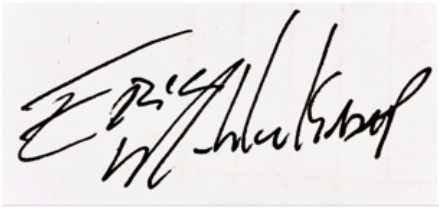
Section
17

Georgia Specific Requirements

HITACHI AUTOMOTIVE SYSTEMS AMERICAS, INC.--GA

TO SUPPLIERS DEALING WITH HITACHI AUTOMOTIVE SYSTEMS AMERICAS, INC.—GA (formerly Unisia of Georgia Corporation)

Supplementary to the (HIAMS)AM Supplier Handbook, the following applies to your business with (HIAMS)AM-GA. In the event of a conflict between any of the following provisions and the (HIAMS)AM Supplier Handbook, the (HIAMS)AM Supplier Handbook shall govern. If you have any questions, please contact your buyer



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Supplier Quality - Director
26-Sep-24

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PURPOSE

These standards relate to all parts, raw materials and accessories to be supplied to (HIAMS)AM-GA.

These are the quality standards to be implemented by supplier to assure that (HIAMS)AM-GA quality requirements are met.

SCOPE

These standards shall apply to all suppliers of parts under a transaction with (HIAMS)AM-GA.

QUALITY- PHILOSOPHY, ORGANIZATION AND CONTROL.

(HIAMS)AM-GA's philosophy is that properly selected suppliers are best qualified to establish the quality control plan for its products. Provided with a clear understanding of (HIAMS)AM-GA's quality requirements, each supplier must maintain an effective and updated quality program that will assure quality parts, raw materials and services are delivered to (HIAMS)AM-GA. The system should provide for:

- QUALITY PLANNING
- PRODUCT AND PROCESS QUALITY
- SUPPLIER QUALITY SYSTEM REVIEW
- FIRST SAMPLE APPROVAL

SECTION I – QUALITY PLANNING

1.1 Process Flow Charts

Process flow charts show the sequence of steps in the production operation, along with the control points. Flow charts provide essential information for quality planning tools such as Process FMEA and Control Plan.

1.2 Feasibility Assessment

Feasibility assessment is the suitability determination of a particular design, process, or material for production. All engineering requirements must be met, while maintaining required capability and volume levels. These assessments use planning tools such as FMEA's, control plans, process capability studies, and designed experiments. Manufacturing feasibility should be established prior to the commitment of production tools or facilities.

1.3 Failure Mode and Effects Analysis (FMEA)

The FMEA process assists in the prevention of product quality concerns through a structured analysis of potential failure modes. FMEA'S should be used for both product design and manufacturing process planning. They are required for all new or changed products to be delivered to (HIAMS)AM-GA.

Process FMEA's identify and evaluate the risk of occurrence of potential process concerns, and define the action to eliminate them. Process FMEA's are prepared by a team from the manufacturing activity, prior to the commencement of hard tooling. Representatives from Quality Engineering and the Manufacturing organizations should head a typical team, with input from (HIAMS)AM-GA. Critical and significant product characteristics and process parameters identified on the FMEA's become key input to the Control Plan.

1.4 Control Plans

Control plans are to be developed by supplier for all significant process parameters and critical product characteristics, as determined by FMEA. In addition, all significant characteristics identified on (HIAMS)AM-GA's Notice for Functionally Critical Item sheets must also appear on Control Plans. Control Plans must be prepared and maintained for all new or changed products or upon specific request from (HIAMS)AM-GA. The development of Control Plans by a cross-discipline team similar to FMEA team is recommended. For new or changed products, the Control Plan must accompany the request for Initial Sample Approval.

1.5 Gage Planning

The choice of gaging, measuring and testing equipment is a key element of advance quality planning. Suppliers must provide for variable data measurement wherever possible. Since variable data provides more information than attribute data, opportunities for process improvement are highlighted, and process capability evaluation is simplified. Measurement system assessments (also known as Gage R & R) should be conducted for gages, measurement, and test equipment used for the evaluation of (HIAMS)AM-GA designated significant and critical product characteristics. A program of calibration and maintenance should be set-up for these gages and measuring equipment.

1.6 Preliminary Process Capability

Preliminary process capability studies are short-term studies conducted to obtain early information on the performance of a new or revised process, relative to (HIAMS)AM-GA's requirements.
These studies should be based on as much data as possible, confidence level of 95% or greater is required to obtain sufficient data for informed decision making. A process capability study is required for each critical characteristic designated by (HIAMS)AM-GA.

Data should be gathered and used to develop preliminary control limits. These limits are used to evaluate the stability of the process. Once the process is known to be stable (no evidence of non-random behavior or special causes), preliminary process potential (Cp) and preliminary process capability (Cpk) can be estimated. Attribute data should not be used for preliminary studies.

The minimum acceptable outcome for preliminary capability studies, for normally distributed data is a Cpk of equal to or greater than 1.33 or 1.67 for special characteristics. Preliminary process capability studies being submitted to (HIAMS)AM-GA with initial Sample Approval Request which do not meet this criterion must be accompanied by an action plan with target dates for corrective action.

1.7 Control of Incoming Parts and Raw Material:

In accordance with the International Standards Organization, Unisia of Georgia Corporation has adopted an environmental policy and made conformances to ISO 14001 Standard part of our daily business operating procedures.

(HIAMS)AM-GA has documented and implemented an Environmental Management System (EMS) which is designed to both protect the environment and comply with applicable environmental law.

In accordance with these policies, we require our suppliers to respect and follow our EMS policies/procedures when providing goods or services to (HIAMS)AM-GA.

We encourage all of our suppliers to be as aware and protective of the environment as possible. We strongly support and encourage their individual efforts to adopt/conform to ISO 14001 Standard as part of their environmental policy.

Approved Materials: Materials used in products for (HIAMS)AM-GA are controlled either by industry standard specifications (e.g., ASTM, DIN, ISO, SAE, JIS, etc.) or by (HIAMS)AM-GA specifications.

Suppliers must certify that materials submitted for Initial Sample Approval Request meet all applicable specifications and requirements. Periodic re-certification must include pertinent laboratory data substantiating the certification statement.

Control of Purchased Products and Raw Materials: The supplier is responsible for the control of purchased products and raw materials. Change in sub-supplier sourcing after initial sample approval requires a new sample submission along with the appropriate documentation to (HIAMS)AM-GA.

Key elements of sub-supplier monitoring and control are:

Transmitting information on the intended application and relevant drawings, specifications, and requirements to the sub-supplier.

Ensuring sub-suppliers have acceptable quality systems which comply with

Suppliers shall be at a minimum, third-party registered to IATF 16949 or registered to ISO 9001:2015 with evidence of conformance to IATF 16949 unless otherwise specified in writing by the customer. If currently not compliant to these requirements, supplier must show a documented plan to achieve this certification.

Obtaining current Control Plans and evidence of their implementation from sub-suppliers.

Ensuring that all sub-suppliers products and raw materials conform to applicable specifications.

Initiating corrective action with sub-suppliers on nonconforming products, and maintaining records of these concerns with the status of corrective actions.

1.8 Process Monitoring and Control Instructions

Suppliers should prepare written process monitoring and control instructions for employees having responsibilities for the operation of processes, in order to ensure that all monitoring and control steps in the Control Plan are carried out. These instructions can be derived from the FMEA and Control Plan, from engineering drawings and specifications, from manufacturing or

quality workmanship standards, or from supplier experience and knowledge of processes and products.

1.9 Package Planning

The choice of packaging material can have a significant effect on product quality, and must be considered during the feasibility evaluation phase. Suppliers must use appropriate packaging, considering the various transportation and shipping methods used, to ensure that products arrive on time, safely, and in a condition suitable for their intended use at (HIAMS)AM-GA. Supplier must also take into consideration the point of end use of their product when selecting packaging materials, so as to minimize multiple handling and re-packing at (HIAMS)AM-GA. All packaging must be approved by (HIAMS)AM-GA utilizing the Supplier Packaging and Data Form which is included in the appendix.

1.10 Ongoing Quality Planning

Ongoing Quality Planning includes action taken to prevent deterioration of processes and products from initial capability levels. These actions should include: ongoing training and certification, periodic review of SPC application and effectiveness, calibration of measuring and testing equipment, and scheduled preventive maintenance. Documented plans for ongoing quality assurance will support the Control Plan.

SECTION II – PRODUCT AND PROCESS QUALITY

2.1 Ongoing Process Capability

Ongoing Process Capability is a long-term measure of process performance relative to specification, for all critical and significant characteristics evaluated using variable data. Ongoing process capability differs from preliminary process capability by using data taken over a long time period. This is done to ensure that all common causes of process variation have been included in the observed data. The actual time period for data collection will depend on time necessary for these sources to vary through their full ranges, but probably not less than twenty production days.

Capability is determined using data from control charts. These charts must indicate a stable and normally distributed process before capability calculations (Cp, Cpk) can be made. (HIAMS)AM-GA requirements for process capability for those dimensions that are designated as critical are a minimum CpK of 1.67, systems with sufficient frequency to ensure the integrity of those systems.

Actions taken can include stability studies, gage R & R, periodic preventive maintenance, and periodic calibration. Trace-ability to national reference standards should be provided ; where no such standards exist, the basis for calibration must be documented.

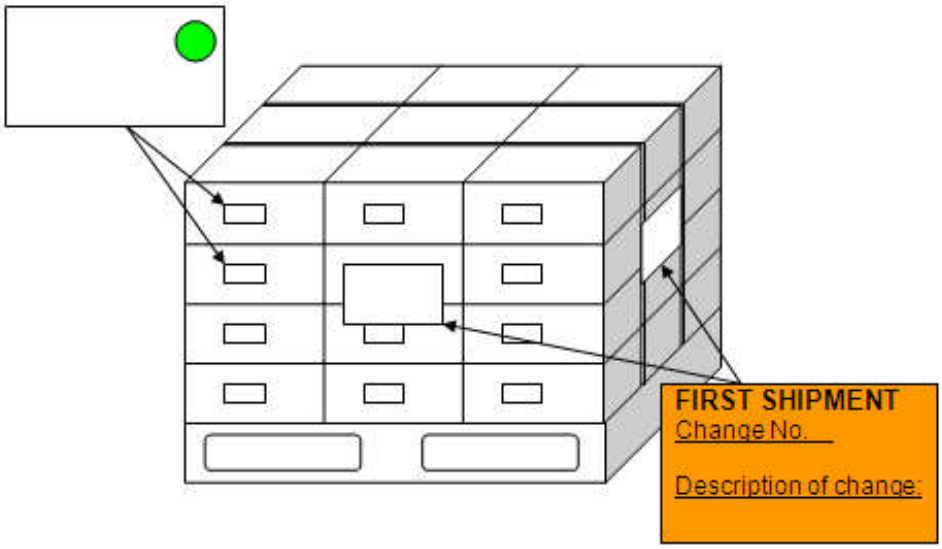
2.5 Material Identification

Supplier must identify the condition and status (accept, reject, hold, sort, rework, etc.) of product. Positive controls should be followed to ensure that unique products for (HIAMS)AM-GA are properly identified and do not become mixed with other products. All identifications should be written in English.

To ship very first production parts after any kind of change (process change, design change and so on), please follow the below instruction:

1) Green dot (ø20) should be placed on the right corner of each shipping label.
2) Place orange or dark pink paper on the center of shipment in each side of pallet.
3) The color paper should include change number and description of change.

Please see the below sketch.



Advance notification should be sent to (HIAMS)AM-GA before first changed production parts are shipped.

2.6 Reference Samples

Suppliers should retain a portion of production runs submitted for initial sample approval, to provide a reference when full production is initiated. Similarly, when first piece inspection is used to qualify a new production set-up, the first piece should be retained throughout the production run.

2.7 Control of Reworked Products

Rework consists of any action taken on the products, which are not a part of the usual production process. Since any action to repair or salvage a product, which does not originally meet customer requirements, is a source of special cause variation, (HIAMS)AM-GA's goal is the elimination of all such actions.

When rework is necessitated as an interim containment measure, the supplier must develop written procedures for the rework operation. These procedures must provide for relevant monitoring, inspection, and testing steps after rework, in order to ensure conformance to all

applicable requirements. Passing the rework product through the normal production monitoring system, wherever practical, is preferred.

2.8 Return Product Analysis

As an essential area of customer focus, the supplier is responsible for an analysis of parts returned by (HIAMS)AM-GA for any reason. Records of the results of these analyses must be kept and made available to (HIAMS)AM-GA upon request. Supplier should use a Team Oriented Problem Solving method to initiate corrective and preventive action in response to (HIAMS)AM-GA's Corrective Action Request.

2.9 Problem Solving methods

(HIAMS)AM-GA recommends the use of the Team Oriented Problem Solving method to ensure consistent communication of concerns. This approach should be used whenever internal (e.g. process issues) or external (customer report) indicators show that a quality concern exists.

2.10 Scheduled Preventive Maintenance

Routine preventive maintenance can contribute significantly to process stability and repeatability and reduce the frequency of emergency repairs to production equipment. Suppliers must develop and maintain a documented system for the routine preventive maintenance of production equipment.

Manufacturer's recommendations, expected tool wear, and trends indicated by analysis of SPC data should be considered in developing and operating this system.

2.11 Continuous Improvement

Supplier should use the documented process to identify continuous improvement priorities and to provide measurable indicators of progress within the supplier organization. Examples: centering the process on the target value, reducing variation, improved productivity, reducing testing frequencies, and eliminating waste.

SECTION III – DOCUMENTING QUALITY

3.1 Procedures

Suppliers should develop, implement, and maintain written procedures to define all aspects of their quality system requirements for the control and continuous improvement of product quality. Each of the topics in Section I through III of this Standard should be covered in these procedures.

3.2 Records

The supplier must keep adequate quality systems records, including Failure Mode and Effects Analysis (FMEA), Control Plans, operating instructions, measurement system assessments, product test methods, and records of test equipment maintenance and calibration. Quality system records must be maintained for a period of 12 years.

As above the supplier must also keep quality performance records including control charts, test results, and periodic product evaluation results.

3.3 Drawing and Change Control

Supplier must have the latest engineering drawings, specifications, and authorized deviation records and ensure that all relevant personnel are aware of (HIAMS)AM-GA's requirements. The supplier should maintain current copies of all external documents (e.g. specifications) referred to by (HIAMS)AM-GA's drawings and specifications.

Suppliers are responsible for establishing and maintaining a system to ensure the orderly and controlled management of design and process change. Concurrent with the effective dates of authorized product changes, the supplier must ensure that obsolete information is removed from all points of use. The supplier must maintain a record of all (HIAMS)AM-GA authorized changes and their respective effective dates.

3.4 (HIAMS)AM-GA's Deviation Process

When (HIAMS)AM-GA's Engineering or Quality pre-authorizes a Deviation from product or process characteristics, the supplier must maintain records of the quantities deviated and the expiration date of the Deviation.

This to ensure that the conditions of the Deviation are not violated. The Deviation number should be shown on each shipping container. A Deviation form is included in the Appendix.

Suppliers who are requested by (HIAMS)AM-GA to ship product having any nonconformance from specifications must obtain a pre-authorized Deviation for the product or process characteristic in question, prior to shipping. Failure to do so can result in the issuance of an Incoming Rejection, which has a negative impact on the supplier's quality performance rating. All requests for Deviations should be submitted to (HIAMS)AM-GA's Purchasing Department and QA Department.

3.5 Changes in Manufacturing Processes (Change Approval)

Process improvements by (HIAMS)AM-GA's suppliers are highly encouraged, as part of the process of continuous improvement. However, once a supplied product has completed the Initial Sample Approval process, there can be no changes to the processes or materials (including changes of sub-suppliers) used to produce that approved product without prior written change authorization from (HIAMS)AM-GA.

Supplier initiated changes to design or process must have written (HIAMS)AM-GA's approval prior to any tooling modification or product incorporation of process or design changes. Formal Initial Sample Approval may also be required.

3.6 Certified Parts

Parts that are certified by (HIAMS)AM-GA will not have incoming inspection performed on them. Suppliers will be notified by (HIAMS)AM-GA in writing when a particular part or component becomes certified. Certification will occur only after ten(10) successive receiving inspections have been completed on a particular part or component and no non-conformances

were found. (HIAMS)AM-GA will then notify the supplier in writing and instruct that all a future shipments of that particular part or component be labeled " CERTIFIED". Certified parts will be audited as determined by the responsible (HIAMS)AM-GA Quality Engineer.

Any non-conformances found as a result of an audit will result in the part or component being removed from the certified parts list. The supplier will be notified in writing when this occurs. In order to obtain re-certification, the part must pass ten (10) successive receiving inspections.

Due to the critical function of certain parts, not all parts will be considered for possible certification.

3.7 Product Indentification & Traceability

(HIAMS)AM-GA's supplies are required to label all cartons of raw product in accordance with its Packaging Guide Manual.

The Label will at minimum contain the supplier part number, lot number and quantity.

Each receipt of material must contain the supplier's lot code. Material/parts received without the supplier's lot code are subject to rejection.

Any costs incurred by unlabeled product (including production stoppage) will be charged back to the supplier.

SECTION IV – QUALITY SYSTEM REVIEW

4.1 The supplier audit N13-02A is used as a tool to evaluate a potential supplier's capability to supply parts to Hitachi Astemo Americas, Inc. This audit will be performed before a potential supplier will be added to the approved supplier list. Supplier shall be at a minimum, third- party registered to IATF 16949 or registered to ISO 9001:2015 with evidence of conformance to IATF 16949

Control Number: _____

(HIAMS)AM-GA
SUPPLIER PRE-AWARD AUDIT

(HIAMS)AM-GA VENDOR RATING GUIDELINES

Section	Total Points Available
- Management Responsibility	30
- Quality System	35
- Document and Data Control	10
- Purchasing	15
- Product Identification and Traceability	10
- Process Control	20
- Inspection and Testing	20
- Control of Inspection, Measuring, and Test Equipment	25
- Inspection and Test Status	5
- Control of Nonconforming Product	15
- Corrective Action	20
- Handling, Storage, Packaging, Preservation and Delivery.	20
- Control of Quality Records	15
- Internal Audits	15
- Training	5
- Statistical Techniques	10
Total	**270**

Rating	Criteria
5	Element included in system, very good execution and documentation.
4	Element included in system, adequate execution and documentation.
3	Element included in system and adequate execution, but documentation inadequate.
2	Element included in system, but execution and documentation inadequate.
1	Element included in system, but execution inadequate or no documentation.
0	Element not in system or not executed.

Supplier Rating

The Supplier Quality Assurance Section of the supplier rating is a measurement of the conformance of part quality and documentation supplied to USAM-USHRP1 for each period. Please refer to Section 5 for more information about Supplier Rating.

The Quality Section of the supplier rating is divided into three sub sections:

1) **PPM**

   This section utilizes the method of PPM calculation (Parts Per Million): (Total Rejected / Total Received) x 1,000,000 = PPM

   The PPM section uses 25 of the 35 possible points. Suppliers are charged based on number of defects per number of parts supplied.

   If PPM is less than or equal to the target level for that commodity, all PPM points are awarded.

   If PPM is greater than the target level and less than the Maximum allowable, then a percentage of the PPM points are awarded. If PPM is greater than the maximum allowable, then zero (0) PPM points will be awarded.

2) **Certifications**

   There is a total of 5 points possible for obtaining the needed certifications (IATF 16949 or ISO 9001:2015)

3) **Documentation**

   This section is used to track proper submission of documents, effective communication, and supplier responsiveness. There is a total of 5 points possible, utilizing points off system.

Reference:

Section 5 - Supplier Rating

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SECTION VI -- INITIAL SAMPLE SUBMISSION AND APPROVAL PROCEDURE

An initial sample is a small quantity of parts randomly chosen from a significant production run 300+pcs which are checked to every dimension and test required on (HIAMS)AM-GA part drawing and related specification. Initial sample must be submitted to (HIAMS)AM-GA for approval prior to first production shipments. Initial sample approval MUST be obtained prior to the first production for the following cases:

New Parts
New supplier
- Change in Manufacturing Facility
- Significant change in Tooling or Process
- New or reworked molds or dies(each cavity) (beyond normal maintenance activities).
- Engineering Product Change (i.e. drawing, specification, material change, material source changes)

The following elements are required to be submitted each time an Initial Sample Approval is requested:

- Initial Sample Approval Sheet
- Samples with dimensional data in metric units and corresponding numbered metric drawing.
- Material Certifications
- SPC Capability Data
- Process Flow Chart
- Control Plan
- Failure Mode and Evaluation Analysis (FMEA)

Each element is described in detail in the following sections.

*NOTE ALL DOCUMENTATION MUST BE IN ENGLISH.

INITIAL SAMPLE APPROVAL FORM

This form will be submitted with the samples each time an Initial Sample Approval is requested. The form in the Appendix can be copied and utilized. The form should be filled out as follows:

Part Name - The drawing name for the part.
Part Number - (HIAMS)AM-GA's part number
Drawing No. - The number on the drawing
Supplier Name - The name of supplier's company
Factory Location - City and State of Factory is manufacturing the part.
Production Lot Size – The total production lot size.

SAMPLE

The samples that are required to be provided to (HIAMS)AM-GA Auto-parts for the initial sample must be produced from production tooling and normal manufacturing processes. (HIAMS)AM-GA must be provided 300 pieces for initial sample approval. 5 out of the 300 pieces must be accompanied with dimensional data (i.e. a complete layout inspection in metric units) for every dimension specified on the part drawing. For multiple cavity dies or multiple machining stations, one part from each stream must be measured and the data provided to (HIAMS)AM-GA.

The specified values (i.e. drawing) should be recorded first and then be followed by the actual measure value. The supplier may use an internal form or may copy the form included in the Appendix of this manual. Each characteristic measured should be consecutively number.

A drawing should be supplemented with the form to show the location for the characteristic measured. Supplier forms or the one included in the Appendix of this manual may be copied and used to record the dimensional data.

The samples are to be shipped in a package labeled with an orange "SAMPLE" tag. A copy of the tag should be placed inside the box as well as outside the box.

MATERIAL CERTIFICATIONS

Material test/certifications should be provided with an Initial Sample Approval Request for new parts and whenever there is a change in materials or material suppliers. Material test must be performed for all parts and product materials when chemical/physical/metallurgical requirements are specified. The supplier must perform the test required by the material specifications.

If the supplier cannot perform the required test, services must be procured from a qualified source. When third party laboratory services are used, the results should be submitted on their letterhead or normal report format. The name of the laboratory that performed the tests must be indicated. Lab must be able to prove certification status.

It is the supplier's responsibility to meet all applicable specifications. Any results that are outside specifications are cause for the supplier not to submit the parts and/or documentation. Every effort must be made to correct the process so that all design record requirements are met. If the supplier is unable to meet any of these requirements, the quality department at (HIAMS)AM-GA is to be contacted for determination of corrective action.

STATISTICAL PROCESS CONTROL (SPC) DATA

SPC must be utilized on those dimensions indicated on (HIAMS)AM-GA's "Notice for functionally Critical Items sheet" for the respective parts number. Control Chart and Process Capability Data will be submitted for those critical dimensions for each Initial Sample Approved request. All critical dimensions require a CpK of equal to or greater than 1.33.

PROCESS FLOW DIAGRAM

A process flow chart(schematic representation of the current or proposed process flow) will be submitted with the Initial Sample Approval Request for all new parts and whenever there is a change in the process.

CONTROL PLAN

A control plan is required with each Initial Sample Approval Request for all new parts and /or whenever process or products are revised and changes in the controls are required. A control plan describes the actions that are required at each phase of the process to assure that all process outputs will be in a state of statistical control. During regular production runs, the control plan provides the process monitoring and statistical methods that will be used to control significant characteristics. Since processes are expected to be continually updated and improved, the control plan must be viewed as a living document. The control plan blank form in the appendix can be copied and used or the supplier may use their own form.

PROCESS FAILURE MODE AND EFFECTS ANALYSIS (PFMEA)

A PFMEA is required with each Initial Sample Approval Request for all new parts and /or whenever processes or products are revised and these changes create opportunities for additional failure modes. A process FMEA involves listing potential failure modes and causes, and uses occurrence and detection probability in conjunction with severity criteria to develop a Risk Priority Number(RPN). The RPN is used to prioritize corrective action considerations. A flow diagram of the process FMEA procedure and example of a Process FMEA are included n the appendix.

CONTROL PLAN COLUMN DESCRIPTION.

1) PROTOTYPE PRE-LAUNCH PRODUCTION		Indicate the appropriate category • Prototype- A description of the dimensional measurements material and performance tests occurring during Prototype build. • Pre-Launch-A description of the dimensional measurements, material and performance tests that will occur after Prototype and before normal production. • Production – A comprehensive documentation of product/process characteristics, process controls, tests, and measurements systems occurring during normal production.
2) CONTROL PLAN NUMBER		Enter the control plan document used for tracking, if applicable. For multiple control pages, enter page number (Page _ of _)
3) PART NUMBER LATEST CHANGE LEVEL		Enter the number of the system, subsystem or component being controlled. When applicable, enter the latest engineering change level and /or issue date from the drawing specification.
4) PART NAME/DESCRIPTION		Enter the name and description of the product/process being controlled.
5) SUPPLIER/PLANT		Enter the name of the company and the appropriate division/plant /department preparing the control plan.
6) SUPPLIER CODE		Enter the identification number ((HIAMS)AM-GA's code) as requested by the procuring organization.
7) KEY CONTACT/ PHONE		Enter the name and telephone number of the primary contact responsible for the control plan.
8) CORE TEAM		Enter the name(s) and telephone number(s) of the individuals(s) responsible for preparing the Control Plan to the latest revision. It is recommended that all of the team member's name, phone numbers, and locations be included on an attached distribution list.
9) SUPPLIER /PLANT APPROVAL/DATE		Obtain the responsible manufacturing plant approval (if required).
10) DATE(ORIG)		Enter the date that the original control plan was compiled.
11) DATE(REV.)		Enter the date of the latest Control Plan updates.
12) CUSTOMER ENGINEERING APPROVAL /DATE		Obtain the responsible engineering approval (if required)
13) CUSTOMER QUALITY		Obtain the responsible quality representative approval (If

APPROVAL/DATE		required)
14) OTHER APPROVAL/DATE		Obtain any other agreed upon approval (if required)
15) PART/PROCESS NUMBER		This item number is usually referenced from the Process Flow Chart. If multiple part numbers exist (assembly), list the individual part numbers and their processes accordingly.
16) PROCESS NAME/OPERATION DESCRIPTION		All steps in the manufacturing of a system, subsystem, or component are described in a process flow diagram. Identify the process/operation name from the flow diagram that best describes the activity being addressed.
17) MACHINE, DEVICE, JIG, TOOLS OR MANUFACTURING		For each operation that is described, identify the processing equipment, e.g., machine, device, jig or other tools for manufacturing, as appropriate.
CHARACTERISTICS		A distinguishing feature, dimension or property of a process or its output (product) on which variable or attribute data can be collected. Use visual aids where applicable,.
18) NUMBER		Enter the cross reference number from all applicable documents such as , but not limited to, process flow diagram, numbered blue print, FMEAs, and sketches (computer generated or otherwise), if required.
19) PRODUCT		Product characteristics are the feature or properties of a part, component or assembly that are described on drawings or other primary engineering information. The Core Team should identify the Special Product Characteristics from all sources. All Special Characteristics must be listed on the Control Plan. In addition, the manufacturer may list other Product characteristics for which process controls are routinely tracked during normal operations.
20) PROCESS		Process Characteristics are the process variables (input variables) that have a cause and effect relationship with the identified Product Characteristic. A Process Characteristics can only be measured at the time it occurs. The Core Team should identify Process Characteristics for which variation must be controlled to minimize product variation. There could be one or more Process Characteristics listed for each. Product Characteristics may affect several Product Characteristics.
21) SPECIAL CHARACTERISTIC CLASSIFICATION		Use the appropriate classification as required by (HIAMS)AM-GA, to designate the type of special characteristics or this field can be left blank for other undesignated characteristics. (HIAMS)AM-GA may require symbols to identify important characteristics, such as those that affect customer safety, compliance with regulations function, fit, or appearance. These characteristics are variously termed, " Critical" "Key", " Safety", or " Significant". Appendix C provides a cross

		reference to these symbols and descriptive
METHODS		A systematic plan using procedures and other tools to control a process.
22) PRODUCT/PROCESS SPECIFICATION/ TOLERANCE		Specification/ tolerance may be obtained from various engineering documents, such as, but not limited to, drawings, design reviews, material standard, computer-aided design data, manufacturing, and/or assembly requirements.
23) EVALUATION/MEASUREMENT TECHNIQUE		This column identifies the measurement system being used. This could include gages, fixtures, tools, and/or test equipment required to measure the part/process/manufacturing equipment. An analysis of the linearity, re-productivity, repeatability, stability and accuracy of the measurement system should be done prior to relying on a measurement system and improvements made accordingly.
24) SAMPLE SIZE/FREQUENCY		When sampling is required list the corresponding sample size and frequency.
25) CONTROL METHOD		This column contains a brief description of how the operation will be controlled, including procedure numbers where applicable. The control method utilized should be based on effective analysis of the process. The control method is determined by the type of process that exists. Operations may be controlled by, but are not limited to, Statistical Process Control, inspection, attribute data, mistake-proofing, (automated/non-automated), and sampling plans. Refer to the example for how typical processes are controlled. The Control Plan descriptions should reflect the planning and strategy being implemented in the manufacturing process. If elaborate control procedures are used, the plan will typically reference the procedure document by a specific identification name and/or number. The method of control should be continually evaluated for effectiveness of process control, for example, significant changes in the process or process capability should lead to an evaluation of the control method.
26) REACTION PLAN		The reaction plan specifies the corrective actions necessary to avoid producing nonconforming products or operating out of control. The actions should normally be the responsibility of the people closest to the process, the operator, jobsetter, or supervisor, and be clearly designated in the plan. Provisions should be made for documenting. In all cases, suspect and nonconforming products must be clearly identified and quarantined, and disposition made by the responsible person designated in the reaction plan. This column may also refer to a specific reaction plan number and identify the person responsible for the reaction plan.

PROCEDURE

1. NAME
   Enter the part or assembly part number and the component/subsystem name.

2. MODEL NUMBER
   Enter the model number and all product line that will be affected by the component/subsystem being analyzed.

3. PLANTS AND/OR SYPPLIER(S) INVOLVED
   List the plants and /or suppliers that are involved in the production of the subsystem being analyzed.

4. DATE
   Show the data the original FMEA was completed on the products, then show the latest revision date.

5. PREPARED BY
   Print and sign the engineer's name who prepared the FMEA.

6. REVIEWED BY
   Print and sign the reviewer's name (s) who reviewed the FMEA.

7. COMPONENT FMEA NUMBER
   The FMEA Code Number used for the component being analyzed appear in the column.

8. PART NAME
   Enter the part name being analyzed. Use the nomenclature and shoe design level as indicated on the engineering drawing.

9. FUNCTION & PROCESS
   A brief description of the function of the part or component under consideration. If the part of component has more than one function list all the functions separately.

10. FAILURE MODE
    List the way in which the part or component could fail to perform its intended function. Every failure mode that part or component can suffer is to appear.

11. CAUSE OF FAILURE
    List every conceivable potential cause of failure assignable to each identified failure mode.

12. EFFECTS OF FAILURE
    Describe the effects of failure in terms of what the customer might experience. List all the effects on the system (local effect) and on the product (global effect).

13. CURRENT CONTROLS
    List all current controls which are intended to prevent the cause (s) of failure from occurring or are intended to detect the cause (s). Do not assume any current controls unless they are specified in the engineering specification. If any other specific controls are considered to be necessary, they must be listed under recommended corrective action.

14. PROBABILISTIC RISK ASSESSMENT (PRA)
    PRA is a quantitative measure to evaluate and/or assess the consequence of the identified failure mode.

    This measure is subdivided into four parts:

    - Probability (chance) of occurrence (P)
    - Seriousness of failure to the product (S)
    - Likelihood that defect will reach customer (D)

- Risk priority measure (R)

15. PROBABILITY (CHANGE) OF OCCURRENCE (P)

Occurrence is how frequently the specific failure cause/mechanism is projected to occur. The occurrence ranking number has a meaning rather than a value.

Estimate the likelihood of the occurrence on a "1" to "10" scale. Only occurrences resulting in the failure mode should be considered for this ranking; failure detecting measures are not considered here.

The following occurrence ranking system should be used to ensure consistency. The "Possible Failure Rates" are based on the number of failures which are anticipated during the process execution. If available from a similar process, statistical data should be used to ensure consistency. In all other cases, a subjective assessment can be made by utilizing the work descriptions in the left column of the table, along with any historical data available for similar processes.

	Probability of Failure	Ranking	Possible Failure Rates		
Very High :	Failure is almost inevitable	10 9	>1in 1in	2 3	<0. 33 ≥0.33
High	Generally associated with processes similar to previous processes that have often failed	8 7	1in 1in	8 20	≥0.51 ≥0.67
Moderate :	Generally associated with processes similar to previous processes which have experienced occasional failure, but not in major proportions.	6 5 4	1 in 1 in 1 in	80 400 2,000	≥0.83 ≥1.00 ≥1.17
Low	Isolated failures associated with similar processes	3	1in	15,000	≥1.33
Very Low	Only isolated failure associated with almost identical processes	2	1 in	15,000	≥1.50
Remote:	Failure is unlikely. No failures	1	<1in	1,500,000	≥1.67

16. SERIOUSNESS/SEVERITY FAILURE (S)

Severity is an assessment measuring the seriousness of an effect and its potential failure mode to the customer. Severity applies to the effect only. Severity should be estimated on a "1" to "10" scale.

Very High: Very high severity ranking when a potential failure mode affects safe vehicle operation and /or involves noncompliance with government regulations. May endanger operator (machine or assembly). (9 with warning, 10 without)

High: High degree of customer dissatisfaction due to the nature of the failure such as an inoperable vehicle (e.g., engine fails to start) or an inoperable inconvenience
Subsystem (e.g., air condition system, power sunroof). Does not involve vehicle safety or noncompliance to government regulations. May cause serious disruption to subsequent processing or assembly operations and/or require major rework.

Moderate: Moderate ranking because failure causes some customer dissatisfaction. Customer is made uncomfortable or is annoyed by the failure (e.g., engine misfire, compressor rumble, sunroof

leaf). Customer will notice some subsystem or vehicle performance deterioration. May cause rework/repair and /or damage to equipment.

Low: Low severity ranking due to nature of failure causing only a slight customer annoyance. Customer will probably only notice a slight deterioration of the system or vehicle performance or a slight inconvenience with a subsequent process or assembly operation, i.e., minor rework action.

Minor: Unreasonable to expect that the minor nature of this failure would cause any real affect on the vehicle or system performance. Most customers will probably not even notice the failure.

17. DETECTION/LIKELIHOOD (D)

Detection is an assessment of the probability that the proposed process controls will detect the failure mode, before the part or component leaves the manufacturing or assembly location. A "1" to "10" scale is used. Assume the failure has occurred and then assess the capabilities of all "Current Process Controls" to prevent shipment of the part having this failure mode or defect. Do not automatically presume that the detection ranking is low because the occurrence is low (e.g., when Control Charts are used), but do assess the ability of the process controls to detect low frequency failure modes or prevent them from going further in the process.

Random quality checks are unlikely to detect the existence of any isolated defect and should not influence the detection ranking. Sampling done using a statistical basis is a valid detection control.

Likelihood the Existence of a Defect will be Detected by Controls Before Next or Subsequent Process, or Before Part or Component Leaves the Manufacturing or Assembly Location

		Ranking
Absolutely Certain of Non-Detection:	Controls will not or can not detect the existence of a defect	10
Very Low:	Controls probably will not detect the existence of a defect	9
Low:	Controls have a poor chance of detecting the existence of a defect	8 7
Moderate:	Controls may detect the existence of a defect	6
High:	Controls have a good chance of detecting the existence of a defect. (Process automatically detects failure)	4 3
Very High	Controls will almost certainly detect the existence of a defect. (process automatically prevents further processing)	2 1

18. RISK PRIORITY NUMBER

The Risk Priority Number is the product of the Seriousness (S), Probability (P), and Likelihood (D) rankings.

PRM = P x S x D

PRM = Probability Rank x Seriousness x Likelihood

This value should be used to rank order the concerns in the process (e.g., in Pareto fashion). The PRM will be between "1" and "1,000". For higher PRM's the team must undertake efforts to reduce this calculated risk through corrective action (s). In general practice, regardless of the resultant PRM, special attention should be given when severity is high.

19. RECOMMENDED CORRECTIVE ACTION (S)

A brief description of the recommended corrective action (s). If a corrective action is not required, indicate by "N.R." in this column.

20. ACTION TAKEN

After an action ahs been implemented, enter a brief description of the actual and effective date.