Effective Date: 8/19/2022

Q253: Supplier Manufacturing Readiness Review (SMRR) + Process Control Review (PCR)

Application:

You have received this Quality Clause as a result of the risk ranking of the product you are quoting or under contract for. The requirements of this Quality Clause must be planned for and complied with unless this is waived by either PO direction or other written approval provided by AR quality and the responsible buyer for this hardware. **If you have not had any performance issues or a break in production in the previous two years, contact your AR buyer prior to quoting or production to determine if some or all of the requirements of this clause can be waived for this PO. Any waiver requires written approval from the AR buyer.**

Definitions:

Supplier Manufacturing Readiness Review (SMRR): Determines the readiness of the manufacturer to proceed with manufacturing of the product.

Process Control Review: To demonstrate that the manufacturing/assembly process has the potential to produce product that consistently meets all requirements during the production run**.**

Process Control shall include the following: Process Flow Diagram, Process Failure Modes and Effects Analysis (PFMEA), and Control Plan.

Compliance Matrix / First Article Inspection: An enhanced First Article requirement adds a Compliance Matrix (CM) component to the standard AS9102 FAI forms**.**

Requirements:

Seller shall prepare and submit documentation required to perform a SMRR and a PCR for Buyer's approval. The review shall be conducted prior to the beginning of any significant fabrication or assembly activity and prior to producing the First Article. The First Article Inspection (FAI) report for this procurement requires an enhanced FAI with additional Compliance Matrix (CM) features as explained in the CM/FAI section of this document.

The **SMRR** should represent a complete and comprehensive presentation of the entire planned production and/or assembly activity. The information prepared for the SMRR should represent the following (as applicable): Product description, business review, Quality and Engineering Notes review, released production drawings, design risk assessment, manufacturing readiness (planning, technique sheets, tooling, etc.), process capability validation, technical review, production verification testing, material certification, parts marking methods, packaging, preservation and labeling approvals, special process approvals, and nondestructive test, inspection, nonconforming product process, and documentation requirements.

The **Process Control Review** should demonstrate that the process has been analyzed for risk during completion of the Process Flow Diagram, PFMEA, Product Line Validation (PLV), and that any applicable risk has been mitigated and/or Control Plans developed: Seller shall submit the following Process Control information in preparation for the SMRR for Buyer's approval:

- **Process Flow Diagram**: Submit process flow diagram(s) that includes all operations in sequential order from purchase order receipt through storage and shipment of the finished item. The process flow diagram(s) are to include any alternate processes and movement of product to any external operations.

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- **Process Failure Modes & Effect Analysis (PFMEA)**: Seller to perform a risk analysis of the manufacturing/assembly process(s) and identify mitigation plans for high risks using the PFMEA methodology (SAE J1739).
- **Control Plan**: Once the need for a Control Plan has been identified, either through identification of relevant special characteristics on the item drawing, or through completing the PFMEA, a Control Plan is developed. The supplier is responsible for developing a Control Plan(s) at the system, subsystem, component, and/or material level to assure process outputs will conform to pre- determined requirements. The control plan will be reviewed to ensure it:
  - Has a process for reviewing and updating the control plan when changes occur Includes and indicates all special characteristics (product and process Key Characteristics and Critical Safety Item) defined by the drawing and PFMEA.
  - Lists the characteristics to be monitored, during the manufacturing process, along with any required control methods.
  - Assure a reaction plan is in place for when the process becomes unstable or a failure occurs.
- **Product Line Validation (PLV):** A review of select critical processes by AR and supplier representatives as they occur in production and is typically tied to validation of the CM/FAI plan or report. This may be performed during SMRR or postponed until a later date if the targeted production processes are not available during SMRR. The review is performed to ensure the following:
  - Instructions are followed as written
  - All the necessary detail to consistently complete an acceptable part is included (eliminate reliance on tribal knowledge)
  - Manufacturing, inspection and test personnel are properly trained
  - Special tooling required is available and properly calibrated
  - Special processes and supporting procedures are in place and under control
  - Planned inspections and equipment are appropriate based on the requirements and tolerances
  - Necessary test procedures and equipment are available and capable of meeting the Technical Data Package (TDP) requirements.

This SMRR and Process Control plan documentation will be submitted to the Aerojet Rocketdyne Buyer and a review will be scheduled at an appropriate location.

Forms QMA-F-7.08.06.024 and QMA-F-7.08.06.025 will be used by Aerojet Rocketdyne (as applicable) to conduct and document the SMRR and Process Control.

Approval by Buyer is required prior to production of the goods. Buyer's approval of manufacturing plans shall not relieve Seller of Seller's requirement to comply with the terms of this contract.

All changes to the approved SMRR plan shall be submitted to Buyer for review and/or approval prior to implementation, unless otherwise defined by Buyer engineering requirements.

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Compliance Matrix / First Article Inspection (CM/FAI): The seller is expected to complete the CM/FAI that includes the basic AS9102 requirements with the additional detail noted in this clause utilizing the Aerojet Rocketdyne provided CM/FAI template: QMA-F-5.04.03.00.0007.

The template when used properly per the accompanying forms instructions ensures that the CM/FAI includes the following detail and all the required approvals:

1) An extracted list of all drawing and specification requirements
2) Materials/part numbers required to make the evaluated part number
3) Detailed specific traceability to the documents that make and verify the extracted features including the methods used to verify compliance to the requirement.
4) Specific tooling required to create or validate the features
5) Training required to create or validate the features

Seller shall provide a complete CM/FAI, for all top level deliverable part numbers listed on the PO and all assemblies, sub-assemblies, and detailed components defined by Aerojet Rocketdyne or AR customer designs used in the fabrication of those deliverable items (including those based on supplier designs). For those parts not defined by AR or AR customer designs, seller shall provide the deliverable part number FAI reports to AR and maintain all other FAI reports and records at their facility and make them available to AR for review upon request.

In performing an FAI the Seller shall include all dimensions, drawing notes and acceptance criteria listed in AR and customer performance and test specifications. When multiple quality requirements are included in an Acceptance Test Plan (ATP) specification, drawing notes or compound dimensional features, then the requirements shall be expanded to multiple entries to cover each of the verifiable quality requirements.

The seller shall submit the completed CM/FAI plan (minus results) to AR through the SAIR process defined in AR1 for AR review and approval. AR will approve the plan and authorize the supplier to populate the CM/FAI with results to complete the CM/FAI report and submit to AR for review/approval. The CM/FAI report is used in lieu of and satisfies the FAI requirements of AR1.

The following changes will require an update to the previously approved CM/FAI plan and/or report unless otherwise directed in writing by AR.

1) A change in the design characteristics affecting fit, form, or function of the part.
2) A change in manufacturing source(s), process(es), inspection method(s), location of manufacture, tooling, or materials that can potentially affect fit, form, or function.
3) A change in numerical control program or translation to another media that can potentially affect fit, form, or function.
4) A natural or man-made event, which may adversely affect the manufacturing process.
5) A lapse in production for two years. This lapse is from the completion of last production operation to the actual restart of production.