

TEXTRON Systems

AAI CORPORATION dba TEXTRON SYSTEMS

Critical Safety Item (CSI) Program Activities

QA-SP65 Rev. E

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1.1 *Definitions and Acronyms*

Buyer	Textron Systems
Critical Safety Item (CSI)	Any part, or assembly containing a critical safety characteristic whose failure, malfunction, or absence could cause loss of or serious damage to the TUAS.
Critical Characteristic (CC)	Any feature, such as dimension, material, function, assembly, installation, manufacturing or inspection process, which if nonconforming, missing or degraded could cause the failure or malfunction of the CSI throughout its life.
Control Plan (CP)	Formal document identifying the CCs of the CSI and the specific control methodology associated with them.
Customer	US Army Tactical Unmanned Aircraft System (TUAS) Project Management Office.
Program IPT	Integrated Process Team which consists of engineering technical leads, quality assurance, Program Management Office (PMO), and Supplier representative(s).
Supplier	Company supplying the CSI item(s)

ACRONYMS

AQL	Acceptable Quality Level
ATP	Acceptance Test Procedures
CM	Configuration Management
COTS	Commercial Off The Shelf
FAI	First Article Inspection
FMECA	Failure Modes Effect Criticality Analysis
GR&R	Gage Repeatability and Reproducibility
IPT	Integrated Process Team
PCA	Physical Configuration Audit
PO	Project Office
QA	Quality Assurance
TUAS	Tactical Unmanned Aircraft System
ROR	Repair of Repairables
OSP	Outside Supplier Processing

1.2 Purpose

The purpose of this guide is to identify the requirements Textron Systems suppliers of critical safety items (CSIs) are expected to comply with. This guide will be flowed down to the Supplier via the Textron Systems purchase order.

1.3 Scope

This document applies to items identified as a critical safety item by Textron Systems.

Software is excluded from the CSI effort.

The Supplier shall provide assistance in identifying the critical characteristics (CCs) of the final assembly and subcomponents and preparation of control plans (CPs) using Textron Systems Form M-741 (see Attachment 2) through the use of engineering drawings and associated manufacturing documentation. Identification of the CCs shall be focused upon the failure modes that can result in the loss or damage of the UAS. Both Supplier and Buyer shall agree upon the failure modes and associated CCs. This effort shall require the input of engineering, manufacturing and quality assurance personnel from both the Buying and Supplying organizations and shall result in a mutually agreeable CP that shall be implemented into the production of Buyer-purchased products. Implementation requirements shall be incorporated into applicable purchasing documentation via purchase order note(s).

Where a subcomponent of a purchased assembly is determined to be a CSI, the Supplier shall make its best efforts to flow down the CSI requirements to Sub-tier Suppliers as described in Attachment 1. The Supplier, along with the Buyer and its Customers, shall participate in discussions with those Sub-Tier Suppliers to determine the CCs and preparation of CPs using Textron Systems Form M-741, as applicable, through the use of the applicable drawings and associated manufacturing documentation. The Supplier may incorporate Textron Systems Form M-741 into its own documentation system. The Program IPT and Supplier have the final decision on where the flow-down requirement shall cease. In the event that a Sub-Tier Supplier does not cooperate, the Program IPT and Supplier shall meet to discuss a resolution or alternative action.

During Level 4 activities, should they be warranted, a First Article Inspection (FAI) and/or Physical Configuration Audit (PCA) may be required. Upon completion of the PCA, the baseline configuration shall be established, and changes shall require Buyer's written approval as described in this document. The requirement for FAI and/or PCA shall be determined by the Program IPT and the Supplier during development programs.

After implementation of a CP, the part(s) enters sustainment and Textron Systems Supplier Quality Engineering and the Seller shall jointly establish a schedule for monitoring compliance to the CP. Any change to a CSI item in part or process shall be communicated to the Buyer through Textron Systems Subcontracts using Textron Systems Item Change Request Form (see Attachment 3).

Suppliers shall not make any changes to CSI parts or control plans without prior written approval from Textron Systems.

Similarly, during sustainment should a delta FAI or PCA be needed (rationale for delta FAI and PCA is given in sections 1.9 and 1.10) this will be coordinated through Textron Systems Configuration Management and Textron Systems Subcontracts.

1.4 *CSI Process Description*

The CSI Program is broken down into four levels ranging from 1 to 4 (see Attachment 1). Each item is required to begin at the Level 1 (one) review and progresses on to the next level if the review indicates additional controls are needed beyond the current level being evaluated. If no additional controls are needed, the part is assigned to that level for action and maintenance. The Buyer shall notify the Supplier of the Level assignment for the applicable parts.

Upon completion of level activities, a part enters sustainment. The qualified part and/or qualified suppliers shall be added to a qualified parts and suppliers list that shall be maintained by the Buyer.

CSI Level requirements and criteria for moving between the levels are provided in Attachment 1.

1.5 *Reference Documents / Order of Precedence*

The following documents are in effect and form an integral part of this document to the extent specified herein. In the event of a conflict between the documents listed herein, the following order of precedence shall be:

Purchasing Documentation for this effort;

1. Textron Systems Control Plan Form M-741
2. Purchase Order Attachments

Note: The control plan must always be followed as written, unless explicitly addressed and defined by the PO. Also, see direction in section 1.6 below regarding “ROR” and “OSP” activities.

REQUIREMENTS

1.6 *Data Gathering and Control Plan Creation*

Data Gathering and Control Plan Creation activities are conducted on Level 3 and 4 assemblies, subassemblies and detail parts (see Attachment 1).

Program IPT personnel shall meet with suppliers and sub-tier suppliers via telecom or site visit for data gathering purposes, as required.

Data collection and discussion shall include the following:

- Buyer documentation submitted to the Supplier

- Supplier and/or Buyer drawings
- Supplier’s flow-down documentation to both internal manufacturing and test activities and suppliers
- Supplier’s manufacturing and configuration control processes
- Sub-tier supplier’s facilities, processes and documentation as deemed necessary by the Program IPT
- Quality documentation for process and product yields and material review activities
- Engineering design review information, as applicable
- Identification of the critical characteristics for the CSI
- Preparation of the CSI Control Plans
- Identification of measurement method of critical characteristics
- Identification of required minimum measurement accuracy of critical characteristics

Note: measurement methods should be capable of meeting or exceeding a 4:1 accuracy ratio or better, for the characteristic being measured. Example: when measuring a dimension with a tolerance of +/- .002”, the measuring equipment should be accurate to +/- .0005” or better. Exceptions shall require sufficient justification and/or testing, to be approved by Textron Systems. Performance of a gauge reliability and repeatability (GR&R) experiment is one possible method.

This data shall be used to evaluate the effectiveness of process and product control in compliance with the Buyer’s CSI Program.

CSI items re-submitted to a Supplier with item attributes of an “ROR-“ (Repair of Repairables) or “OSP-“ (Outside Supplier Processing) suffix shall use the item Control Plan in its entirety for assemblies, subassemblies and detail parts.

An alternative Control Plan is not acceptable for “ROR-“ or “OSP-“ activities. If the existing Control Plan is not sufficient, the supplier shall submit, in coordination with the Program IPT, a revised Control Plan inclusive of specifying applicable sections for “ROR-“ or “OSP-“ activities.

1.7 Configuration Management (CM)

Configuration Management activities are applicable to all assemblies, subassemblies and detail parts (see Attachment 1).

The Supplier shall maintain a configuration management program, following Industry Standards or MIL-HDBK-61A for guidance. The Supplier shall perform CM tasks pertaining to the delivery of the production parts or products that complies with ISO 9001, AS9100 or an equivalent system approved by the Buyer. The Supplier shall be responsible for validating and maintaining the configuration documentation through the entire term of the contract. The Supplier shall be required to obtain Buyer’s written approval of any configuration changes that impact form, fit or function for the parts or products prior to the delivery of a product(s).

1.8 *Configuration Control*

The Supplier shall maintain a configuration baseline for all documentation, drawings, data sheets, software, test setup, and procedures associated with the design and development of the parts or products. The Supplier shall implement formal configuration management procedures which shall be made available for the Buyer's review at the Supplier's facility.

1.9 *Physical Configuration Audit (PCA)*

Physical configuration audits shall be conducted as required for Level 3 and Level 4 assemblies, sub-assemblies and detail parts, including castings and forgings (see Attachment 1).

A PCA is performed in order to validate a configuration against the documentation that defines its physical characteristics and to verify that all hardware is properly documented with the documentation meeting the governing standards. Configuration audits are used for the validation of baseline identification documentation and to rectify any discrepancies found between the documentation and the system or equipment. This activity validates the hardware with the drawings to define the physical portion of the system.

The Buyer will prepare a Configuration Audit Agenda, Plans and Audit Minutes. Audits will be conducted at the Supplier's facility or at a sub-tier supplier's facility as deemed appropriate by the cognizant supplier and prior to acceptance of the system. The Customer shall be invited to participate in the PCA. PCA records include the audit minutes, discrepancy reports, certification sheets and other data as required.

The requirement for PCA shall continue to apply even after initial compliance. The requirement may be satisfied by a full or partial PCA that addresses differences between the current configuration and prior approved configurations, when any of the following events occur. This list is not inclusive.

1. A change in design affecting fit, form or function of the part.
2. A change in manufacturing source(s), process(es), location of manufacture, tooling or material, that can potentially affect fit, form or function.

1.10 *First Article Inspection (FAI)*

A First Article Inspection shall be conducted as required on Level 3 and Level 4 assemblies, sub-assemblies and detail parts, including casting and forgings (see Attachment 1).

Evaluation activities shall include any or all of the following:

1. Review of documentation for the manufacturing process (e.g., routing sheets, manufacturing/quality plans, manufacturing work instructions, etc.).
2. Review of referenced exhibits supporting the FAI (e.g., inspection data, test data, Acceptance Test Procedures, etc.).
3. Review of nonconformance documentation (if any).
4. Review of material certifications for compliance, as applicable.
5. Verification that approved Special Process sources are used (as applicable), and that the manufacturing planning/routing document calls out the correct specification.

6. Verification that CC requirements have been met, as applicable.
7. Verification that part specific gages and/or tooling are qualified and traceable, as applicable.
8. Verification that every design characteristic requirement is accounted for, uniquely identified and has inspection results traceable to each unique identifier.

The requirement for FAI shall continue to apply even after initial compliance. The requirement may be satisfied by a full or partial FAI that addresses differences between the current configuration and prior approved configurations, when any of the following events occur. This list is not inclusive.

1. A change in design 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 material, 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.

ATTACHMENT 1

CSI Level	Requirements	Criteria For Advancement To Next Level Of Control
1	<ul style="list-style-type: none"> • Review and document the field failure data for the item • Review and document the part history for relation to previous incidents • Review and document in-house failure data for the item • Identify and review the current controls (e.g. supplier surveys, FATs, PCAs, Inspection plans, test procedures, engineering documents) for the item and modify if there are gaps identified by the items historical data captured above or input from CSI IPT • Identify and review the current purchasing method (COTS contractor/PN, etc.) for the item and modifying if there is a gap identified by the item's historical data captured or input from CSI IPT • Review FMECA information for the effects of a part failure and the likelihood of occurrence. • Part must be bought from contractor-approved suppliers or be manufactured by the contractor. 	<p>Mandatory</p> <ul style="list-style-type: none"> • Has been identified as a root or contributing cause of an incident • Failure data indicates presence of adverse patterns. <p>Considered</p> <ul style="list-style-type: none"> • Contractor needs to manage and/or control the configuration and design of the item • Need for additional traceability/serialization exist • Failure/Performance data indicates decreasing performance. Additional data needed to confirm. • Any changes in production/supply chain
2	<ul style="list-style-type: none"> • Identification of Critical Failure modes, from FMECA, for the item and correlation with the acceptance criteria of the item at an existing level of control • Collect data relating to the identified failure modes so that trending of identified failures can be performed and analyze for input into future actions. If inspection and testing is done ensure parametric values are captured and retained as part of the records for the item. 	<p>Mandatory</p> <ul style="list-style-type: none"> • Has been identified as the root cause of an incident or as a contributing cause in more than one incident • Failure data indicates presence of adverse patterns. <p>Considered</p> <ul style="list-style-type: none"> • Contractor needs to and be capable of managing and controlling the configuration and design of the item • Need for additional traceability/serialization exist • Failure/Performance data indicates decreasing performance. Additional data needed to confirm. (Inspection/surveys) • Any changes in production/supply chain • Characteristics related to failure not adequately identified in existing documentation
3	<ul style="list-style-type: none"> • Revise or create a source control or specification control drawing per contractor templates and procedures that define the critical characteristics. • Communicate and identify critical characteristics to suppliers and assure their understanding and 	<p>Mandatory</p> <ul style="list-style-type: none"> • Has been identified as the root cause of an incident or as a contributing cause in more than one incident

CSI Level	Requirements	Criteria For Advancement To Next Level Of Control
	<p>compliance to requirements and classification as a critical safety item. This shall be accomplished by identification of CSI classification on contractor drawings and/or Purchase Orders</p> <ul style="list-style-type: none"> • All critical characteristics, which can be nondestructively inspected/tested, shall be subjected to 100 percent inspection or sampling of 0.10 AQL Level by the contractor or subcontractor when the subcontractor's sampling inspection processes have been reviewed, approved and such actions documented by the contract. Critical characteristics, which require destructive testing, are to be tested on a lot or batch basis to a contractor approved sampling plan, with no skip lots allowed. Inspection records shall identify the CSI part number (P/N), serial number and characteristic inspected. Critical characteristics shall be identified on the inspection records in such a manner as to draw attention to them. • Review Critical characteristic limits for any needed changes relating to the utilization of the part. • Perform supplier surveys/audits, conduct First Article Tests, and conduct Physical Configuration Audits as deemed necessary by the IPT. • Supplier must be required to notify contractor of any changes to the item 	<ul style="list-style-type: none"> • Failure data indicates presence of adverse patterns. <p>Considered</p> <ul style="list-style-type: none"> • Contractor needs to and be capable of managing and controlling the configuration and design of the item • Need for additional traceability/serialization exist • Failure/Performance data indicates decreasing performance. • Any changes in production/supply chain • Characteristics related to failure not adequately identified in existing documentation • Linkage between measured critical characteristic and manufacturing process needs to be defined • Supplier non responsive or does not have adequate controls in place
4	<ul style="list-style-type: none"> • The item should be purchased to a contract assigned part number. If that is not possible, then the PO shall link the requirements from other relevant contractor documents (specifications, reports, etc.) as additional requirements for the item. • Contractor and supplier should have a control plan in place to monitor the critical characteristics of the item. (Reference Attachment 2 for example of control plan) • Supplier must be required to notify contractor of any changes to the item • Inspection records shall reflect the exact readings or dimensions, date of inspection, identity of inspector, and any required inspection certification as per inspection plan. These requirements are in addition to other contractual requirements. • Implement a documented process that details the actions and responsibilities for continuous dialog between the contractor and CSI supplier for maintenance of configuration control and obsolescence planning • Perform supplier surveys, First Article Test, Physical Configuration Audits as deemed necessary by the IPT • Items must be serialized 	

ATTACHMENT 2

Part Number: (One P/N per control plan)		CSI CONTROL PLAN Any changes to control plans must be approved prior to implementation				Control Plan Number:			
Part Object Rev (e.g., 001, 002, ...):						Control Plan Revision/Date:			
Part Description:						Supplier Approval / Date:			
Supplier:						AAI Engineering Approval / Date:			
Supplier Contact:						AAI QA Approval / Date:			
		Customer Approval / Date:							
Characteristics		Mfg Tools/Machines	Characteristic Classification	Methods				Reaction Plan	
Product	Process			Product/Process Specification/Tolerance	Evaluation/Measurement Technique/Accuracy	Sample			Control Method
						Size	Frequency		

EXAMPLE



AAI Item Change Request

THIS FORM SHALL BE USED TO REQUEST ANY DESIGN, PROCESS, OR OTHER CHANGE TO A CSI ITEM OR CORRESPONDING CONTROL PLAN, AND DESIGN CHANGES TO ANY OTHER AAI-DESIGNED ITEM PROVIDED TO AAI BY A SUPPLIER. PLEASE NOTE THAT ALL SECTIONS MUST BE COMPLETED OR ANNOTATED "N/A". IF SUPPORTING DOCUMENTATION IS AVAILABLE AT TIME OF REQUEST PLEASE ATTACH AND SUBMIT.

Change Request		
Company Name: <input style="width: 100%;" type="text"/>		
Requestor: <input style="width: 90%;" type="text"/>	Date of Request: <input style="width: 90%;" type="text"/>	
Part Number Affected: <input style="width: 90%;" type="text"/>	CSI Item: Yes <input type="checkbox"/> No <input type="checkbox"/>	Control Plan Number Affected (CSI Items Only): <input style="width: 90%;" type="text"/>
Change Request Justification: <input style="width: 90%;" type="text"/>		
Description of requested change (Proposed Action): <input style="width: 90%;" type="text"/>		
Design (Form, Fit, Function, etc) or Process Change: <input style="width: 90%;" type="text"/>		
Affect on current production (if yes explain): Yes <input type="checkbox"/> No <input type="checkbox"/> <input style="width: 50px;" type="text"/>		
Supporting documentation attached: Yes <input type="checkbox"/> No <input type="checkbox"/>		
Requestor Approval Authority (Signature/Title): <input style="width: 90%;" type="text"/>		
SUPPLIER: SUBMIT TO BUYER AND SUPPLIER QUALITY ENGINEER. AAI MANUFACTURING: SUBMIT TO ARMS PROJECT ENGINEERING MRB REP OR ALTERNATE		
To Be Completed by AAI Arms Engineering MRB Delegate or Alternate SUBMIT TO FUNCTIONAL ENGINEERING GROUP FOR ANALYSIS AND ACTION PER QAPG-QE63.		
NC Number: <input style="width: 90%;" type="text"/>		
Item Change Request Approve/Reject: Approve <input type="checkbox"/> Reject <input type="checkbox"/>		
Rejection Justification: <input style="width: 90%;" type="text"/>		
Item Change Request Approval (Print, Sign, and Date)		
AAI Project Engineering <input style="width: 90%;" type="text"/>	AAI Quality <input style="width: 90%;" type="text"/>	

RETURN TO QUALITY ADMINISTRATION AFTER COMPLETION

Change History			
Version	Date	Author	Description
-	11/1/11	M. Nussbaum	Initial Release. Derived from R38767-00009
A	1/31/2012	S. Preller	Sect 1.6: Included "Identification of measurement method of critical characteristics (See Appendix A)"; Included GR&R to Acronym list; Included Appendix A; Updated Example Control Plan.
B	4/19/13	M. Nussbaum	Sect 1.6: Include "OSP-" and "ROR-" Control Plan requirements; Acronyms: Include "OSP" and "ROR"; Corrected Control Plan form reference as M-741, updated form example. NOTE: rev B never released to supplier base
C	01/06/14	M. Nussbaum	Consolidate revs A and B
D	09/23/14	M. Nussbaum	Deleted Appendix A, updated measurement methods instructions, sect. 1.6. Updated image of Item Change Request form. Moved acronyms to beginning of document.
E	4/2/18	J. Houk	Update AAI references to Textron Systems. Updated image of Item Change Request.