Marvin Engineering
261 West Beach Avenue
Inglewood, California 90302
USA
310-674-5030
Fax: 310-673-9472
sales@marvineng.com

Marvin Test Solutions
1770 Kettering
Irvine, California 92614
USA
949-263-2222
Fax: 949-263-1203
info@marvintest.com

Flyer Defense
151 West 135th Street
Los Angeles, California 90061
USA
310-324-5650
Fax: 310-324-5646
flyer@marvineng.com

Lapeer Industries
400 McCormick Drive
Lapeer, Mlichigan 48446
USA
810-664-1816
Fax: 810-664-1370
sales@lapeerind.com

Marvin Land Systems
261 West Beach Avenue
Inglewood, California 90302
USA
310-674-5030
Fax: 310-673-9472
sales@marvinland.com

First Article Inspection GUIDEBOOK

2014 EDITION

The Marvin Group

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1.0 INTRODUCTION

1.1 Purpose

This guidebook provides directions on how to identify, plan for and satisfy Marvin Engineering Company (MEC) specific requirements for completing a compliant First Article Inspection (FAI). It is based on the latest revision of AS9102, and additional MEC expectations.

An FAI is performed to provide objective evidence that:

- All engineering, design, contractual and specification requirements are correctly understood, accounted for, verified and recorded.
- Materials, tooling, processes, documentation and personnel are capable of consistently producing compliant hardware.
- Part/assembly is 100% compliant, defined, base-lined and repeatable.

This document applies when an FAI is required by the purchase order and/or Purchasing Product Assurance Provisions (PAP) clause #24, or any reference documents (such as a Statement of Work). This document also applies to *all* sub-tiers who produce design characteristics and/or sub-assemblies.

1.2 Benefit

The benefit acquired from this guidebook will result in improved 1st pass yield of first article document reviews and the enhancement of the supplier's reputation.

1.3 Target Audience

This guidebook is addressed to Quality Control and Supplier Quality managers, Quality Engineers, and Manufacturing Engineers.

2.0 REFERENCES

2.1 Reference Documents

- International Aerospace Standard 9102 Latest Released Revision
- Marvin Engineering Product Assurance Provisions (PAP 22, 24, 59)
- Reference: "http://www.marvingroup.com/index.php/supplier_information/" for more information regarding FAIs.

2.2 Required Forms

If a supplier chooses to use an approved AS9102 or equivalent form (instead of the MEC Forms), any additional information required by MEC forms shall also be provided.

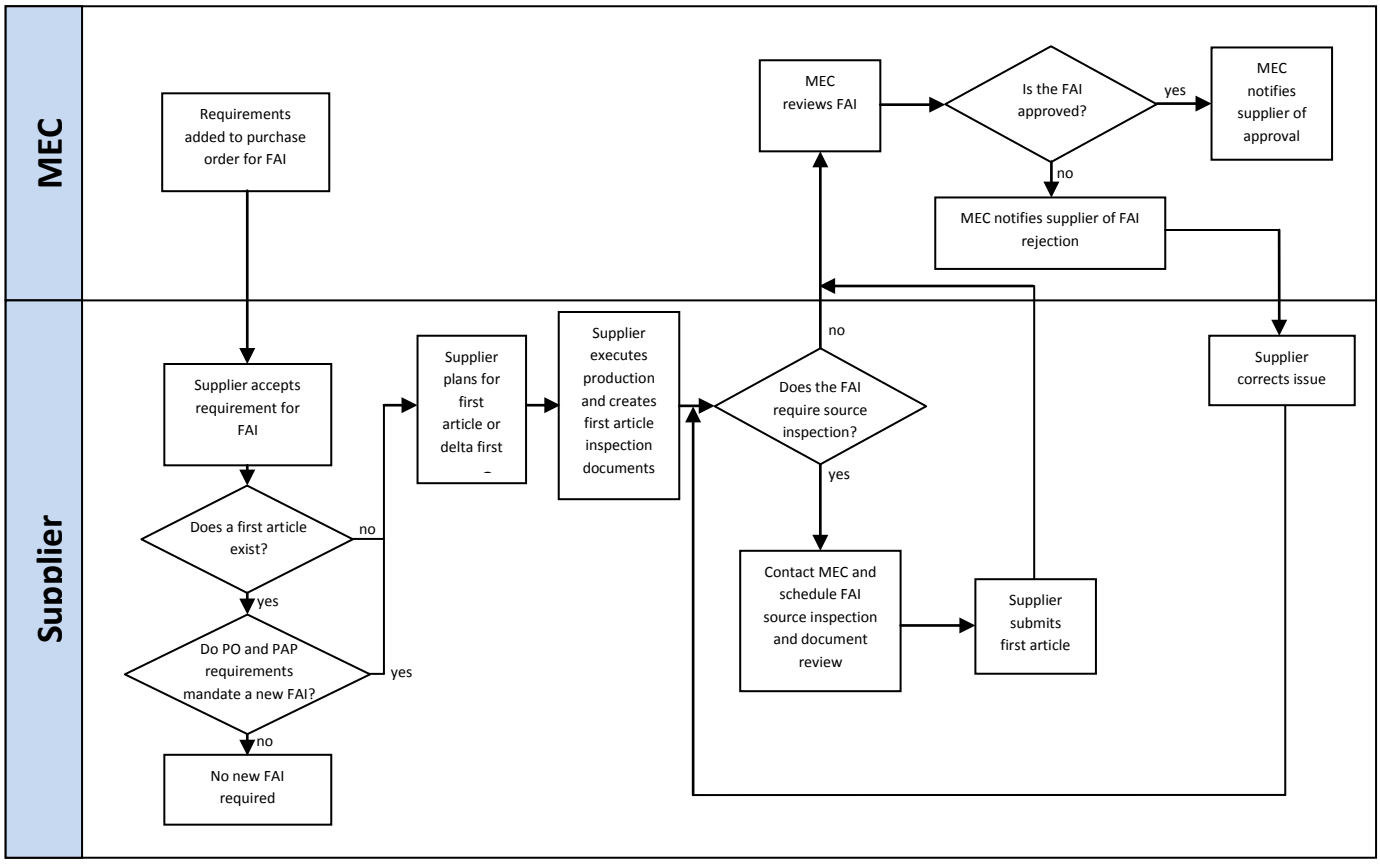
- AS9102 Form 1: Part Number Accountability or equivalent.
  Used to identify the part that is being inspected (FAI part) and associated sub- assemblies or detail parts.

- AS9102 Form 2: Product Accountability - Raw Material, Specifications and Special Process(es) and Functional Testing or equivalent.
  Used if any material, special processes or functional testing are defined as a Design Requirement.

- AS9102 Form 3: Characteristic Accountability, Verification and Compatibility Evaluation or equivalent.
  Used to account for the verification of each design characteristic.

3.0 REQUIREMENTS

3.1 Marvin Engineering's First Article Process



3.2 Purchase Order FAI Requirement

FAI requirements are stipulated in the PO either directly in the notes or in the PAP clauses. When directly requested by the PO, an FAI shall be conducted by the seller and the documented results furnished to and accepted by an MEC quality representative prior to acceptance of production parts.

When requested in the PO PAP clauses then the seller shall provide FAIs or partial FAIs per PAP 24.

All FAIs shall conform to AS9102 with the following exceptions:

- Design Tooling – In addition to the requirement to record all designed tooling (inspection fixtures, CMM programs, etc.) the supplier shall also supply the type and tool number for the tool used to inspect all critical features.

- Nature and Number of Observations – The supplier shall ensure that the number of observations is recorded in the "results" column.

  Example 1 : If the requirement states .xxx +/- .xxx 6 plcs typical then the results shall show a range from .xxx to .xxx (x6).

  Example 2: If the requirement states break sharp edge x12 then the results shall show "PASS (x12)". See AS 9102 form 3 example.

3.3 FAI Planning

The following items shall be taken in to consideration *prior* to manufacturing compliant hardware and completing a FAI:

3.3.1 Pre-Planning Activities

- Ensure that the process, planning and tooling that will produce the part being presented is one that is repeatable enough to consistently yield compliant hardware.
- Compliance with MEC POs and associated PAP clauses are to be considered part of your pre-planning activities.
- Ensure that the Engineering package utilized is "Released" and the revision is per the PO requirement.
- Hardware utilized for an FAI shall be part of the first production run. This FAI part should not be a qualification unit since qualification is completed prior to FAI.
- Ensure all parts and materials included on Parts List are part of the FAI package and include a Certificate of Conformance for each.
- Verify that 100% of drawing characteristics, notes, embedded specifications and sub- assemblies are achievable and supported with objective evidence (as applicable). Ensure all process measurements are accounted for and verified prior to final assembly.
- Identify special processes, and if required, ensure the use of MEC or MEC's customer approved Special Processors in accordance with PO requirements.
- Ensure applicable FAI requirements are flowed down to sub-tiers and are reviewed upon completion.
- Ensure controls and documented processes are in place to fulfill drawing requirements such as:
  - Quality Management Systems
  - Documented Production Processes
  - Qualification
  - Testing
  - Counterfeit Part Prevention
  - Inspection and acceptance tooling
  - Sub-tier Management
  - Approved Acceptance Test Procedure (ATP)/Verification Test Procedure (VTP)
  - Appropriate training of all personnel
  - Others (as applicable)

- Ensure production baseline process controls are in place to achieve and maintain compliance to PO process change control requirements as defined by Purchase Order (PAP22 and 59).
- Supplier or contractor shall notify MEC of any changes (any alteration to the design, technical specifications, materials, component sourcing, production process, facilities, location, etc.) whether instigated by seller or its sub-tier suppliers.
- When PO PAP 5 is invoked a Source Inspection applies and an on-site FAI review may be required in advance of part shipment.

3.3.2 Equipment

- Have appropriate measurement equipment/methodology for each characteristic and ensure that all equipment is calibrated.
- Ensure equipment accuracy (i.e., at least 10X accuracy), and also ensure it is capable of performing the measurement. Supplier should always consider measurement system analysis studies for close tolerances such as Gage R&R.

3.3.3 Digital Data (as applicable)

- Ensure use of MEC supplied models as applicable to the PO. This should be the latest approved model, revision, and version provided in accordance with the PO, software, etc.
- Ensure supplier is approved to special process/PO for Reduced Dimension Drawing (RDD) when required by drawing.
- Referenced models are not to be used for manufacturing or acceptance.

3.4 FAI Submittal

- Questions regarding FAI submittals should be directed to the buyer listed on the PO.
- FAI items that do not require source inspection are to be completed at the supplier and then provided to MEC Quality for review and approval.
- Production material received without an approved FAI is subject to immediate return.
- For parts that require FAI and Source Inspection, requests must be made no less than 5 working days prior to shipment date. Scheduling shall accommodate any in process inspections identified in the PO. Requests are made by contacting the procurement representative/buyer.

3.5 Partial/Delta FAI

- The FAI requirement, once invoked, shall continue to apply even after initial compliance.
- The FAI requirements may be satisfied by a partial FAI that addresses differences between the current configuration and prior approved configurations. When a partial FAI is performed, the organization shall complete only the affected fields in the FAI forms.

- FAI requirements may also be satisfied by previously approved FAI(s) performed on identical characteristics of similar parts produced by identical means as long as PAP 24 is adhered to. When FAI requirements (partial or complete) are satisfied in this manner, identify the approved configuration in the index of part numbers on AS9102 Form 1.
- The requirements which drive a Partial/Delta FAI are contained in PAP 24.

4.0 FIRST ARTICLE INSPECTION EXAMPLE

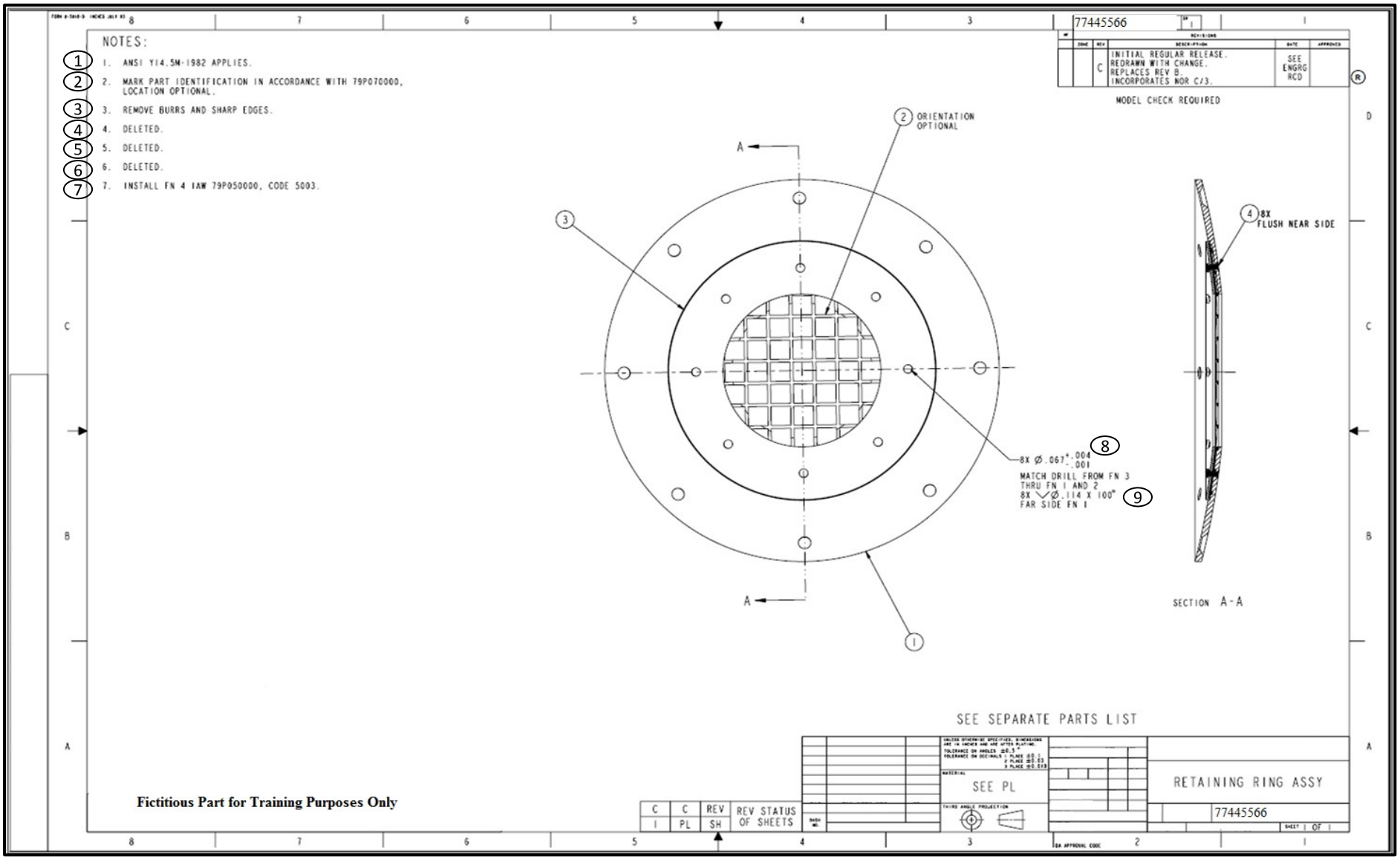
4.1 Ballooning an Engineering Drawing

While conducting the FAI a common technique called “ballooning” is used to identify each characteristic on the drawing; this establishes an organized method to capture objective evidence that each drawing requirement has been met. Ballooning helps ensure accuracy and completeness. It is highly recommended if a drawing of the accepted FAI is submitted as part of the officially documented FAI package. An alternate method to “ballooning” is to reference drawing sheet and zone location(s).

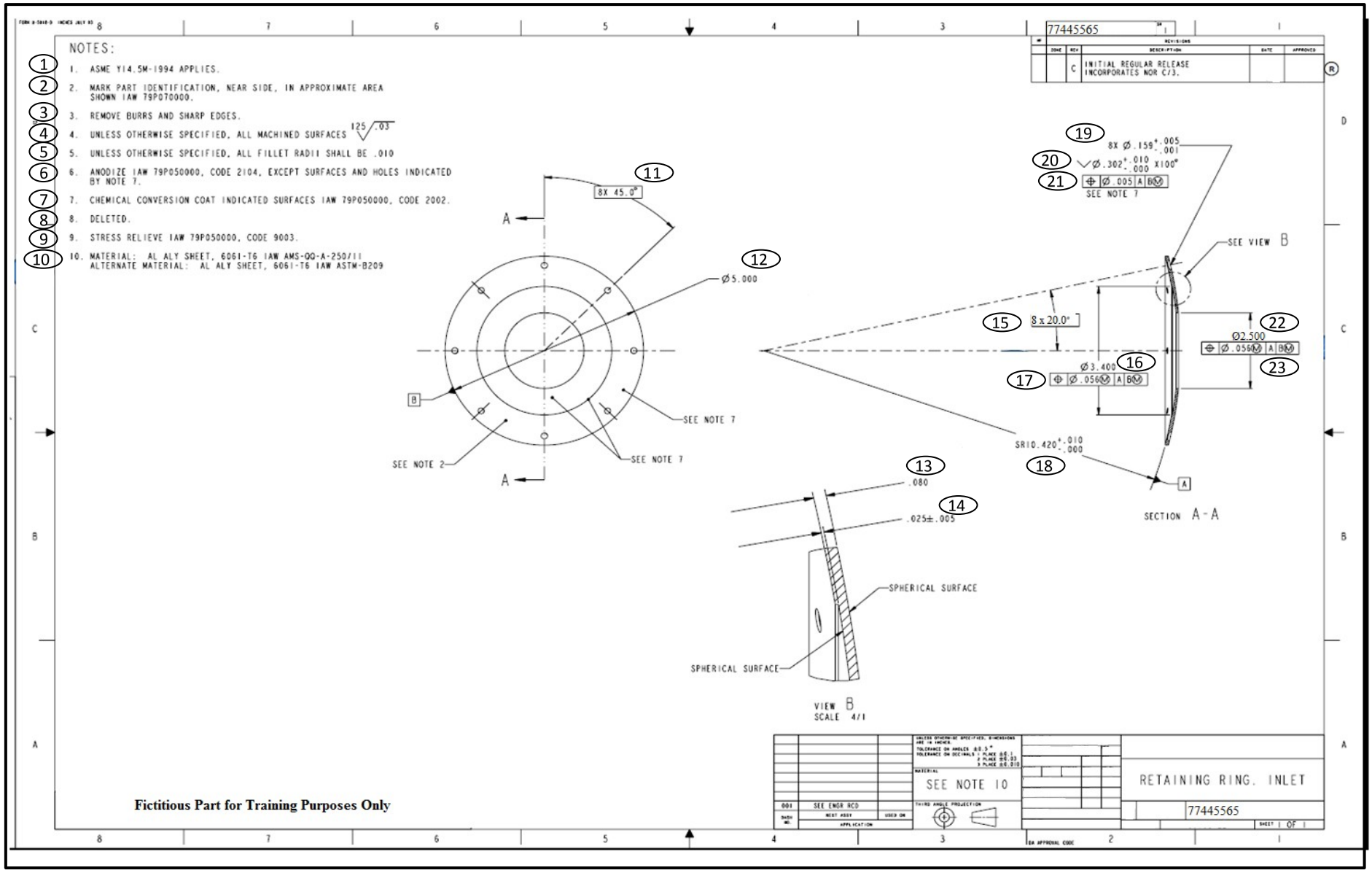
The example (below) highlights a top assembly drawing (with one sub-assembly), and illustrates how each required FAI form is filled out based on the example drawing requirements.

The example FAI contained herein will map from initial drawing ballooning all the way through completion of the FAI. The “balloons” in the example below are used to reference the item numbers listed on AS9102 Form 3 (Characteristic Accountability, Verification and Compatibility Evaluation).

4.1.1 Top Assembly



4.1.2 Sub-Assembly



4.2 FAI Form Examples

Each field in the forms below will be identified as:

- (R) Required: This is mandatory information
- (CR) Conditionally Required: This field must be completed when applicable.
- (O) Optional: This field is provided for convenience

NOTE: An asterisk "" before the field descriptions indicates an MEC requirement in addition to the AS9102 forms.*

4.2.1 AS9102 Form1 – MEC Form F-806

	First Article Inspection Report AS9102 Form 1 Part Number Accountability		
1. Part Number 77445566-001	2.Part Name Retainer Ring Assembly	3.Serial Number/Lot Number 1	4.FAI Report Number 12345-67
5. Part Revision Level Rev. C	6.Drawing Number 77445566	7. Drawing revision lewel Rev.C	8.AdditionalChanges N A
9. Manufacturing Process 1234	10_ Organization Name Supplier 123 Inc	11.Supplier Code MEC123	12.P.O. Number 41000000, Line Item 1
13. Detail FAI □ Assembly FAI □	14. Full FAI □ Partial FAI □	Baseline Part Number including revision level	
	Reason for Partial FAI:		

a) if above part number is a detail part only, go to Field 19
b) if above part number is an assembly, go to the "INDEX" section below.

INDEX of part numbers or sub-assembly numbers required to make the assembly noted above.

15. Part Number/Rev	16. Part Name	17. Part Serial Number/Lot Number	18.FAI Report Number
77445565-001 / B	*Retainer Ring*	*NIA*	*12345-89*

(Use additional sheets, as necessary)

19. Signature indicates that all characteristics are accounted for; meet drawing requirements or are properly documented for deposition. *NAME*	20. Date
21. Reviewed By (Quality Management or Designee) *NAME*	22. Date
Also indicate if the FAI status: □ FAI is complete □ FAI is not complete □ FAI rejected	
23. Marvin Engineering Supplier Quality Engineer Signature and Stamp (for procured items)	24. Date

4.2.2 MEC Expectation for Proper Form AS9102 Form 1 Completion

NOTE: An asterisk "" before the field descriptions indicates an MEC requirement in addition to the AS9102 forms.*

1. (R) Part Number: Enter the number of the part (FAI part).

2. (R) Part Name: Enter the name of the part as shown on the drawing.

3. (CR) Serial Number/*Lot Number: Enter the serial number/Lot number of the part.

4. (O) FAI Report Number: Enter the reference number that identifies the FAI. This may be an internal report number.

5. (CR) Part Revision Level: Enter the latest part revision that affects the part being first article inspected and include the parts list revision level as needed. If there is no revision, indicate as such.

NOTE: The latest drawing revision (Field 7) does not always affect all parts contained on a drawing.

6. (CR) Drawing Number: Enter the drawing number associated with the FAI part.

7. (CR) Drawing Revision Level: Enter the revision level of the engineering drawing. If there is no revision, indicate as such by inputting "-".

NOTE: Specify parts list revision level (if applicable) in addition to the drawing revision level

8. (CR) Additional Changes: Enter the reference number(s) of any changes that are incorporated in the product but not reflected in referenced drawing/part revision level (e.g., change in design, engineering changes, manufacturing changes, deviation or exclusion from certain drawing requirement, etc.).

9. (R) Manufacturing Work Order Number: Enter a reference number that provides traceability to the manufacturing record of the FAI part (e.g., router number, manufacturing plan number, etc.).

NOTE: Add the Manufacturing Work Order Number information as required.

10. (R) Organization Name: Enter the name of the organization performing this FAI and program name if available.

11. (O) Supplier Code: Enter the supplier code which is a unique number provided by MEC to the Supplier.

NOTE: It is sometimes referred to as a vendor code, vendor identification number, supplier number, etc.

12. (O) P.O. Number: Enter the Customer Purchase Order number/Item number, if applicable or required.

13. (R) Detail FAI or an Assembly FAI: Check as appropriate.

14. (R) Full FAI or Partial FAI: Check as appropriate.

NOTE: For a partial FAI, provide the baseline part number (including revision level) to which this partial FAI is performed and the reason for it. For example, changes in design, process, manufacturing location, etc.

*15. (CR) Part Number & *Revision: Enter the detail or next level sub-assembly part number (and its revision) to be included in the assembly.

NOTE: This entry is required only if the part number in field 1 is an assembly requiring lower level parts to be installed into the assembly.

16. (CR) Part Name: Enter the part name as shown on the drawing.

NOTE: This entry is required only if the part number in field 1 is an assembly requiring lower level parts to be installed into the assembly.

17. (CR) Part Serial Number/*Lot number: Enter the serial number (or lot number) of the part that is installed in the assembly, when applicable.

NOTE: This entry is required only if the part number in field 1 is an assembly requiring lower level parts to be installed into the assembly.

18. (O) FAI Report Number: Enter the FAI report number for detail part.

NOTE: This entry is required only if the part number in field 1 is an assembly requiring lower level parts to be installed into the assembly.

19. (R) Name and signature of the person who prepared FAI Form 1 (may be an electronic signature). The preparer may be the Supplier.

20. (R) Date of Preparation: Enter the date when this FAI Form 1 was prepared.

21. (O) Reviewed by: Enter the name of the person who approved the FAI report and check the appropriate FAI status box. This is usually the Quality Management or Designee.

22. (O) Date of Approval: Enter the date when the FAI report is approved.

23. (O) Reviewed By: Enter the name, signature, and/or stamp of the Marvin Quality Employee who reviewed the FAI report (required for procured items only).

24. (O) Date of Signature: Enter the date when the signature and/or stamp of the MEC Quality Employee has been provided (required for procured items only).

4.2.3 AS9102 Form2 – MEC Form F-807

	First Article Inspection Report AS9102 Form 2 Product Accountability- Raw Material, Specifications and Special Process(es),Functional Testing				
1. Part Number 77445566-001	2. Part Name Retainer Ring Assembly		*3. Serial Number/Lot Number*		4. FAI Report Number 12345-67
5. Material or Process Name	6. Specification Number/Revision	7. Process Code	8. Special Process Supplier Code	9.Customer Approval Verification (Yes/No/NA)	10. Certificate of Conformance Number
Rivet Solid CS 1000	MS20426/L	N/A	N/A	N/A	PO 98765
Sealant	MIL·PRF-23337770/B	N/A	N/A	N/A	PO 98765
11. Functional Test Procedure Number			*12. Acceptance report number, if applicable*		
13. Comments					
14. Prepared By *Name here*			15. Date Date here		

4.2.4 MEC Expectation for Proper AS9102 Form 2 Completion

NOTE: An asterisk "" before the field descriptions indicates an MEC requirement in addition to the AS9102 forms.*

1. (R) Part Number: Enter the number of the part (FAI part).

2. (R) Part Name: Enter the name of the part as shown on the drawing.

3. (CR) Part Serial Number/*Lot Number: Enter the serial number/lot number of the part.

4. (O) FAI Report Number: Enter the reference number that identifies the FAI. This may be an internal report number.

5. (CR) Material or Process: Enter the name of material or process.

NOTE: List material certifications and any special process referenced on the engineering drawing.

*6. (CR) Specification & *Revision Level: Enter all material and/or process specification numbers (include permitted alternates, if used), as listed on the engineering drawing and/or parts list and revision level.

7. (O) Process Code: Enter any required code from the Customer for material or process listing.

8. (CR) Special Process Supplier Code: Enter the Customer given Supplier code for the organization performing special process(es) or supplying material, as applicable.

9. (CR) Approval Verification: Indicate if the special process or material source is approved by the Customer. Write "NA" if Customer approval is not required.

10. (CR) Certificate of Conformance/*Compliance (Yes/No): Record the number of the certificate, if available. (e.g., special process completion certification, raw material test report number, Standard Catalog hardware compliance report number, traceability number, P.O. number, lot number, job number etc.).

11. (CR) Functional Test Procedure Number: Enter the Functional Test Procedure

12. (CR) Acceptance Report Number: Enter the functional test certification indicating that test requirements have been met.

13. (O) Comments: Enter and comments as applicable.

14. (R) Prepared By: Enter the name of the person who prepared this form.

15. (R) Date: Enter the date when this form was completed.

4.2.5 AS9102 Form 3 – MEC Form F-808

	First Article Report AS9102 Form 3 Characteristic Accountability, Verification and Compatibility Evaluation							
1. FAI Report Number: PO 123456			**2. Part Number:** R4656007-1		**3. Revision:** C		**4. Part Name:** Complex Faring	
5. Serial/Lot Number(s): 100			**6. Approved By:** Mr/Ms Inspector		**7. Approval Date:** 4/16/2013			
8. Char No.	**9. Reference Location**	**10. Characteristic Designator**	**11. Drawing Requirement**	**12. Results: Actuals & Number of Observations**	**13. Designed and Inspection Tool**	**14. Non-Conf. No.**	**15. Acc Stamp**	**16. Insp Date**
1	Note 1		Remove sharp edges	Accept			Ã	4/15/13
2	Note 2		Anodize IAW XYZ	Accept			Ã	4/15/3
3	Note 3		All Machine finishes 63	Surface finish **32**			Ã	4/15/13
4	Note 4		Paint per W-XYZ-Spec	**NA** - Not performed by this supplier.				
5	Note 5		AL Sheet 6061 T6 IAW QQ-A-XYZ	Accept			Ã	4/15/3
6	Sht1 Zn2B		45° x 8	44.7°-45.3° **(x8)**			Ã	4/15/3
7	Sht1 Zn4D	Critical/Key	5.250 +/- .0005 8 plc	5.2498-5.2502 **(x8)**	ID Micrometer #m8736		Ã	4/15/13
8	Sht1 Zn3C		TP .005/A/B/C	.004	CMM Program #2343f		Ã	4/15/13
9	Sht1 Zn3C	Critical/Key	3.0000 +/- .0005	3.0003	Supper Mic. #sm7		Ã	4/15/13
10	Sht2 Zn2D		.060 (+.004/-.001) 6 plc typ	.0595-.0625 **(x6)**			Ã	4/15/13
11	Sht2 Zn2C		6.000 +/- .030	6.01			Ã	4/15/13
12	Sht2 Zn2D		.250 +/- .005 10 plc	.245-.255 **(x10)**			Ã	4/15/13
Use additional sheets as necessary.								
Prepared by:					Date:			

4.2.6 MEC Expectation for Proper AS9102 Form 3 Completion

NOTE: An asterisk "" before the field descriptions indicates an MEC requirement in addition to the AS9102 forms. (O)=Optional; (R)=Required; (CR)=Conditionally Required*

1. (O) FAI Report Number: Reference number that identifies the FAI. This may be an internal report number.

2. (R) Part Number: Enter the number of the part (FAI part).

3. (R) Revision: Enter the part revision.

4. (R) Part Name: Enter the name of the part as shown on the drawing.

5. (CR) Part Serial Number/*Lot Number: Enter the serial number/lot number of part.

6. (R) Approved by: Enter the name of the person that reviewed and approved the FAI. This is usually a Quality department supervisor.

7. (R) Approval Date: Enter the approval date.

8. (R) Char No: Enter the unique assigned number for each Design Characteristic. These should correlate with any ballooned features on the ballooned drawings.

9. (CR) Reference Location: Enter the location of the Design Characteristic (e.g., drawing zone (page number and section), specification, etc.).

NOTE: If drawing is not ballooned, reference locations are required

10. (CR) Characteristic Designator: If applicable, enter the characteristic type (e.g., key characteristic, Critical Safety Item (CSI), critical, major, etc.)

11. (R) Drawing Requirement: Enter the specified requirement for the Design Characteristic (e.g., drawing dimensional characteristics with nominal and tolerances included, drawing notes, specification requirements, etc.).

*12. (R) Results: Actuals & Number of Observations - Enter measurement(s) obtained for the Design Characteristics. For marking, document actual part marking in Results field.

NOTE: For Multiple Characteristics, list each characteristic as an individual value or list with the minimum and maximum of measured values attained. If the "Drawing Requirement" stated multiple features (example: x8, 16pls, 6 pls typ, etc.) then the results shall also so this value as ((x8), (x16), (x6), etc.) after the range. If a characteristic is found to be non-conforming then the results for that characteristic must be listed individually with the measured value(s).

If a Design Requirement requires verification testing, then the actual results shall be recorded on the form. If a laboratory report or certificate of test is included in the FAI, then these results need not be written on the form, record the reference number in this field. The laboratory report or certificate of test must show specific values for requirements and actual results. Attach copies of reports or certificate, as applicable.

For metallurgical characteristics with visual verification requirements that are rated against standard photographs, list the photo number of the closest comparison. A statement of conformance is acceptable (record the reference number in this field).

For processes that require verification per Design Characteristic, include statement of compliance (e.g., certification of compliance, verification indicator such as "accept," etc.).

For part marking, ensure that marking is legible, correct in content and size and properly located, per applicable specification.

*13. (CR) Designed Tooling: If a specially designed tool (including Numerical Control (N/C) programming) is used as a media of inspection, enter the tool/N/C identification number and revision level. If the line time is a key characteristic, Critical Safety Item (CSI), critical, major, etc., then enter the tool type and calibration number used to inspect that feature.

14. (CR) Non-Conformance Number: Record a non-conformance document reference number if the characteristic is found to be non-conforming.

NOTE: Any non-conformances must be dispositioned and closed out. Supporting documents should be added to FAI package to confirm this. If this is a Marvin Engineering part number, MRB authority must be granted by Marvin Engineering.

15. (O) Accept Stamp: Enter the identification of the inspector who performs inspection on listed characteristic. This should be an inspector's stamp, but inspector's initials can be used if the inspector has not stamp.

16. (O) Date of Inspection: Enter the date inspection is performed.

17. (R) Prepared By: Enter the name of the person who prepared this form.

18. (R) Date: Enter the date when this form was completed.

5.0 COMMON ERRORS WHICH CAUSE FAI REJECTION

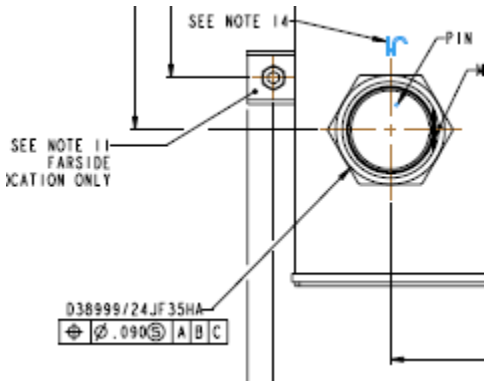
5.1 Common mistakes found in submitted FAI packages.

- Typos – incorrect data (revisions, numbers, values, etc.) are one of the most numerous causes for FAI rejections.

- Missing or hidden requirements for Detailed Commercial Off the shelf “COTS” Parts where dimensions are not included on the assembly drawing.

    - When required, requirements for detail parts/hardware installation must comply with the document specified. In this example, D38999 requires a hole for the installation of the connector to the assembly. The dimensions are located in the D38999 spec and not the drawing.

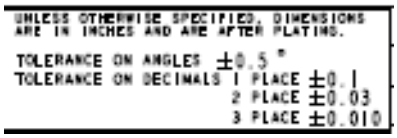
    - These dimensions shall be included in the FAI package.



- Example: MIL-DTL-38999 has the requirements for the hole size for the connector illustrated as well as torque requirements.
- All Dimensions and/or notes not accounted for.
    - Any notes that contain a dimension shall have a physical measurement recorded. The use of “accept” or “OK” is not permitted.
- Incorrect or missing special process flow down requirements such as.
    - Special process supplier shall be MEC approved per purchase order requirements.

    - Supplier shall be certified to build to RDD (Reduced Dimension Drawing) per purchase order requirements.
- Incorrect tolerances assigned to dimension resulting in part non-conformance.
    - Standard dimension tolerances such as .100 (three place decimal meaning +/- .010) are found in the tolerance block located in the lower right part of the drawing as shown below.

- Basic dimensions are normally defined as a dimension surrounded by a box as shown below
  .



  - Tolerances assigned to this dimension are defined by the Feature Control Frame associated with the Basic Dimension. The Geometric Symbol associated with the Feature Control Frame could be True Position, Profile, Flatness, etc.

- Incorrect Raw material/adhesives information provided.
  - Shelf life shall not be expired; appropriate adhesive shall be used on labels, etc.
  - Raw Material required to be indicated on form MEC-0293/AS9102 Form 2.
- Parts for an assembly identified on the wrong form.
  - Parts for an assembly are required to be indicated on form MEC-0292/AS9102 Form 1.
- Incorrect revision level.
  - Ensure PO revision matches released engineering specified for item(s) on FAI report.
  - Verify the required revision of MEC specifications, like 79P050000, by using the link provided on the PO or by contacting the MEC Buyer. Indicate all revision levels in block 6 of MEC-0293/AS9102 Form 2.
  - Ensure through MEC Procurement that you are working to the latest released engineering.
  - NOTE: There are many types of drawings and release processes. Most drawings will have an “Official Engineering Release” symbol normally at the top right of the first page of the drawing indicating released. If this does not appear, check with MEC Procurement.
  - Special Process certifications should be to the latest revision. This is a standard PO Note for all PO’s (TCR838 Note).
- Incorrect inspection equipment used or not noted on FAI report.
  - When inspection equipment is listed, ensure that inspection equipment has sufficient measurement accuracy for requirements being measured.
- Wrong part number identified on FAI form(s).
  - There shall be no typographical errors, missing dash numbers, and/or designators such as Q1, D1,TPSS
  - Example: If the purchase order requires P/N 7979797-003 Q1 the FAI form shall read the full P/N: 7979797-003 Q1
- Missing Certificates of Conformance, test reports, and FAI forms as part of the FAI

package.

- Ensure there is no Missing/Incomplete sub-tier supplier data such as:
  - Improper material alloy listed
  - Incorrect special process used
  - Incorrect specification revision levels listed
- Ensure supplier equivalent forms meet the MEC/AS9102 form requirements.
- Ensure all forms (including Form MEC-0295) are provided in the FAI package.

- FAI form(s) not signed/approved by appropriate representative and/or dated.
  - Form(s) MEC-0293 & MEC -0294 should be signed by the preparer of the FAI.
- Incomplete recording of “multiple actuals.”
  - A feature that is required multiple times requires recording multiple actuals.
    - Example: FIN #6 has to be installed in 12 places (need to indicate 12 places or measurements as defined by engineering). This can include a range with max/min indicated followed by (x12).

6.0 FREQUENTLY ASKED QUESTIONS

The items listed below describe and answer FAQs concerning Supplier First Article Inspection.

6.1 Q. What forms are required for a partial / delta First Article Inspection?
A. Forms 1 through 3 are required for all First Article Inspections. Complete only the affected fields for the characteristics that need to be revalidated.

6.2 Q. Do drawing notes that contain dimensions need to have a measurement recorded?
A. Yes. All dimensions shall have a measurement, tolerance and inspection method recorded.

6.3 Q. Do requirements for COTS items not included on the assembly drawing need to be included?
A. Yes. When details for part / hardware installation are contained within that specification and produced on our assembly the dimensions shall be included.

6.4 Q. Will use of unapproved Marvin Engineering Special Processors cause my First Article to be rejected?
A. Yes. This is also considered a part nonconformance.

6.5 Q. Why would equipment or instrument recorded under designed tooling be rejected?
A. The MEC quality representative reviewing the First Article does not have confidence a valid, repeatable and reproducible measurement is obtainable.

6.6 Q. What are the most common documentation errors that cause a First Article Inspection Report to Fail?
A. Typo errors: (inverted numbers and tolerances, etc);
A. Part numbers and subassembly parts missing (form 1);
A. Incorrect revision level (form 1);
A. Missing specification revision (form 2);
A. MEC Form (First Article Inspection: Product/Process Verification Checklist) missing;
A. Visual inspection method used for a dimension (form 3);
A. Special process hierarchy not complete (form 2);
A. Special process supplier code & Supplier missing (form 2)

6.7 Q. When a feature indicates multiple places are measurements required for each place?
A. Yes. A feature that is required multiple times requires multiple actual or a min/max range followed by the number of times it was measured . . . ex. (x12).

6.8 Q. If material certifications, test reports are not included will my first article be rejected?
A. Yes. All documentation is required for objective evidence to demonstrate the First Article meets requirements.

6.9 Q. Can I develop my own acceptance tooling for use without Marvin Engineering approval?

A. No. All supplier self-developed acceptance tooling must be approved by Marvin Engineering

6.10 Q. What is the best process to ensure a measurement process will produce repeatable and reproducible results?

A. A Gage Repeatability and Reproducibility study.

6.11 Q. What if I have additional questions concerning the completion of a First Article Inspection?

A. Questions can be directed to Marvin Engineering Procurement or Supplier Quality Departments.

7.0 DEFINITIONS

Approved FAI

Documented approval from MEC Quality Control Inspection representative. MEC approval is required to ship material unless otherwise directed by MEC Buyer.

Ballooning

This technique establishes an organized method to capture objective evidence that each drawing requirement is met. Ballooning is recommended to ensure accuracy and completeness. It is preferred if a ballooned drawing of the accepted FAI is submitted as part of the officially documented FAI package.

Certificates of Conformance (C of C)

The Contractor shall submit with each shipment, a Certificate of Conformance which shall be dated and bear the signature, electronic equivalent, or electronically generated title of an authorized contractor's Representative, stating that the materials furnished to Marvin Engineering are in conformance with applicable requirements of the Contract, drawings, and specifications, and that supporting documentation is on file and will be made available to Marvin Engineering or Government Representatives upon request. Certification shall include name of contractor of materials being supplied, quantity shipped, and Contract number.

An example of an acceptable statement of Certification of Conformance is as follows: "This is to certify that all items noted are in conformance with the Contract, drawings, specification and other applicable documentation, that all process certifications, chemical and physical test reports, are on file at this facility and are available for review by Marvin Engineering."

Change Control

Formal process used to ensure that changes to a product or system are introduced in a controlled and coordinated manner throughout the life cycle. This includes flowing the change through the appropriate channels within Marvin Engineering before incorporation.

Corrective Action

Action(s) to eliminate the cause(s) of a detected nonconformity or other undesirable situation in order to prevent recurrence. The extent of corrective actions shall be proportional to the effects of related nonconformities. The FAI is not complete until the organization closes all non-conformances affecting the part and implements corrective actions. The organization shall re-do an FAI for those affected characteristics and shall record the results.

Equivalent Form

Interchangeable AS9102 or company specific forms that include the additional requirements (“9” requirements) from MEC FAI forms F-806, F-807, F-808.

First Article Inspection:

A procedure that provides objective evidence that all engineering, design and specification requirements are correctly understood, accounted for, verified, recorded, and that the combination of material, tooling, processes, documentation and personnel is capable of producing compliant hardware. FAI includes the manufacturing/inspection planning, manufacturing processes, tooling and software, (Numerical Control (N/C) tapes and Coordinate Measuring machine programs), test, inspection methods and equipment used in the fabrication of products.

FAI Plan

A documented plan for the company's FAI procedure. Preparation requires gathering all source documents including: Contract requirements (Purchase Order), Ballooned engineering drawings, specifications referenced in drawings, embedded or layered specifications, raw material certifications, Capability Maturity Model data, planning/shop routers, documentation validating integrity, production processes (i.e., soldering, plating, heat treating, etc.)

FAI Rejection

First Article Inspection Reports where nonconformance/s are identified shall have the status of Rejected. Nonconforming product shall not be delivered to the Buyer without required Material Review Board approval (Buyer approved Waiver or other document). The FAI shall remain in a rejected status until the corrective actions associated with nonconformance have been completed, a subsequent build has been accomplished and an acceptable Delta FAI has been completed. Any non- conformances must be dispositioned and closed out per internal requirements (i.e. MRB, RC/CA, etc.). Supporting documents should be added to the FAI package.

Manufacturing Suffix Part Number

A part number with a qualifier at the end (such as Q1, D1, TPSS). Part numbers with a manufacturing suffix have additional documentation indicating the part will deviate from engineering in some way. Ensure the technical data or engineering package received includes the required documentation. Contact the buyer if the documentation is missing.

Reduced Dimension Drawing (RDD)

Drawings that do not contain all the information required to fabricate and inspect the part, but must be used in conjunction with the computer-generated model file.

Source Inspection

MEC supplier quality reserves the right to perform in- process inspection, in-process surveillance and/or audits at any time during the life of the purchase order. Parts, assemblies, processes and tests are subject to detailed inspection by the MEC quality representative prior

to assembly, test and/or delivery when required. Such inspections, tests and mandatory inspection points (MIPs) shall be identified during the purchase order review process, and failure to comply with agreed upon MIPs with MEC supplier quality shall be cause for rejection of completed end items.

Special Process

A documented method used to manufacture products where a product undergoes a physical, chemical or metallurgical transformation where conformance to the specification cannot be readily verified by normal inspection methods, and the quality of the product depends on use of specific equipment operated in a specific manner, under controlled conditions, by trained personnel with instructions, procedures and standards. All special processes must be performed at a MEC approved supplier.

Sub-tier

Any and all suppliers that the contracted supplier uses for products and/or services.

Variables Data

Quantitative measurements taken on a continuous scale.
For example, the diameter of a cylinder or the gap between mating parts.