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<p>| Document Security Level | Company Confidential – Contains information, including, but not limited to, methods techniques or processes that derive independent economic value. Approved for internal and ES&amp;S authorized VSTL use only. |</p>
<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>05/23/2012</td>
<td>Initial document reformat</td>
</tr>
<tr>
<td>2.0</td>
<td>11/05/2012</td>
<td>KL re-write</td>
</tr>
<tr>
<td>2.1</td>
<td>4/8/2013</td>
<td>Removed blank pages. Added the ECO identification document as an appendix - mdn</td>
</tr>
</tbody>
</table>
I. **INTRODUCTION**

Election Systems & Software, Inc. (ES&S) maintains product documentation for all of their election hardware. The product documentation consists of drawings, bills of material, and part descriptions and is used to define the design and quality parameters for the product. As such, changes to the documentation need to be rigorously controlled. ES&S does this through an Engineering Change Order Process. Since this documentation also drives configuration and material control, manufacturing, and certification, it is crucial that ECO procedures are followed.

The writing of ECOs is the responsibility of the Sustaining Engineering Group at ES&S, though requests for change can come through various channels. Within the Sustaining Engineering Group, it is the Product Line Engineer’s responsibility to evaluate all change requests for their products. They decide if an ECO is warranted and they initiate the ECO procedure as prescribed in this document.

I.1 **PURPOSE**

This document lays out the ECO process used at ES&S.

I.1.1 **SCOPE**

This document details the processes necessary to maintain product documentation as well as the process of maintaining hardware configurations, notifying materials management of changes, revising manufacture/QC processes, and requesting certification approval.

The intended audience for this document includes ES&S engineering stakeholders, certification stakeholders, the accredited Voting System Test Laboratory (VSTL), and state election stakeholders.

I.1.2 **TARGET AUDIENCE**

This document is intended for ES&S certification team members, VSTL reviewers and Engineering Change Order (ECO) process team members.

I.1.3 **USING THIS DOCUMENT**

This document is organized to describe the process for initiating, evaluating, documenting, gaining approval, and implementing an ECO.

I.2 **DEFINITIONS AND ACRONYMS**

**I.2.1 DEFINITIONS**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certification</td>
<td>A formal demonstration, by a duly authorized body, that a product, process or service complies with its specified requirements and is acceptable for its intended use.</td>
</tr>
</tbody>
</table>

**I.2.2 ACRONYMS**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM</td>
<td>Contract Manufacturer</td>
</tr>
<tr>
<td>CMP</td>
<td>Configuration Management Plan</td>
</tr>
<tr>
<td>ECO</td>
<td>Engineering Change Order</td>
</tr>
<tr>
<td>MCO</td>
<td>Manufacturing Change Order</td>
</tr>
<tr>
<td>PDM</td>
<td>Product Data Management</td>
</tr>
<tr>
<td>PLE</td>
<td>Product Line Engineer</td>
</tr>
<tr>
<td>VSTL</td>
<td>Voting System Test Laboratory</td>
</tr>
</tbody>
</table>

**I.3 REFERENCED DOCUMENTS AND RESOURCES**

The following documents and resources are referenced from this document. The latest revisions apply.

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 VSS</td>
<td>FEC 2000 Voluntary Voting System Standards</td>
</tr>
<tr>
<td>2005 VVSG</td>
<td>EAC 2005 Voluntary Voting System Guidelines</td>
</tr>
<tr>
<td>IEEE 828</td>
<td>Standard for Software Configuration Management Plans</td>
</tr>
<tr>
<td>What Requires an ECO?</td>
<td>ES&amp;S Document</td>
</tr>
<tr>
<td>(ESSSYS_M_I_0501_WhatRequiresECO)</td>
<td></td>
</tr>
</tbody>
</table>
1. **ECO Internal Process Overview**

Whenever a hardware change is required, an Engineering Change Order (ECO) must be initiated. Requests for change are initiated either formally or informally from various internal or external groups. The Sustaining Engineering Group is responsible for evaluating, and as necessary, writing and implementing the ECO.

The first step in the evaluation process is to classify the change into one of the categories listed below.

1. **Clerical Changes** – These changes are typographical in nature and have no effect on the intended hardware. Examples would include correcting spelling on engineering drawings or database entries, clerical issues with the packaging drawings, or eliminating ambiguity in existing documentation. These changes do not affect the form, fit or function of the voting system.

2. **Alternative Manufacturer or Second Source Suppliers** – Changes in this category generally expand the availability of certain components by adding alternate manufacturers for a particular part. Examples include adding alternative manufacturers to increase supply availability, decrease lead time of parts, increase purchasing bargaining position, and replacing a manufacturer who has gone out of business. These changes do not affect the form, fit or function of the voting system.

3. **End-of-Life Component Replacement or Substitution** – These changes are necessary when a manufacturer decides to discontinue a particular part and entails the identification of a compatible replacement part. This new part may be supplied by the original manufacturer or it may require sourcing from an entirely new manufacturer. Examples include, but are not limited to, the replacement of a part that one manufacturer has discontinued but another manufacturer continues to produce; a part change required as a result of an industry to a new standard (i.e. shift to RoHS compliance). These changes are not intended to change form, fit or function, but often times it is unavoidable.

4. **Design Change** - These changes address a performance issue with the existing product and, as such, affect form, fit or function. The change elevates the performance of the product by either addressing an existing operational issue or enhancing future performance. An example would be eliminating catch points in the paper path or changing to a higher capacity power supply. These changes are intended to improve function only, but may also affect form and fit.

5. **New Model** - This change covers the introduction of an entirely new product. It can either be a new spin on an existing product or a new design altogether. An example would be introducing a new version of the DS200 that includes a different LCD, CPU, and housing configuration. These changes establish a new form, fit and/or function going forward.

By categorizing the ECO against a particular change, ES&S can better assess the level of testing and approval required to implement the change.

The Product Line Engineer (PLE) is responsible for fully assessing the impact of a particular change. The ECO form (see section 5.1) is used to catalog all pertinent information. Beginning with the impact on material, the PLE assesses current material orders, work in process, and in-house inventory. Inventory management and configuration control dictate how changes are documented and implemented. For example, when a part is revised, a new part number is assigned when there is sufficient difference to impact interchangeability (i.e. the two part revisions cannot occupy the same bin because there is a preferential difference).
After discussing and agreeing to the change with the Materials Management and Manufacturing team, the Product Line Engineer assesses what impact the change will have on fielded equipment. This assessment involves discussing the change, as applicable, with Field Services, Customer Service, and Sales.

With a clear understanding of the impact of the change, the Product Line Engineer completes the preliminary ECO form, generates preliminary documentation, and schedules an internal ECO Board Meeting. At this meeting, representatives from various teams involved finalize their plans for implementing the change. The PLE also determines whether the ECO requires submission to the Certification Department. The criteria for submitting a change to the Certification Group are outlined in *What requires an ECO*. Generally, all but the most trivial ECOs are presented to the certification group.

Engineering Change Orders are presented to Certification for two critical reasons:

1. They can assess the impact this change will have on certified configurations
2. They will champion the efforts to get Federal and State approval for the change.

Part of Certification’s impact assessment is to identify every certified suite that contains the affected product. Certification also reviews the ECO for completeness and determines whether the ECO provides sufficient justification and back-up explanation. The certification team may also request additional testing to supplement efforts to secure Federal and State approval. As necessary, Cert also determines which Voting System Test Lab will evaluate the ECO based upon several factors including which labs are affiliated with different states.

When VSTL submission is necessary, the ECO and all applicable documentation attachments are forwarded to ES&S’ Certification Department. Upon receipt of the internally approved ECO, ES&S’ Certification Department inputs each ECO into ES&S’ ECO Management System which is utilized to track all ECOs that have been issued against ES&S voting systems. In addition, the ECO Management System provides a mechanism to track the approval by the VSTL, the Election Assistance Commission (“EAC”) (if such ECO is associated with an EAC certified product) and applicable State and/or jurisdictions whose voting systems are affected by each ECO. ES&S’ Certification Department shall be responsible for submitting all ECOs to the VSTL for review and approval after the ECO has entered into the ECO Management System.

The approval of an ECO by the applicable agency allows material control activities, as applicable, to begin. These activities include procurement, rework, and scrapping in accordance with the intent of the ECO. The ECO approval is also serves as notification to depot repair and field services, as applicable, that repair activities may have changed.
Engineering Change Order Process

2. **VSTL Approval Process**

Upon receipt of the ECO, the VSTL shall log and review the ECO submitted by ES&S and determine if such change requires additional testing prior to approving the ECO. The VSTL shall make one of the following three determinations with respect to reviewing and approving an ECO submitted by ES&S:

<table>
<thead>
<tr>
<th>Change Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Minimus Change</td>
<td>If the VSTL determines that the hardware change set forth in the ECO is de minimus, then no testing is required and the ECO shall be approved by the VSTL pending final approval by the EAC (for those ECOs associated with an EAC certified product). Once the VSTL and/or EAC approves the ECO, ES&amp;S is notified that no additional testing is necessary and that the ECO has been approved by the VSTL and/or EAC;</td>
</tr>
<tr>
<td>Minor Change</td>
<td>If the VSTL determines that the hardware change set forth in the ECO is minor, additional information may be requested by the VSTL from ES&amp;S and the VSTL may require certain testing be completed on the hardware change. Upon completion of such additional testing, the ECO shall be approved by the VSTL pending final approval by the EAC (for those ECOs associated with an EAC certified product). Once the VSTL and/or EAC approve the ECO, the VSTL shall provide ES&amp;S with the applicable testing reports along with the approval of the ECO by the VSTL and/or EAC.</td>
</tr>
<tr>
<td>Major Change</td>
<td>If the VSTL determines that the hardware change set forth in the ECO is a major change, the VSTL may deny the approval of the ECO pending final review by the EAC (for those ECOs associated with an EAC certified product). If the VSTL and/or EAC deny the approval of the ECO, full recertification will need to take place on the voting system which such hardware change is being incorporated into.</td>
</tr>
</tbody>
</table>

Table 2.1 Change Type Description

Once the VSTL and/or EAC approves the ECO submitted by ES&S, the VSTL shall log the approved ECO in its database and notify ES&S of its and/or the EAC’s approval of the ECO as well as provide ES&S with any and all test reports completed in conjunction with its review of the ECO. ES&S shall update the ES&S ECO tracking database by inputting the approved ECO in the database along with all test reports and approvals issued by the VSTL and EAC. In addition, ES&S updates its baseline hardware version number based on the type of approval the VSTL provides with respect to each ECO. The VSTL’s detailed approval process for ECOs is set forth on Attachment 3, “VSTL ECO Approval Process.”
### 3. ECO State and/or Jurisdiction Notification Process

Upon ES&S’ receipt of the approved ECO and test reports, if applicable, ES&S shall notify all applicable States and/or jurisdictions whose voting systems may be affected by the hardware change set forth in the ECO. ES&S’ State Certification Managers shall be responsible for notifying the applicable States and/or jurisdictions of any ECO changes.

**NOTE**  It is ES&S’ position that for all ECOs approved by the EAC, the EAC shall promulgate rules which require that all States and Jurisdiction accept the EAC finding and administratively approve all EAC approved ECOs. However, until the EAC provides for such administrative approval, the following process shall be followed by ES&S in obtaining the approval of ECO changes to its voting systems with the States and/or Jurisdictions.

Pursuant to a majority of State laws, any change made to a previously approved or certified voting system must receive the approval of the appropriate state government authority (e.g. Secretary of State, State Board of Elections, etc.) or its designee prior to any such change being implemented in the currently certified voting system. In order to ensure ES&S is in compliance with applicable State law, ES&S shall notify every State whose voting systems may be affected by the subject ECO once the ECO has been approved by the VSTL and/or EAC. Included in such notification, shall be ES&S’ request that the State approve the ECO changes.

The ES&S State Certification Managers shall notify each State and/or jurisdiction by sending the attached form letter notifying the State and/or Jurisdiction of the VSTL approved ECO and requesting its written approval of the ECO. The form letter shall be modified to include the applicable information related to the ECO and the State and/or Jurisdiction receiving the notification and request for approval.

The ES&S State Certification Managers shall notify each State and/or jurisdiction of VSTL approved ECOs on a timeline to be determined by ES&S’ Certification Department but in no event shall such notification occur less than quarterly.

Prior to a State’s and/or jurisdiction’s written approval of a VSTL approved ECO submitted by ES&S, ES&S Representatives shall not take any of the following actions with respect to those voting systems which are subject to ECOs that have not yet been approved by the respective State and/or jurisdiction:

- ES&S shall not sell, rent, swap or loan any voting system equipment which incorporates any hardware components that are subject to the ECO;
- ES&S shall not perform any maintenance or repair work on a voting system which incorporates any hardware components that are subject to the ECO. This applies both to customer onsite repairs and ES&S depot repairs.

Once a State and/or jurisdiction has provided ES&S’ Certification Department with written approval of an ECO, ES&S’ Certification Department shall update its ECO Management System and provide notification to all appropriate ES&S associates that such ECO has been approved and the hardware components subject to the ECO may be incorporated into voting systems and sent to those States and/or jurisdictions which have approved the ECO. In addition, maintenance and repair work may be completed for those voting system units which require incorporation of the hardware components that are subject to the approved ECO.
All State and/or jurisdictional approvals of ECOs shall be logged to the ES&S ECO Management System. The approval by the State and/or jurisdiction is the last step in the approval process of the ECO. The ES&S ECO Management System shall include all approval steps taken for a specific ECO. From the initial submission of the ECO, to the testing and approval process by the VSTL and/or EAC up through the approval of the ECO by the applicable states, the ES&S ECO Management System will track an ECO from creation to approval. Such tracking will be necessary to ensure that all ECOs have the proper traceability and audit trail in the event an issue is raised regarding a specific ECO.

A complete overview and flowchart summary of the ES&S ECO approval process is set forth in Attachment 4.
4. **FORM LETTER FOR NOTIFYING STATES OR JURISDICTIONS OF ECO CHANGES**

[Date]

[Contact Name]

[Title]

[Address]

RE: Election Systems & Software, Inc. (“ES&S”) Notification and Request for Approval of Voting System Engineering Change Order(s) (“ECO”)

Dear: [Contact Name]

Pursuant to applicable State law and ES&S company policy, notice is hereby given that the following ECO(s) have been approved by ES&S’ third party Voting System Test Lab (“VSTL”). The ECO(s) represent changes made to hardware components of ES&S’ voting system which are currently certified for use in your State and/or jurisdiction. The hardware changes set forth in the ECOs do not affect the software and/or firmware currently certified for use in your State and/or jurisdiction. The ECO changes set forth below were determined by the VSTL to be de minimus or minor in nature and do not require re-certification of the voting system at the Federal level.

A description of the VSTL approved ECO(s) is set forth below. In addition, ES&S has attached to this letter all test reports provided by the VSTL with respect to the ECO(s). If your State and/or jurisdiction requires that all VSTL test reports be provided directly from the VSTL to your State and/or jurisdiction please let me know and I will have the applicable reports sent to your designated contact.

<table>
<thead>
<tr>
<th>ECO ID</th>
<th>Description</th>
<th>Voting System Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In accordance with applicable State law and ES&S company policy, ES&S requests the written approval of the State and/or jurisdiction for incorporation and use of the hardware changes identified in the ECO(s) set forth above. By approving the ECO(s), you agree to allow ES&S to incorporate and use the ECO changes in the State’s and/or jurisdiction’s currently certified and approved voting systems. ES&S respectfully requests that the State and/or jurisdiction approve the ECO(s) within thirty (30) days from the date of this letter.

Company Confidential – Contains information, including, but not limited to, methods techniques or processes that derive independent economic value. Approved for internal and ES&S authorized VSTL use only.
Please be advised that ES&S will not be able to provide voting systems nor provide repair or maintenance services to the State’s and/or jurisdiction’s currently certified voting systems that are subject to the ECO(s) set forth herein until ES&S receives the State’s and/or jurisdiction’s written approval of the ECO changes.

If you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

[State Certification Manager]

cc:
5. **ATTACHMENT 2 – ES&S INTERNAL FORMS & INSTRUCTIONS**

When a hardware change is implemented, an Engineering Change Order (“ECO”) must be drafted by ES&S’ Sustaining Engineering Department to document changes to voting system hardware. ES&S’ Sustaining Engineering Department creates and tracks all ECOs made to an ES&S voting system and assures that the affected documentation is updated.

The hardware documentation resides in one of three places:
- Product Data Management – Off site repository.
- 3rd Party Contractor – Externally created and maintained
- Internal – We maintain

The hardware documentation for ES&S “go forward” products is stored in a Product Data Management system managed by a third party. The documentation for legacy products is stored on a limited access server. The following sections describe the process for updating documentation.

In addition, ES&S’ Sustaining Engineering Department creates a baseline hardware version number for each tabulator. All approved ECOs accumulated up to the date of manufacture are associated with a particular voting system baseline. A complete explanation of ES&S hardware numbering scheme is detailed on Schedule 1. Earlier implementations of the baseline hardware versions exist on legacy products. Below is ES&S’ internal process for developing and tracking an ECO created by ES&S’ Sustaining Engineering Department.

5.1 **ECO FORM**

An ECO form must be filled out for every change that impacts a released product (ref When an ECO is required). This is the official change communication to the affected departments within ES&S. The PLE is responsible for getting approval for the change, often through convening an ECO Board Meeting to discuss the change.

If the change affects documentation in PDM, an ECO number is automatically generated in PDM and entered on the ECO form (1). For changes affecting legacy products, the ECO number is assigned by ES&S’ hardware documentation coordinator.

The first sheet of the ECO describes the change and impact in general terms that summarize the intent. This front sheet gets signed by purchasing, manufacturing, and quality control (2). The second sheet provides the implementation details including impacts on drawings / bills of material and recommended disposition of affected parts (3).

The second sheet is broken into two columns. The left column (4) describes the documentation updates require in the PDM system. An automated ECO is produced in PDM that becomes part of the official documentation package. The right column (5) includes the cross reference to ES&S’ assigned stocking keeping unit (SKU) with particular details on dispositions.
5.2 **ECO PROCESS – PRODUCT DATA MANAGEMENT (“PDM”) SYSTEM**

ES&S utilizes a PDM system as its repository for released production drawings on ES&S’ “go forward” voting systems. This system is managed by ES&S’ contract manufacturer. The contract manufacturer provides a service of periodically assessing the availability of parts. As necessary, they initiate requests for change orders to keep suppliers current. Changes that have no effect on the engineering documentation, such as adding to current list of suppliers for a particular part, are often written as a “Manufacturing Change Order (MCO).” These requests are evaluated by the applicable PLE and, as applicable (see *What requires an ECO*), are approved as is or recorded on an ECO form for further evaluation and approval.

When a request for a hardware change that affects documentation in PDM is made, the responsible Product Line Engineer evaluates the change. After completing an ECO form and convening a board meeting, the ECO form is forwarded to the PDM provider to create the preliminary documentation and completion of the PDM change form. A copy of the PDM change form is shown on Schedule 2 of this Attachment.

The PDM change form progresses through various states within the system. After getting the internal approvals, the provider promotes the PDM change to the Sustaining Engineering Department for review. Either directly or indirectly, the PDM change is routed to the responsible PLE for review and approval. The PLE review includes:

1. Verify that the PDM change matches the ECO form. Often times the exercise of updating the documentation reveals related documentation that the PDM provider will include. The resulting updates to the ECO form need to be circulated, as applicable, to the board for approval.

2. Confirm that the *Description of Change* and *Reason for Change* reflect, in layman’s terms, the purpose of the ECO.

3. Review the preliminary documentation for accuracy.

Prior to final approval of the ECO, the responsible PLE convenes a meeting with Certification for one final check. The impact to existing certified configurations needs to be evaluated along with making plans to certify the new hardware configuration. The language of the ECO can be modified to better convey the scope of the change to the applicable certifying agency. The certifying agency will need to determine the level of testing required to evaluate the impact of the hardware change.

With concurrence from Cert, the PLE approves (or authorizes approval) the ECO and the PDM provider implements the documentation updates. This updated documentation, along with the PDM change and ECO form are sent in final form to ES&S’ Certification Department for transmittal to the Voting System Test Lab (“VSTL”) for review, testing (if applicable) and approval. A flowchart of the above process is set forth below on Schedule 3 of this Attachment.
5.3 **ECO PROCESS – NO PRODUCT DATA MANAGEMENT (“PDM”) SYSTEM**

For those ES&S products which are not included in the PDM system, ES&S utilizes the same ECO form and approach for the creation and tracking of ECOs. The difference is that there is no PDM change created by the provider.

5.3.1 **ES&S NON-PDM ECO INTERNAL PROCESS FOR PRODUCTS MANUFACTURED BY ES&S.**

The procedure is the same as above in section 5.2 except that it is ES&S’ responsibility to update the documentation. The PLE does this either directly or with the help of the documentation coordinator. It is also the PLE’s responsibility to make sure the documentation maintained in a controlled environment.

5.3.2 **ES&S NON-PDM ECO INTERNAL PROCESS FOR PRODUCTS MANUFACTURED BY ES&S CONTRACT MANUFACTURERS.**

The procedure is the same as above in section 5.2 except that it is ES&S’ responsibility to work with the contract manufacture outside of PDM to update the documentation. The PLE coordinates the documentation update with the contract manufacturer and makes sure the documentation maintained in a controlled environment.

5.3.3 **SCHEDULE 1 – ES&S HARDWARE NUMBER SCHEME**

It is ES&S’ policy to associate all ECOs to a hardware numbering scheme associated with each product manufactured by ES&S. ES&S maintains two sets of hardware numbering schemes based on whether the voting system is a “go forward product” or a legacy product. For all “go forward” products, ES&S has created a four digit hardware numbering scheme which is used to associate all changes to a hardware baseline. For ES&S’ legacy products, ES&S utilizes a three digit numbering scheme in order to track all changes made to the hardware baseline version of the legacy voting systems to the extent possible. ES&S is phasing out the use of the three digit schemes as legacy products are replaced in the field. ES&S’ Sustaining Engineering Department creates the baseline hardware version number for each voting system in accordance with the following and updates such numbering scheme upon the approval of all ECO and other changes which have been made to each voting system.
The hardware revision scheme for ES&S “go forward products” consists of 4 digits. Following is an explanation of when and why a particular digit may increment.

<table>
<thead>
<tr>
<th>Version Number Node</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Digit</td>
<td>The first digit reflects the essential function of the equipment (precinct tabulator, DRE, central scanner, etc.) and has always been 1.</td>
</tr>
<tr>
<td>Second Digit</td>
<td>The second digit of the hardware revision indicates a major hardware difference that is not compatible with others. This could either reflect a major redesign or differentiate a family of equipment. One example would be offering different display sizes within a family of product. These sizeable differences commonly show up as selectable options in order entry.</td>
</tr>
<tr>
<td>Third Digit</td>
<td>The third digit reflects the production run that created the voting equipment. All ECOs that have been approved since the end of the previous production run are implemented. While ECOs may have been incorporated between production runs, units that differ only in the third digit are interchangeable and functional equivalents, albeit with the application of the appropriate upgrade kits.</td>
</tr>
<tr>
<td>Fourth Digit</td>
<td>The fourth digit is reserved for approved changes that occur within a production run.</td>
</tr>
</tbody>
</table>

Table 5.1 Version indicator description
5.3.4 **HARDWARE REVISION LABELING CONVENTION (LEGACY PRODUCTS)**

![Diagram of Hardware Versioning - Legacy](image)

<table>
<thead>
<tr>
<th>Version Number Node</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Change</td>
<td>Testing Required/Initial Release - This field is used as the starting point for a product in defining the hardware revision level. It will only advance as the result of a major change such as a redesign. This assumes the existing model number does not change</td>
</tr>
<tr>
<td>Significant Change</td>
<td>Testing Required - This field will advance as the result of an ECO which requires laboratory testing</td>
</tr>
<tr>
<td>De Minimis</td>
<td>No Testing Required - This field will advance as a result of minor ECO driven changes where testing is not required</td>
</tr>
</tbody>
</table>

**Table 5.2 Hardware version description - legacy**

5.3.5 **HARDWARE COMPARABILITY MATRIX EXPLANATION**

The hardware revision label is applied at the time of manufacture to reflect the “as built” configuration. Subsequent changes to the hardware can only be made through the installation of product upgrades which includes the application of an “ECO Applied” sticker. The hardware revision label remains static, continuing to reflect the original “as built” configuration. The engineering documentation, on the other hand, continues to be updated in anticipation of the next production run. This includes incrementing the hardware revision label for that future build. Hardware changes (with the “ECO Applied” stickers) and engineering documentation updates continue to accumulate prior to the next production run.

With a new production run, all incremental changes since the last build are incorporated and the hardware revision label increments (third digit). To illustrate, let’s take an example of a tabulator that was manufactured during the initial production run. Correspondingly, it receives the hardware revision label 1.0.0.0. Now let’s assume there were 3 revisions implemented against this hardware configuration. This unit would have the original hardware revision label 1.0.0.0 along with three “ECO Applied” stickers. With the next production run, the hardware revision label increments to 1.0.1.0 and the configuration incorporates these previous changes.

The third and fourth digits of the revision label allow tracking of hardware differences within equivalent configurations. From the example above, the 1.0.0.0 tabulator is functionally equivalent to the 1.0.1.0 tabulator, completely interchangeable in every application.
If a hardware change is made that alters the function of the machine, and consequently its interchangeability, the new functionality is reflected a change to the second digit of the revision label. In other words, all units with the same first and second digits are interchangeable (Eg. all 1.0.X.X units are interchangeable). However, units with different second digits have a functional difference (Eg. 1.0.X.X is functionally different from 1.1.X.X) which affects its interchangeability.
## 5.4 Schedule 2 – ECO Template PDM

ECO-000526 - Normal & DMR ECO • ES&S - Training ECO

### Pending

<table>
<thead>
<tr>
<th>ECO-000526</th>
<th>Normal &amp; DMR ECO • ES&amp;S - Training ECO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number</strong></td>
<td>ECO-000526</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>Pending</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Normal &amp; DMR ECO</td>
</tr>
<tr>
<td><strong>Description of Change</strong></td>
<td>ES&amp;S - Training ECO</td>
</tr>
<tr>
<td><strong>Reason For Change</strong></td>
<td>To train product owners on the functionality of the Regulatory Review section.</td>
</tr>
<tr>
<td><strong>Lifecycle Phase</strong></td>
<td>Design</td>
</tr>
<tr>
<td><strong>Product Line(s)</strong></td>
<td>ES&amp;S/General</td>
</tr>
<tr>
<td><strong>Workflow</strong></td>
<td>ECO Normal Workflow</td>
</tr>
<tr>
<td><strong>Change Analyst</strong></td>
<td>Administrator (admin)</td>
</tr>
<tr>
<td><strong>Date Originated</strong></td>
<td>10/26/2009 06:43:58 AM PST</td>
</tr>
<tr>
<td><strong>Date Released</strong></td>
<td>10/26/2009 06:43:58 AM PST</td>
</tr>
<tr>
<td><strong>Date Closed</strong></td>
<td>10/26/2009 06:43:58 AM PST</td>
</tr>
</tbody>
</table>

---

### Misc Data

**Notes:**

**Access Control**

- **Change Approver:**
- **Team Members:**
- **External Access:** ES&S Common Items, ES&S Full Access
- **Access Notes:**

**Origination Control**

- **Create User:** Administrator (admin)
- **Create Date:** 10/26/2009 06:43:58 AM PST

**Customer**

- **Classification:** Alternate Manufacturer (Second Source)
- **Regulatory Review Required?** Yes
- **Type of Review:** 2005
- **Hardware Revision:** 1.1.5.3

https://nu.pivotint.com/Agile/PCMServlet

2/8/2010

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ECO Notes: Training ECO

Page Three

**Engineering Info**

Engineering Comments:

**Customer Info**

Customer Impacted?:
Customer Impact Comments:

**Risk Info**

Risk Analysis Required?:
Risk Analysis Comments:

**Implementation/Disposition Info**

Implementation Required?:
Implementation Comments:

https://nu.pivotint.com/Agile/PCMServlet

2/8/2010
5.5 **SCHEDULE 3 – ECO CREATION FLOW CHART**

Product Line Engineer receives Change Request

Is Change Warranted?
- Yes
  - PLE Analyzes Doc Impact & Completes ECO Form
  - Update Documentation
  - Internal ECO Board Discussion
  - PLE Reviews ECO with Certification Group
  - Agency Review Required?
    - Yes
      - VSTL Flow
    - No
      - Incorporate Change

- No
  - PLE Follows Up with Requestor: Modify & Resubmit or Terminate

Is Change Trivial?
- Yes
  - Update Documentation
- No
  - PLE Analyzes Doc Impact & Completes ECO Form
5.6 **SCHEDULE 4 – DOCUMENTATION UPDATE**

![Flowchart Diagram]

- **PDM Documentation**
  - Pivot Confirms Understanding of Drawing Change Request & Assigns ECO Number
  - Pivot gathers affected drawings and drafts a PDM change notice
  - PDM Change Notice routed to PLE or Sustaining Engineering Manager
  - FLE Reviews for:
    - Completeness
    - Accuracy
    - Clarity
  - Yes: PLE Approves PDM Change Request & Notifies Documentation Coordinator
  - No: FLE Reviews for:
    - Completeness
    - Accuracy
    - Clarity
  - Yes: PLE Approves Documentation Updates & Notifies Documentation Coordinator
  - No: Coordinator gathers affected documentation and updates.

- **Internal / Mocola**
  - PLE Notifies Documentation Coordinator of Change
  - Yes: PLE Approves Documentation Updates & Notifies Documentation Coordinator
  - No: Coordinator gathers affected documentation and updates.

- **3rd Party Contract Manufacturer**
  - PLE Notifies 3rd Party Project Manager of Change
  - Yes: PLE Approves Documentation Updates & Notifies Documentation Coordinator
  - No: 3rd Party gathers affected documentation & updates.
6. **ATTACHMENT 3 – VSTL ECO APPROVAL PROCESS**

Upon receipt of an ECO forwarded by ES&S, the applicable VSTL conducts an initial technical review of each ECO submitted. This initial technical review by the VSTL determines the scope of hardware testing which may be required based on the type of ECO change being proposed. Such testing may range from no testing resulting from a “De Minimis” change, to selective testing requirements (only certain aspects of the hardware testing suite are required), to a requirement for performing the entire suite of hardware testing on the unit. After the VSTL conducts its initial technical review, the lab notifies ES&S and the EAC (if such ECO is related to an EAC certified product) with initial results and an indication whether additional testing is needed.

6.1 **REVIEW OF ECO FOR NON-EAC CERTIFIED SYSTEMS**

After the initial notification, the VSTL completes one of two processes depending on whether or not the ECO is associated with an EAC certified voting system or a product certified prior to the EAC. If the approval of the ECO is associated with a non-EAC certified voting system, the VSTL completes the required testing on the ECO without the involvement of the EAC and upon completion of its review and testing provides ES&S’ Certification Department of its review of the ECO. If the VSTL approves the ECO change and such change is considered De Minimis (no further testing required), the VSTL notifies ES&S of the same and ES&S’ Certification Department updates its ECO Management System with the approval and the ECO is closed (approved) by the appropriate ES&S Sustaining Engineering Department Product Owner. Thereafter, the Product Owner initiates the ECO change in ES&S voting system at the appropriate time. In the event the VSTL determines that additional testing is required for an ECO, the VSTL notifies ES&S’ Certification Department. The VSTL completes its required testing and upon the successful completion of such testing, the VSTL notifies ES&S’ Certification Department of its approval and forwards the appropriate test report and approval documentation to ES&S’ Certification Department. ES&S’ Certification Department updates its ECO Management System with the approval and the ECO is closed (approved) by the appropriate ES&S Sustaining Engineering Department Product Owner. Thereafter, the Product Owner initiates the ECO change in ES&S voting system at the appropriate time.

6.2 **REVIEW OF ECO FOR EAC CERTIFIED SYSTEMS**

If the approval of the ECO is associated with an EAC certified voting system and ES&S wishes such system to include the EAC certification label, the VSTL completes its initial review and provides its recommendation for ECO approval to the EAC. If the EAC agrees with the VSTL determination that the ECO change is De Minimis (no further testing required), the EAC reviews the VSTL’s recommendation and makes the following determination.

<table>
<thead>
<tr>
<th>EAC Decision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreement with the VSTL De Minimis Change</td>
<td>If the EAC agrees with the VSTL determination that the ECO change is De Minimis, the following procedure is initiated:</td>
</tr>
<tr>
<td></td>
<td>1. EAC notifies the VSTL of its approval and the VSTL in turn provides notification in writing to ES&amp;S’ Certification Department of the VSTL and EAC approval.</td>
</tr>
<tr>
<td></td>
<td>2. ES&amp;S’ Certification Department updates its ECO Management System with the approval and the ECO is closed (approved) by the appropriate ES&amp;S Sustaining Engineering Department Product Owner.</td>
</tr>
<tr>
<td></td>
<td>3. Thereafter, the Product Owner initiates the ECO change in ES&amp;S voting system at the appropriate time.</td>
</tr>
</tbody>
</table>

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## EAC Decision

<table>
<thead>
<tr>
<th>Description</th>
<th>EAC Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disagreement with VSTL De Minimis Change</td>
<td>If the EAC does not agree with the VSTL’s determination that the ECO change is De Minimis, the following procedure is initiated:</td>
</tr>
<tr>
<td></td>
<td>1. EAC notifies the VSTL of its decision along with the required hardware testing which needs to be completed prior to the EAC approving the ECO.</td>
</tr>
<tr>
<td></td>
<td>2. Upon successful completion of all required hardware testing, the VSTL notifies the EAC that the ECO successfully passed all required testing and the EAC approves the ECO.</td>
</tr>
<tr>
<td></td>
<td>3. The VSTL provides notification to ES&amp;S’ Certification Department of the VSTL and EAC approval and forwards all applicable test reports and other documentation to ES&amp;S.</td>
</tr>
<tr>
<td></td>
<td>4. Upon receipt of such notice, the ES&amp;S Product Owner reviews the VSTL testing report and documentation for accuracy.</td>
</tr>
<tr>
<td></td>
<td>5. If everything is correct, ES&amp;S’ Certification Department updates its ECO Management System with the approval and the ECO is closed (approved) by the appropriate ES&amp;S Sustaining Engineering Department Product Owner.</td>
</tr>
<tr>
<td></td>
<td>6. Thereafter, the Product Owner initiates the ECO change in ES&amp;S voting system at the appropriate time.</td>
</tr>
<tr>
<td>Agreement with the VSTL Non-De Minimis Change</td>
<td>If the VSTL determines that the ECO change requires some level of testing (whether that be limited testing or full testing), the VSTL notifies the EAC for review and the following procedure is initiated:</td>
</tr>
<tr>
<td></td>
<td>1. If the EAC agrees with the VSTL’s recommendation, the EAC notifies the VSTL who in turn notifies ES&amp;S of the required testing which needs to be performed.</td>
</tr>
<tr>
<td></td>
<td>2. Upon successful completion of all required hardware testing, the VSTL notifies the EAC that the ECO successfully passed all required testing and the EAC approves the ECO.</td>
</tr>
<tr>
<td></td>
<td>3. The VSTL provides notification to ES&amp;S’ Certification Department of the VSTL and EAC approval and forwards all applicable test reports and other documentation to ES&amp;S.</td>
</tr>
<tr>
<td></td>
<td>4. Upon receipt of such notice, the ES&amp;S Product Owner reviews the VSTL testing report and documentation for accuracy and completeness.</td>
</tr>
<tr>
<td></td>
<td>5. If everything is correct, ES&amp;S’ Certification Department updates its ECO Management System with the approval and the ECO is closed (approved) by the appropriate ES&amp;S Sustaining Engineering Department Product Owner.</td>
</tr>
<tr>
<td></td>
<td>6. Thereafter, the Product Owner initiates the ECO change in ES&amp;S voting system at the appropriate time.</td>
</tr>
</tbody>
</table>
### EAC Decision Description

If the EAC disagrees with the VSTL’s position that limited additional testing will be required and determines that more extensive hardware testing is required, the following procedure is initiated:

1. The EAC notifies the VSTL who in turn notifies ES&S of the required testing which needs to be performed.
2. Upon successful completion of all required hardware testing, the VSTL notifies the EAC that the ECO successfully passed all required testing and the EAC approves the ECO.
3. The VSTL provides notification to ES&S’ Certification Department of the VSTL and EAC approval and forwards all applicable test reports and other documentation to ES&S.
4. Upon receipt of such notice, the ES&S Product Owner reviews the VSTL testing report and documentation for accuracy.
5. If everything is correct, ES&S’ Certification Department updates its ECO Management System with the approval and the ECO is closed (approved) by the appropriate ES&S Sustaining Engineering Department Product Owner.
6. Thereafter, the Product Owner initiates the ECO change in ES&S voting system at the appropriate time this is communicated to the VSTL who in turn notifies ES&S of the modified testing requirements.
7. Upon successful completion of all required hardware testing the VSTL makes this known to ES&S’ certification department and forwards the appropriate test report.
8. The appropriate hardware engineer/product manager will review the VSTL hardware testing report for accuracy. At this point the final test report becomes a part of the ECO document package and the hardware change is made at the appropriate time.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Disagreement with VSTL Non-De Minimis Change</td>
<td>If the EAC disagrees with the VSTL’s position that limited additional testing will be required and determines that more extensive hardware testing is required, the following procedure is initiated:</td>
</tr>
</tbody>
</table>

Table 6.1 EAC decision description
De Minimis Change and Modification Certification Process

May 17, 2010

Discussion:

De Minimis Changes. A de minimis change is a change to voting system hardware that is so minor in nature and effect that it requires no additional testing and certification. Such changes, however, require VSTL review and endorsement as well as EAC approval. Under no circumstance shall a change be considered a de minimis change if it has reasonable and identifiable potential to impact the system’s operation and compliance with applicable voting system standards. Any proposed change not accepted as a de minimis change is a modification and shall be submitted for testing and review consistent with the requirements of the EAC’s Certification Manual. An approved de minimis change is not a modification.

Modifications. A modification is any change to a previously EAC-certified voting system’s hardware, software, or firmware that is not a de minimis change. Any modification to a voting system will require testing and review by the EAC according to the requirements of Chapter 4 of this Manual.

What this means:

A de minimis change requires no testing. If the VSTL requires any testing at all, the change is then categorized as a modification.

De Minimis Change and Modification Certification Process

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7. ATTACHMENT 4 – ECO OVERVIEW FLOWCHART
The following appendices are referenced from or included in this plan. All files are stored in the SharePoint documentation repository at:


Printed copies are out of date.

<table>
<thead>
<tr>
<th>Document Code</th>
<th>Process Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSSYS_M_F_0510_ECOCreation</td>
<td>Schedule 3: ECO Creation Flowchart</td>
</tr>
<tr>
<td>ESSSYS_M_F_0520_DocUpdate</td>
<td>Schedule 4: Documentation Update</td>
</tr>
<tr>
<td>ESSSYS_M_I_0501_WhatRequiresECO</td>
<td>What Requires an ECO</td>
</tr>
</tbody>
</table>

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