RAIL COACH FACTORY

Kapurthala, Punjab – 144602

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Policy on First Article Inspection

Amendment History:

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1.0 Introduction

RCF is introducing First Article Inspection (FAI) policy to help its suppliers in reducing their supplied items' rejections during fitment and service.

This document defines the policy and procedure which shall be followed for doing First Article Inspection (FAI) at the manufacturer's or supplier's premises before accepting the same at RCF.

RCF, Kapurthala is an IRIS^{TM} Certified organization and is continuously working towards improving the quality of its products and services. To achieve this, it is very important that spares and parts/assemblies which RCF purchases from its suppliers must be of outstanding quality and should conform to the laid down purchase and manufacturing standards.

Whenever a supplier makes a new part/assembly/fabrication, he has to make sure that the item he has produced shall be acceptable to the buyer. For this, the supplier has to ensure that the part/assembly is manufactured by following correct manufacturing drawings, correct manufacturing practice and uses correct type and quality of raw material. Thereafter he also has to ensure that every time that he makes that part/assembly, it is made to the same consistent quality, physical and chemical properties and dimensions. If he does not ensure this, then it is possible that some of those manufactured parts/assemblies will fail in quality tests at the purchaser's end or during service and get rejected. In other words, he has to produce his assemblies "***First time right, Every time right.***"

FAI of any item is the act of Inspection, Verification and Documentation of the representative sample from the first serial production run which may be of a new product or a major upgrade of an existing product.

An essential post FAI activity is **First Mounting Inspection** – which is, in simple words, ***shop fitment trial*** of the FAI item to check for any interference or any other issues that cannot be checked during FAI.

It may be clearly understood that '***first sample'*** does not refer to just one piece produced for showing to the inspection team by whatever means possible.
First sample means - a piece of the product that is created as per complete manufacturing plan for undertaking the series production of the same item on the manufacturing line. FAI shall be done only on such a piece.

In other words, any sample made for showing to inspection team - as a one-off piece, without following the complete production process including in-process quality checks as per Manufacturing and Inspection plan, ***shall not*** be considered acceptable for FAI. Also, ***a partially made product cannot be accepted for FAI***.

This policy document on **First Article Inspection (FAI)** describes how should the first article (spare-part/sub-assembly/assembly) made manufactured by the supplier be inspected. It also gives a check-list of various points in manufacturing at the supplier's premises that should be checked and verified so as to ensure that the assemblies made by the supplier are "***First time right, Every time right***".

FAI is a joint exercise of trust and commitment between the supplier and purchaser. When done properly and with transparency, FAI significantly reduces the chances of rejections, number of

subsequent inspections audits and quality checks by RCF. It's a step for increasing ease of business with RCF.

From RCF's point of view, we shall know who are the good, reliable and consistent suppliers. From suppliers' point of view, it means less rejections and less penalties.

2.0 Scope of FAI

The FAI policy shall be applicable to all those components/assemblies being purchased by RCF wherein the requirements of FAI have been mentioned in the contract documents or workorders.

3.0 Objective of doing FAI

First Article Inspection (FAI) shall be done by RCF to establish that:

1. Manufacturer has clearly and correctly understood the drawings and specifications of the part/assembly which has to be manufactured by him.
2. That the manufacturer has thoroughly understood engineering design and has planned his M&P and operations correctly so as to meet the contract w.r.t. performance and quality.
3. That the manufacturer has the correct and adequate numbers of Machines, Jigs, Tools, Fixtures and Measurement Gauges for undertaking series production.
4. The manufacturer is satisfied that his materials, tooling, manufacturing and inspection processes, documentation, and personnel used/engaged by the manufacturer are capable of consistently producing contractually correct product.
5. That the manufacturer has correct inspection systems in the correct places so as to prevent any use of wrong material or wrong process from happening during each manufacturing stage.
6. Supplier has the necessary systems and plan firmly in place to ensure that after entering into contract with RCF, if there is an unforeseen change in fabrication process or in material specification because of market fluctuations, their production capacity or capacity for timely deliveries is not adversely affected.

4.0 When shall FAI be done?

FAI shall be done for any component / assembly if any of the following conditions occur:

1. If the product is manufactured by the supplier for the First time.
2. If any change in the part's design has happened which has effect on its fitment, shape, function and/or interchangeability.
3. FAI shall mandatorily be done when there has been a: -
   - 3.1. change in site/location of the manufacturing plant even if the plant is under same ownership,
   - 3.2. change in the ownership of the Production plant,
   - 3.3. change in the original supplier of the purchased item,

3.4. change in manufacturing process(es),

3.5. change in inspection method(s),

3.6. change in acceptance criteria,

3.7. change in tooling used in manufacturing,

3.8. change in materials used.

4. Whenever the manufacturer is using CNC/NC machines for making the part/sub-parts, if there has been a change in numerical control program (alteration in NC program's operating language-set/command-set, or sequence of operations, or change of tooling, or alteration in machining intervals/sequence/speed) or translation to another media that is utilized to produce end item parts.
5. Whenever a natural or man-made event has occurred at the manufacturing premises which is likely to affect the machine(s) - such as foundation damage due to flooding of factory, excavation near machine foundation, vandalism of machines/tools/gauges facilities, etc.
6. The manufacturer has not produced the said part/assembly for a period of four years. (Partially making the part/assembly to a similar shape/function shall not be an acceptable claim for waiver).
7. In such cases where the manufacturer's supplied parts are repeatedly failing (more than three times in a calendar year or when two successive lots have failed) or giving rise to frequent NCRs (three or more NCRs in a calendar year or two successive lots have resulted in NCR).
8. For those items which are made after modifying Off-the-Shelf commercially available items or AID (Altered Item Drawing) items, FAI of the modified portion (**Delta-FAI**) at a minimum is required.

   The requirement of whether FAI shall be done on the purchased part shall be mentioned in the contract documents / work-order.

NOTE1: A first article inspection report is not required for rework/repair purchase orders or for parts or material conforming to an established industry or national authority published specification, which has all characteristics identified by text description indelibly imprinted on the product.

5.0 Where shall FAI be done and by whom?

1. FAI shall be done by the purchaser or his authorized representative at the place of manufacture.
2. Prior to RCF doing the FAI, the supplier is required to do Self-FAI verbatim on the same lines as shall be done by RCF covering all the points Quality Plan (QP) and Manufacturing and Inspection Plan (MIP).
3. For this purpose, the supplier shall generate his FAI scheme and formats based on their internal quality plans, inspection proformas, article's STR/ Specifications/ drawings, relevant

IS/ ASTM/ ASME/ BIS/ DIN /UIC specifications/standards. The FAI report generated by the manufacturer/supplier shall be submitted to CDE/CEDE RCF.

4. If the part/assembly is manufactured at multiple locations, FAI shall be done at all such locations by following the sequence of manufacture.
5. As part of the FAI report, supplier shall also furnish the following information: -

   5.1. **Manufacturing and Inspection Plan (MIP).**

   This plan includes all documents which describe the planning, control, inspections and tests defined during the production. It lays down which technical standards shall be referred to at which stage of manufacturing, define step-by-step procedures of manufacturing, give reference to appropriate drawings, lay down the technical the Work Instructions (**WI**s), Work Procedures, Manufacturing Steps, Inspection points and Inspection templates.

   5.2. **Quality Plan (QP)**

   These documents shall specify which processes, procedures and materials shall be applied in the manufacturing process by whom. They shall also lay down the inspection process and the responsible person for ensuring the compliance to these inspection processes.

6. Manufacturer shall list down the Inputs and Resources required for undertaking the series manufacturing of the given item as per *annexure - I.*
7. In response to supplier's furnished Self-FAI report, RCF shall either convey to the supplier any inadequacies or incorrectness in the submitted FAI or accept the same and plan RCF's FAI at the earliest.
8. Where testing or process verification is required to be witnessed, it shall be witnessed and verified by RCF or its authorized representative at Firm's Premises physically.
9. The cost of verification of any test or process by a third-party laboratory or test house, when done for the first time as part of FAI, shall be borne by the supplier.
10. For supplying items to RCF, FAI done by ***any agency other than RCF shall not be acceptable***.

6.0 FAI of items made using Special Processes:

Whenever any part is manufactured by using "Special Processes" as defined below, the FAI report must contain full information of the same to ensure that the supplied part is acceptable to purchaser.

As per IRIS^{TM}, "***Special Processes"*** are those processes employed in manufacturing where the conformity of the resulting products cannot be readily, technically, or economically determined without destructive testing of the product. Therefore, to save costs, these special processes employed in making the to-be-supplied part need to be done under strictly controlled parameters and by specially trained skilled persons. The following processes are considered special processes: -

1. Bonding & Sealing

2. Casting
3. Crimping
4. Force fitting
5. Forging
6. Heat Treatment
7. Laminating (Composites)
8. Moulding
9. Potting (Electronics)
10. Riveting
11. Stress Relief Treatment
12. Surface Treatment (Painting, Coating), Powder Coating
13. Torque Tightening
14. Welding (Including Soldering & Brazing)
15. 3D Printing
16. Vacuum Plant Impregnation (VPI)

If any of these above-listed processes are used either wholly or even partly in manufacturing the supplied product, the same shall be deemed to be **Ok/Not Ok** based on the parameters seen during their operation and on the basis of procedures/sequences being followed. These shall be especially documented in specific details, giving numerical values wherever needed, which shall be provided as a part of the Self-FAI Report.

Special processes must be very tightly controlled and they need process validation. RCF shall therefore be giving special emphasis on recording and documentation of Special Processes in its FAI Report.

Note: Kindly refer to IRQB Guideline 6: Special Processes for preparing the process qualification plans for the above processes.

7.0 Conducting the FAI

The FAI shall be done as per following steps: -

1. The contractor / supplier shall plan the production and manufacture of the First Article after stabilizing their own production process.
2. Self-assessment (Self-FAI) shall be conducted and its observations recorded by the contractor / supplier covering the points listed hereunder.
3. Supplier shall do a review of their production documentation and satisfy themselves of the completeness of their manufacturing process namely: -

3.1. Manufacturing steps sheets,

3.2. Work Instructions (WIs)

3.3. Manufacturing Inspection Plan (MIP)

3.4. Quality Plan (QP)

4. Record evidence that all the specific gauges, tools, jigs, fixtures that are used in the manufacture of the product are validated, qualified and traceable.
5. Record evidence that the statutory and regulatory requirements pertaining to the product are met.
6. Ensure that all operations are correct as planned and they refer to the correct specification, material types, conditions, and approvals.
7. List down the items/parameters that are to be checked and recorded during manufacturing e.g.

   7.1. Dimensions to be inspected.

   7.2. Chemical/Metallurgical composition

   7.3. Design values vs. Observed values of Tests done on the item.

   7.4. Well defined Acceptance test procedure and the parameters to be measured in the same.

   7.5. List of special processes and their control parameters.

   7.6. Details of Raw material certification and test results.

   7.7. Details of Skilled Operators Trade Proficiency and their certificates.

8. Record evidence, wherever required, of the fact that only customer approved sources have been utilized.
9. Record evidence that required designed tooling (e.g., part specific gauges) are used and appropriately documented.
10. Record evidence that every design characteristic or functional requirement is accounted for, uniquely identified, and has inspection results traceable to each unique operator/machine/process/material.
11. Define parameters and their values and make a template to record results of the inspection and testing of the product at required intermediate stages of manufacturing.
12. Satisfy oneself that the design characteristics or functional characteristics of the part or assembly so manufactured can be correctly inspected and measured at appropriate stage of manufacturing for ensuring quality control.
13. Verify and record that the parameters and values so defined and recorded as above are in conformance with the purchase specifications/requirements.
14. Ensure that the output of each intermediate manufacturing process can be measured, inspected, tested, and/or verified to determine whether they meet the final requirements of

the product? If not, then implement corrective measures and make a record of the corrections duly verified by Production/Quality in-charge.

15. Verify the scheme of part marking to ensure that same is legible, correct in content and size, and properly located per applicable specifications.

16. If any unsuccessful FAI was done earlier and purchaser or if RCF had pointed out any non-conformities/shortcomings, the review analysis of such non-conformances/errors/shortcomings should be done and documented and included in the Self-FAI Report for completeness.

17. Wherever applicable, Type test on the first article shall be done as part of FAI. Details of various types of tests that shall need to be done on the product at a later stage and date are listed below. Firm needs to have full set up for conducting the same.

Category of Test	**Remarks**
Type tests (First Article or First Piece)	Such tests are required only for seeking either first time product approval or upon change of design and/or change of manufacturing processes. Type tests are required to be done once only and the report can be used until required to be redone due to: - 1. Revalidation of the FAI due to condition mentioned in Clause 3.0. 2. Change of design leading to changes in form / fit / function and interface requirements.
Routine tests	Routine Tests are required to verify the satisfactory functional working of the system. These may also require simulated inputs for testing the operations under full range of inputs. These tests shall be done by the manufacturer during manufacturing and records maintained for inspection. Certified copy of Results of Routine tests must be furnished whenever WTC is required to be submitted by supplier.
Acceptance tests	These tests shall be done on all or sample of lot for bulk supply. Sampling shall be done as per IS2500 if not specified in the contract. These tests shall normally consist of Routine Tests and additionally those specified in the specific contract.
Place where above mentioned tests are done	Supplier is mandatorily required to declare that the tests were done in-house or by external agency. In case of external agency doing those tests, the name of test agency, it's credentials like NABL accreditation details, scope approval certificate issued by NABL, etc. must be mentioned in their

	own records alongwith a copy of the same shall also be enclosed for reference.

18. Whenever there is a minor difference between the current configuration of the offered product and prior approved configurations of the same product, there is a need to do Partial FAI or **Delta-FAI** of such first article. Whether an article being supplied by a firm needs to undergo complete FAI or Delta-FAI shall be clearly specified in the purchase order by RCF. For an article that qualifies for approval in Delta-FAI as per clause 4.0 Item 8 above, the FAI requirements be satisfied by doing a Delta-FAI.

8.0 First Article Inspection Report (FAI-Report)

FAI-Report – whether it is Self FAI or RCF's FAI, shall be made containing the following information: -

i) Manufacturer shall prepare his own Self-assessed FAI report as per guidelines given earlier in this document.

ii) The Self-assessed FAI report must contain all points described in Clause 7.0

iii) RCF shall scrutinize the Self-assessed FAI report of the firm and either accept it for further action or shall return it to the firm with description of non-conformities/deficiencies within 15 days of receipt.

iv) Manufacturer shall take necessary steps to make required corrections and submit fully updated self-assessed FAI report to CDE/CEDE.

v) Once the manufacturer submits his own Self-assessed FAI report and the same is declared as accepted for further processing, CDE or CEDE shall prepare three documents: -

a. FAI Planning Document (Form No MDF 5004)

b. FAI Preparation Document (Form No MDF 5005)

c. FAI Execution Document (Form No. MDF 5006)

vi) These documents are enclosed as *Annexure – II* through *Annexure-IV*. Firms can go through them and be in readiness for verification of the same by RCF Inspection team.

vii) FAI report of RCF shall be drawn as per the format given in ***Annexure – V***.

viii) ***Firm must mandatorily own original documents of various relevant standards and testing requirements from the publishers that are applicable to making and testing of their product***. All these documents must be latest ones. These include documents from IEC/DIN/UIC/BIS/IS/ASTM/NIST/IEEE/ASME/ ITU/BSI/CEN/CENELEC/JISC etc. If the firm does not produce these relevant documents in original at the time of RCF's FAI at their premises, FAI shall be withheld until they qualify this requirement.

9.0 Response Options after FAI is done by RCF:

After the FAI is completed by RCF, following course of action is available to the firm: -

S. No.	FAI Evaluation Outcome	Further Action	Remarks
1	FAI Passed.	Firm to submit the First Article (First Piece) for fitment checks on RCF shop floor. Bulk supply to commence only after First Article or First Piece passes shop-fitment checks.	Only fitment related issues shall be examined by Shop-floor staff, Design staff and Quality Staff. Commenting on any other issue of design is beyond purview at this stage. Fitment checks shall be witnessed by the same persons of RCF and Firm who witnessed FAI at firm's premises.
2	FAI Failed.	Firm shall be given full documentation of reasons for declaring the FAI failed. Firm can request RCF for permission to set right the non-conformities pointed out in FAI report. After correcting the non-conformities, firm shall submit fresh Self-FAI Report to RCF. If RCF is satisfied that the Non-conformities have been set right satisfactorily, RCF shall do another FAI as was done in the first time.	The firm shall have to submit full technical details of their proposed action plan to rectify non-conformity. After RCF is satisfied that the firm's proposal carries sound technical merit, firm shall be informed to re-initiate action for fresh FAI.
3	Repeat FAI passed.	Firm to submit the First Article (First Piece) for fitment checks on RCF shop floor. Bulk supply to commence only after First Article or First Piece passes shop-fitment checks.	Subsequent supply of the firm shall be taken in Quality Audit because of failure of the first FAI.

i.) In respect of S. No. 3 above, if the item fails during the fitment check on shop-floor, the FAI shall be deemed to have failed and contract shall be terminated at Firm's cost and cause.

ii.) Once the contract is cancelled, the firm shall have to restart the process of obtaining fresh supply orders including doing of FAI.

iii.) Bulk supply shall commence only after First Article passes shop-fitment checks. These fitment checks shall be witnessed by the same person of RCF who witnessed FAI at firm's premises.

iv.) At any stage until final clearance of the First Article, improvements may be advised to the firm if required as a result of learnings during their manufacturing or fitment. Firm shall be bound to take cognizance of these Improvement Advices. This shall be a part of the technical document of the purchase agreement.

v.) Before conveying any such Improvement advice to the firm, personal approval of CDE/CEDE is mandatory. This power of approval shall not be delegated by CDE/CEDE to subordinate officials unless they are unavailable for this purpose. In such case, the Improvement advice shall be conveyed by officer nominated by CDE/CEDE and the same shall be regularized *post-facto* once the superior officer assumes office.

vi.) Notwithstanding the FAI clearance, regular supply of the approved item may be sampled at later dates for quality audits.

10.0 Approval for Deviation from the FAI policy of RCF:

GM/RCF Kapurthala, is authorized to grant approval for deviation from the above policy to meet emergency requirements.

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