement not applicable

Item #	Related HTSA Question #	Category/Process Steps		
5.0		**QUENCHANT AND SOLUTION TEST PARAMETERS**	**REQUIREMENTS / FREQUENCY**	**OK / NOK / NA**
D5.1	2.12 3.14	**Polymer Quench Media**		
		Concentration	Daily	**OK**
		Cooling Curve Analysis	Every six months (complete replacement of the quench media and cleaning of the quench tank within six months satisfies this requirement).	**OK**
D5.2	2.12 3.14	**Water Quench Media**		
		Suspended solids	Every six months (complete replacement of the quench media and cleaning of the quench tank within six months satisfies this requirement).	**OK**
D5.3	2.12 3.14	**Brine or Caustic Quench Media**		
		Concentration and/or Specific Gravity	Daily	**N/A**
		Suspended solids	Every six months (complete replacement of the quench media and cleaning of the quench tank within six months satisfies this requirement).	**OK**
D5.4	2.13	**Rust Preventive - Soluble Oil**		
		Concentration	2x/week	**OK**
D5.5	2.11	**Cleaning Solution**		
		Concentration of cleaner	Daily	**N/A**
		Temperature of solution (required if temperature is specified to be above ambient temperature).	Each shift.	**N/A**

PROCESS TABLE E – Annealing / Normalizing / Stress-Relieving

All requirements given below are subordinate to customer specific requirements.

The Customer may have additional requirements, e.g. inspection testing, greater frequencies. When performing the job audit, the auditor shall verify heat treater is conforming to the Customer's requirements.

Continuous furnace frequencies for item numbers E4.2 and E4.3 are per lot (work order) or as specified, whichever is more frequent.

OK - Complies to requirement
NOK - Does not comply to requirement (Explain noncompliance in 'Related HTSA Question #')
NA - Requirement not applicable

Item #	Related HTSA Question #	Category/Process Steps	
1.0		**PROCESS AND TEST EQUIPMENT REQUIREMENTS**	**OK / NOK / NA**
E1.1	3.1 3.7	Recording instruments are required for temperature controlling devices and protective atmosphere monitoring unit, e.g. dew point, oxygen probe, or other atmosphere controlling devices.	**OK**
E1.2	1.18	A program for furnace, generator, and oxygen probe burnout is required (applies to carbon bearing atmospheres).	**N/A**
E1.3	3.2	Furnace weigh scales shall be verified quarterly and calibrated annually at a minimum.	**N/A**
E1.4	3.2	Dew pointers, gas analyzers, spectrometers, and carbon IR combustion analyzers (shim stock analysis), used to verify carbon potential in furnaces, shall be calibrated annually at a minimum. This is applicable when used in controlling carbon-bearing atmospheres.	**N/A**
E1.5	3.2	Verification of spectrometers and carbon IR combustion analyzers (shim stock/foil analysis) shall be performed daily or prior to use.	**N/A**
E1.6	3.2	Verification of gas analyzers with zero gas and span gas when used as the back-up verification shall be performed weekly at a minimum. When used for primary control of the carbon-bearing atmospheres, verification shall be daily.	**N/A**
E1.7	3.2	Atmosphere controllers shall be calibrated quarterly (single-point or multi-point calibration). A six month calibration interval is allowed if multi-point calibration is utilized.	**N/A**
E1.8	2.16 3.2	Laboratory and Test equipment used for product and process testing shall be calibrated annually at a minimum, per the applicable national standard (e.g. ASTM, EN, JIS) or approved equivalent standard, and verified per internal procedure if not specified in the applicable standard.	**OK**
E1.9	3.2	Refractometers typically used to check polymer quenchants and washer solutions shall be verified prior to use with distilled water.	**OK**

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Continuous furnace frequencies for item numbers E4.2 and E4.3 are per lot (work order) or as specified, whichever is more frequent.

OK - Complies to requirement
NOK - Does not comply to requirement (Explain noncompliance in 'Related HTSA Question #')
NA - Requirement not applicable

Item #	Related HTSA Question #	Category/Process Steps	
2.0		**PYROMETRY**	**OK / NOK / NA**
E2.1	3.2 3.3	Thermocouples and calibration of thermocouples shall conform to Section P3.1.	**OK**
E2.2	3.2 3.3	Calibration of instrumentation shall conform to Section P3.2.	**OK**
E2.3	3.2 3.3	System Accuracy Test (SAT) for all control, monitoring, and recording thermocouples shall conform to Section P3.3.	**OK**
E2.4	3.4	Temperature Uniformity Survey (TUS) shall be performed annually and after major rebuild per Section P3.4. Temperature uniformity tolerance for furnaces operating at or above 680°C (1250°F) shall be +/- 15°C (or +/- 25°F). Temperature uniformity tolerance for furnaces operating below 680°C (1250°F) shall be +/- 10°C (or +/- 20°F).	**OK**
E2.5	3.5	**For processes at or above 680°C (1250°F)**: Process temperature(s) shall be controlled within +/- 10°C (or +/- 15°F) of the set point as evidenced by recording instruments. Furnace temperature shall be controlled with soak times starting at the lower tolerance limit (as defined above). **For Continuous Furnaces, this requirement applies to the Qualified Work Zone.**	**N/A**
E2.6	3.5	**For processes below 680°C (1250°F):** Process temperature(s) shall be controlled within +/- 5°C (or +/- 10°F) of the set point as evidenced by continuous recording instruments. Furnace temperature shall be controlled with soak times starting at the lower tolerance limit (as defined above). **For Continuous Furnaces, this requirement applies to the Qualified Work Zone.**	**OK**

PROCESS TABLE E – Annealing / Normalizing / Stress-Relieving

All requirements given below are subordinate to customer specific requirements.

The Customer may have additional requirements, e.g. inspection testing, greater frequencies. When performing the job audit, the auditor shall verify heat treater is conforming to the Customer's requirements.

Continuous furnace frequencies for item numbers E4.2 and E4.3 are per lot (work order) or as specified, whichever is more frequent.

OK - Complies to requirement
NOK - Does not comply to requirement (Explain noncompliance in 'Related HTSA Question #')
NA - Requirement not applicable

Item #	Related HTSA Question #	Category/Process Steps				
3.0		PROCESS MONITORING PARAMETERS	REQUIREMENTS / FREQUENCY			OK / NOK / NA
			Batch (Chamber) Furnace	Continuous Furnace	Atmosphere Generation	
E3.1	1.4 2.14	Monitor primary temperature control instrument(s).	Continuous recording with alarm system set per limits in E2.5 and E2.6 In absence of alarm system, sign-off every 2 hours and at the end of the cycle, or each cycle for processes under 2 hours satisfies this requirement.	Continuous recording with alarm system set per limits in E2.5 and E2.6. In absence of alarm system, sign-off every 2 hours and at the end of the cycle, or each cycle for processes under 2 hours satisfies this requirement.	Generators shall be continuously monitored and recorded. Sign-off required for each shift for generators. An alarm system will satisfy the sign-off requirement.	**OK**
E3.2	1.4 2.14 3.7	Monitor generator atmospheres.			Generators shall be continuously monitored and recorded. Other systems, such as nitrogen-methanol systems, may either be continuously monitored and alarmed, or sign-off every 2 hours.	**N/A**
E3.3	1.4 2.14 3.7	Monitor primary furnace atmosphere control(s).	Continuous recording with alarms set per acceptable limits. In absence of alarm system, sign-off every 2 hours and at the end of the cycle, or each cycle for processes under 2 hours satisfies this requirement.	Continuous recording with alarms set per acceptable limits. In absence of alarm system, sign-off every 2 hours and at the end of the cycle, or each cycle for processes under 2 hours satisfies this requirement.		**N/A**
E3.4	1.4 2.14 3.7 3.8	Verify primary atmosphere control method by back-up method.	Daily	Daily	Daily	**N/A**
E3.5	1.4 2.14	Monitor time in furnace, cycle time, or belt speed.	Each batch or furnace load.	Sign-off twice/shift and after any change in the belt speed. Alarm systems (if set per acceptable limits) or continuous recording satisfy this requirement.		**OK**
E3.6	1.4 2.7	Monitor load size, fixturing, or loading rate as applicable.	Each batch or furnace load.	Sign-off twice/shift and after any change in loading rate.		**OK**
E3.7	2.14	Monitor cooling rate (start temp, end temp, °F/min), as applicable	Each batch or furnace load	Once per shift		**OK**

PROCESS TABLE E – Annealing / Normalizing / Stress-Relieving

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The Customer may have additional requirements, e.g. inspection testing, greater frequencies. When performing the job audit, the auditor shall verify heat treater is conforming to the Customer's requirements.

Continuous furnace frequencies for item numbers E4.2 and E4.3 are per lot (work order) or as specified, whichever is more frequent.

OK - Complies to requirement
NOK - Does not comply to requirement (Explain noncompliance in 'Related HTSA Question #')
NA - Requirement not applicable

Item #	Related HTSA Question #	Category/Process Steps				
4.0		**IN-PROCESS/FINAL TEST PARAMETERS**	**REQUIREMENTS / FREQUENCY**			**OK / NOK / NA**
			Batch (Chamber) Furnace	**Continuous Furnace**	**Atmosphere Generation**	
E4.1	1.4 2.15	Microstructure shall be checked at a low magnification of 100X and a high magnification of 400X or above (when specified). Microstructure visual references shall be available.	Daily per furnace unless specified by Customer to be checked with greater frequency, e.g. each batch.	Daily per furnace unless specified by Customer to be checked with greater frequency, e.g. each batch.		**OK**
E4.2	1.4 2.15	Surface hardness (when specified).	Each batch or furnace load.	Each lot or every 4 hours.		**OK**
E4.3	1.4 2.15	Core hardness (when specified).	Each batch or furnace load.	Each lot or every 4 hours.		**OK**
5.0		**SOLUTION TEST PARAMETERS**	**REQUIREMENTS / FREQUENCY**			**OK / NOK / NA**
			Batch (Chamber) Furnace	**Continuous Furnace**	**Atmosphere Generation**	
E5.1	2.13	**Rust Preventive - Soluble Oil**				
		Concentration	2x/week	2x/week		**N/A**
E5.2	2.11	**Cleaning Solution**				
		Concentration of cleaner	Daily	Daily		**N/A**
		Temperature of solution (required if temperature is specified to be above ambient temperature).	Each shift.	Each shift.		**N/A**

Section 4 - Job Audit

Job Identity:

Customer:
Shop Order Number: 70960.1
Part Number:
Part Description: Shaft, Parking
Material: S43-48C (1045)

Heat Treat Requirements: Pat length, Eff case @ 85.5 HR15N 0.8mm to 2.5mm, Surface hardness 50-60 HRC.

Audit was completed on:
1/5/2026 thru 1/6/2026

Question #	Job Audit Question	Related HTSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation	Actual Condition (Objective Evidence)	Pass / Fail / N/A
4.1	Does the heat treat facility have the customer specifications for the part?	1.5	Customer	Job Order 70960.1 Print 1678-P3	Customer supplied a copy of the drawing and I.S. developed an Inspection sheet for verification.	P
4.2	Is material identification (part numbers, lot numbers, heat numbers, contract numbers, etc.) maintained throughout the heat treat process?	2.2 2.3 2.4	Customer and Internal	70960.1 ORDP-F-02 QLTY-F-01	Job Card/Traveler Inspection Sheet	P
4.3	Are the Loading/Racking requirements identified?	1.6 2.7 2.9	Internal	70960.1	Parts repacked in customer supplied dunnage after tempering.	P
4.4	Is the proper recipe or process specification (cycle times, temperature, atmosphere, etc.) used? Refer to Process Tables, Section 3.0, for specific parameters.	1.5 1.6 2.1 2.14 2.15	Customer and Internal	70960.1 SETP-F-01 ORDP-F-02 QLTY-F-01	The job is Set-up using a Master Job Card, then verified using an Inspection Sheet.	P

Section 4 - Job Audit

Job Identity:
Customer:
Shop Order Number: 70960.1
Part Number:
Part Description: Shaft, Parking
Material: S43-48C (1045)
Heat Treat Requirements: Pat length, Eff case @ 85.5 HR15N 0.8mm to 2.5mm, Surface hardness 50-60 HRC.

Audit was completed on:
1/5/2026 thru 1/6/2026

Question #	Job Audit Question	Related HTSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation	Actual Condition (Objective Evidence)	Pass / Fail / N/A
4.5	What are the product inspection requirements per the Control Plan?	2.15				
4.5.1	Requirement: (1)		Set Up		Verified in the QC lab Inspection Sheet	
	Test Method:		AS Quench Hardness and Case Depths	70960.1 QLTY-F-01	Samples in sample bag.	P
	Test frequency or quantity:		1 Piece Minimum		Samples in manila envelope	P
	Selection of samples:		Set up piece		1 parts checked	P
	Specification:		per inspection sheet	QLTY-F-01	Acceptable to Inspection Sheet	P
4.5.2	Requirement: (2)		Surface Hardness		Verified in the QC lab Inspection Sheet	
	Test Method:		Check Rockwell C Scale on part surface	70960.1 QLTY-F-01	Samples in sample bag.	P
	Test frequency or quantity:		1 Every 2 hours		Samples in manila envelope	P
	Selection of samples:		In order by station		3 parts checked	P
	Specification:		Per Inspection sheet.HRc 50 to HRc 60	QLTY-F-01	Acceptable to Inspection Sheet	P
4.5.3	Requirement: (3)		Case Depths		Verified in the QC lab Inspection Sheet	
	Test Method:		Check Effective Case Depth.	70960.1 QLTY-F-01	Samples in sample bag.	P
	Test frequency or quantity:		Twice per shift		Samples in manila envelope	P
	Selection of samples:		In order by station		3 parts checked	P
	Specification:		Per inspection sheet. 0.8mm to 2.5mm Effective to 50 HRc	QLTY-F-01	Acceptable to Inspection Sheet	P
4.5.4	Requirement: (4)		Pattern length		Verified in the QC lab Inspection Sheet	P
	Test Method:		Section a part	70960.1 QLTY-F-01	Samples in sample bag.	P
	Test frequency or quantity:		Twice per shift		Samples in manila envelope	P
	Selection of samples:		In order by station		3 parts checked	P
	Specification:		12mm Maximum Heat Treat Area, per inspection sheet	QLTY-F-01	Acceptable to Inspection Sheet	P

Section 4 - Job Audit

Job Identity:

Customer:

Shop Order Number: 70960.1

Part Number:

Part Description: Shaft, Parking

Material: S43-48C (1045)

Heat Treat Requirements: Pat length, Eff case @ 85.5 HR15N 0.8mm to 2.5mm, Surface hardness 50-60 HRC.

Audit was completed on:
1/5/2026 thru 1/6/2026

Question #	Job Audit Question	Related HTSA Question #	Customer or Internal Requirement	Job (Shop) Order or Reference Documentation	Actual Condition (Objective Evidence)	Pass / Fail / N/A
Operator or Inspector Responsibilities						
4.6	Were appropriate process steps signed off?	1.4 2.2 2.3 2.14	Internal	70960.1 QLTY-F-01 OK to Ship Tag	Yes	P
4.7	Were all inspection steps, as documented in the control plan performed?	1.2 1.4	Customer and Internal	70960.1 QLTY-F-01 QLTY-F-03	Yes	P
4.8	Were steps/operations performed that were not documented in the control plan?	1.2 1.4 1.6	Internal	70960.1	No undocumented steps were performed.	P
4.9	If additional steps were performed, were they authorized?	1.2 1.4	Customer and Internal	70960.1	None were performed.	P
4.10	Does the governing specification allow reprocessing or rework?	1.11	Customer and Internal	70960.1	If desired result is not achieved, customer has authorized Rework.	P
4.11	If the order was certified, did the certification accurately reflect the process performed?	2.14 2.15	Internal	70960.1 QLTY-F-01	The customer received the Inspection report, prior to shipping parts.	P
4.12	Was the certification signed by an authorized individual?	1.17	Internal	70960.1 QLTY-F-01	Yes	P
4.13	Are the parts and containers free of inappropriate objects or contamination?	2.6 2.11	Customer and Internal	70960.1	Yes inspected before packing, Using the dunnage sent in by the customer.	P
	Packing Requirements					
4.14	Are packaging requirements identified?	2.9	Using customer dunnage	70960.1	All material is shipped back in the containers received.	P
4.15	Are parts packaged to minimize mixed parts (for example, parts packed over height of container)?	2.9	Internal	70960.1	Materials packed in a manner to prevent mixing of parts.	P
	Shipping Requirements					
4.16	Were the parts properly identified?	2.3 2.9	Internal	70960.1 OK to Ship Tag	OK to ship envelop containing the Inspection Report, packing list and shipper.	P
4.17	Were the containers properly labeled?	2.3 2.9	Internal	70960.1 OK to Ship Tag	Job cards issued at receiving stay with the parts in the containers to the job site and to all subsequent operations to final inspection and then the OK to ship envelop is attached	P