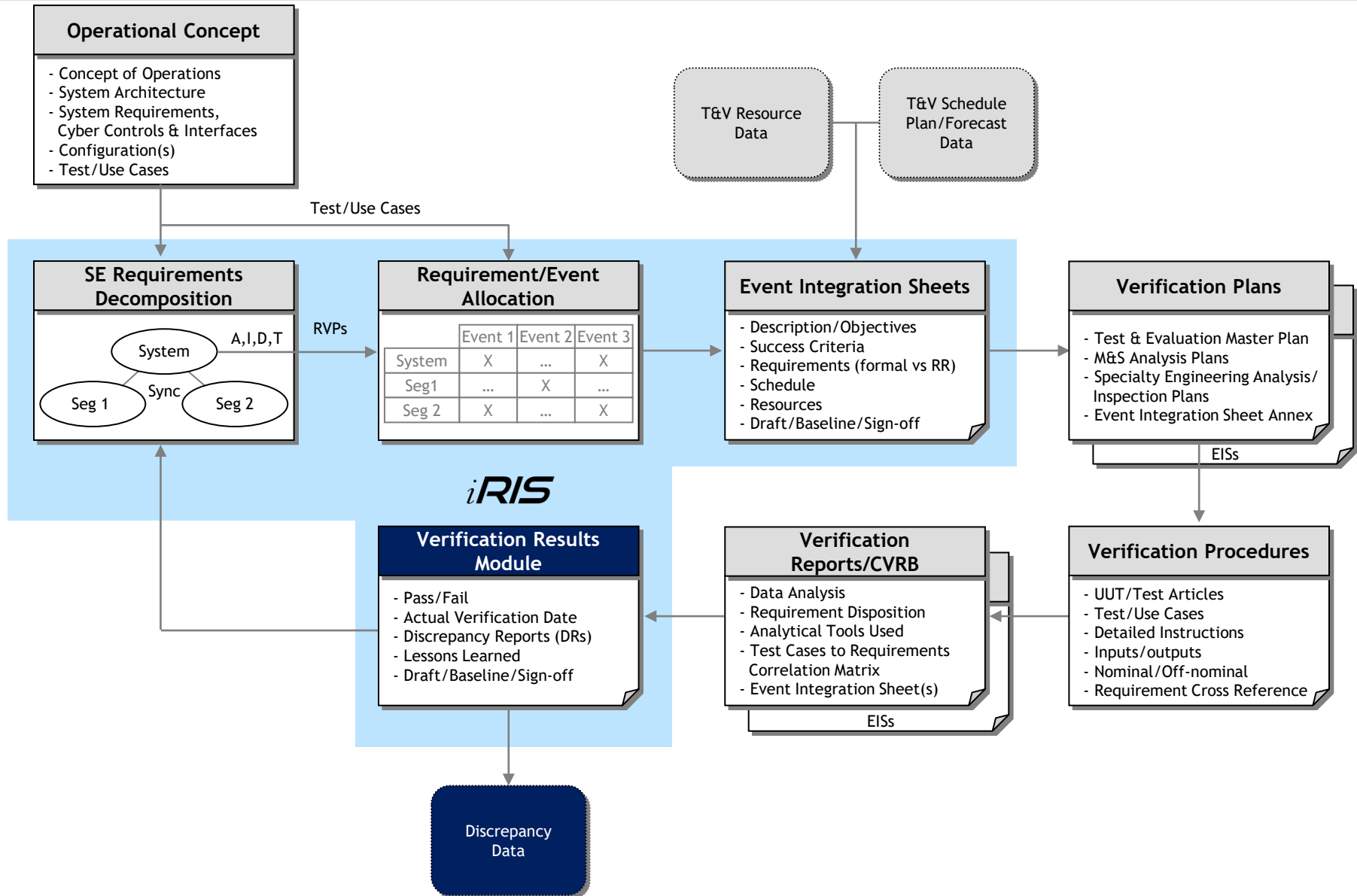




Module 4: Requirements Verification Completion

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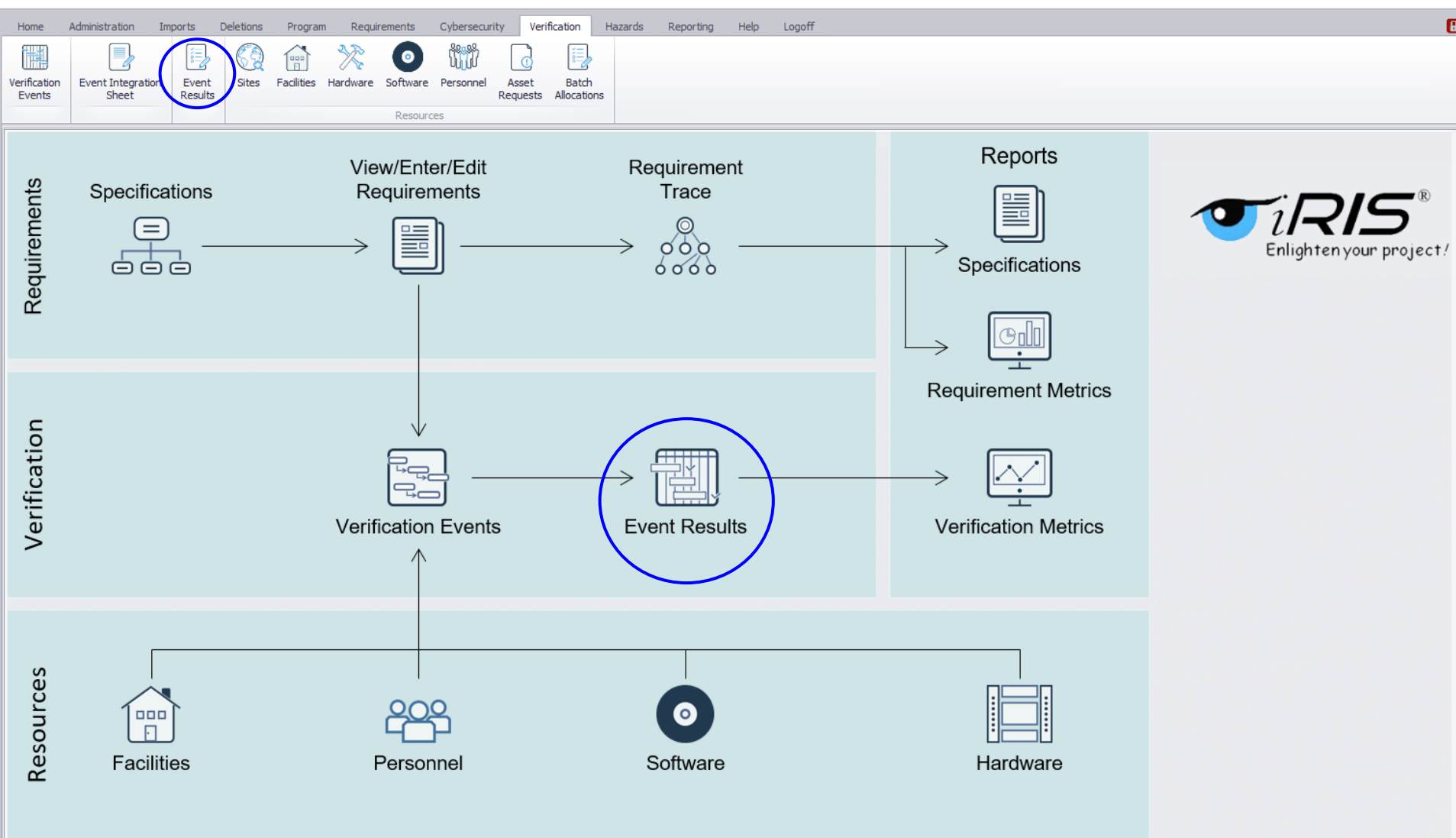
iRIS in the Verification Completion Workflow



Module Objective: Learn how to use EBP/iRIS to support verification completion

- EIS Requirement Disposition
 - Requirement Disposition Data Entry Options
 - Manual
 - Batch Processing
 - Verification Status Definitions
 - Electronic Signature
 - Requirement Level
 - Event Level

Entering the Requirements Verification Completion Workspace



EIS Completion Report

Status Options

- ☒ Met
- ☐ Not Met
- ☐ Partial
- ☐ Not Tested

| | | | | | |
|---|--------------------------|-----------------|---|-------------------------|--|
| Verification Report: 1017-FTS Flight Termination System Performance Test | | | | | |
| 18 Requirements | | | | | |
| Start: 12/28/2019 | | End: 12/28/2019 | | | |
| Links to EIS Documents and Information | | | | | |
| Description: | | | Hyperlink: | | |
| | | | | | |
| Requirement Number: | CA-007 | External ID: | | Name: | Nozzle Control Actuator Drive nut and thrust base assembly |
| Description | | | | | |
| For multi turn rising stem applications, the drive nut shall be installed in a detachable, ductile iron thrust base. The design shall allow actuator removal from the thrust base, leaving the thrust base attached to the valve to retain valve position. Thrust bearings shall be lubricated by means of an easily accessible grease fitting. | | | | | |
| Status: | Met | Specification: | 08) Booster TVC Actuators | Deviation Report Number | |
| Verification Evidence | Test Report 123, Page 96 | | | Waiver Number | |
| Verification Approach | | | | | |
| Specific data monitors were sampled to verify correct levels | | | | | |
| Links to Result Documents and Information | | | | | |
| Description: | | | Hyperlink: | | |
| Compliance Artifact | | | http://localhost/pro_1/Hyperlinks/risetime.png | | |
| Signatures | | | | | |
| Responsibility | | Staff Name: | | Date | |
| Responsible Engineer | | | | | |
| Customer | | | | | |

Verification Status Color Code Definition *CelerisSystems*SM

| Verification Status Color Code Legend | |
|--|----------------|
| Formal Verification | Risk Reduction |
| Met | Met |
| Open | Open |
| Not Tested | Not Tested |
| Partial | Partial |
| Not Met | Not Met |

- Color Codes Used in iRIS GUIs & Reports
- Provide Real-time Verification Status

Verification Report: 1017-FTS

Flight Termination System Performance Test

Requirement Details

Requirement Number: CA-013

Requirement Name: Nozzle Control Actuator Single Point Failure

Requirement Description

The Nozzle Control Actuator shall undergo an analysis that demonstrates that the system satisfies the fault tolerance requirement. Each analysis shall follow a standard industry methodology such as a fault tree analysis or a failure modes effects and criticality analysis.

.....

Verification Evidence

Test Report 123, Page 99

.....

Deviation Report Number

Waiver Number

Status:

☒ Met

☐ Not Met

☐ Partial

☐ Not Tested

Verification Approach

Specific data monitors were sampled to verify correct levels

.....

Back

Update

Result Sign-Off

.....

Result Hyperlinks

| Name | Hyperlink |
|-----------------------|--|
| ▶ Compliance Artifact | http://localhost/pro_1/Hyperlinks/risetime.png |

New...

View

Delete

iRIS Administrator Can also Batch Import Results Using MS Excel

- On Occasion, Requirements May Migrate in-to or out-of EISs During the Verification Results Data Entry Process
- iRIS has Built-in Controls to Notify Users When Requirement Migration has Occurred:

iRIS
Administrators
and EIS Owners
can Accept or
Reject these
Changes

Session Results

Verification Report:

Drag a column header here to group by that column

| Locked | Verification Num... | Title | Actual St... | Actual End | Assessments or Verifica... | Results Prep... | Results In |
|-------------------------------------|---------------------|--------------------------------|--------------|------------|----------------------------|-----------------|------------|
| <input type="checkbox"/> | 1000-IMU | IMU Mass Properties | 9/7/2019 | 9/7/2019 | 5 | 5 | 1 |
| <input type="checkbox"/> | 1001-IMU | IMU Design and Construction | 9/8/2019 | 9/10/2019 | 3 | 3 | 3 |
| <input type="checkbox"/> | 1002-IMU | IMU Load Deflection | | | 3 | 3 | 3 |
| <input type="checkbox"/> | 1003-IMU | IMU Reliability Analysis | | | 3 | 3 | 3 |
| <input type="checkbox"/> | 1004-IMU | IMU Load Dynamics Test | | | 2 | 2 | 2 |
| <input checked="" type="checkbox"/> | 1005-IMU | IMU End-to-End Test | | | 28 | 26 | 26 |
| <input type="checkbox"/> | 1006-Batt | Battery Mass Properties | | | 5 | 5 | 4 |
| <input type="checkbox"/> | 1007-Batt | Battery Design and Construc... | | | 2 | 2 | 2 |
| <input type="checkbox"/> | 1008-Batt | Battery Load Deflection | | | 2 | 2 | 2 |
| <input type="checkbox"/> | 1009-Batt | Battery Reliability Analysis | 10/6/2019 | 10/12/2... | 7 | 7 | 7 |
| <input type="checkbox"/> | 1010-Batt | Battery Load Dynamics Test | 10/13/2019 | 10/18/2... | 6 | 6 | 6 |
| <input checked="" type="checkbox"/> | 1011-Batt | Battery End-to-End Test | 10/18/2019 | 10/26/2... | 14 | 12 | 12 |
| <input type="checkbox"/> | 1012-FTS | FTS Mass Properties | 10/22/2019 | 10/26/2... | 7 | 7 | 5 |

Open Session

Indicates
Requirements
have been added
to the EIS

Verification Report:

Drag a column header here to group by that column

| Locked | Verification Num... | Title | Actual Start | Actual End | Assessments or Verificati... | Results Prepped | Results In |
|-------------------------------------|---------------------|--------------------------------|--------------|-------------|------------------------------|-----------------|------------|
| <input type="checkbox"/> | 1000-IMU | IMU Mass Properties | 9/7/2019 | 9/7/2019 | 5 | 5 | 1 |
| <input type="checkbox"/> | 1001-IMU | IMU Design and Construction | 9/8/2019 | 9/10/2019 | 3 | 3 | 3 |
| <input type="checkbox"/> | 1002-IMU | IMU Load Deflection | 9/11/2019 | 9/13/2019 | 3 | 3 | 3 |
| <input type="checkbox"/> | 1003-IMU | IMU Reliability Analysis | 9/14/2019 | 9/16/2019 | 3 | 3 | 3 |
| <input type="checkbox"/> | 1004-IMU | IMU Load Dynamics Test | 9/17/2019 | 9/18/2019 | 2 | 2 | 2 |
| <input checked="" type="checkbox"/> | 1005-IMU | IMU End-to-End Test | 9/19/2019 | 10/14/20... | 25 | 26 | 26 |
| <input type="checkbox"/> | 1006-Batt | Battery Mass Properties | 10/1/2019 | 10/17/20... | 5 | 5 | 4 |
| <input type="checkbox"/> | 1007-Batt | Battery Design and Construc... | | | 2 | 2 | 2 |
| <input type="checkbox"/> | 1008-Batt | Battery Load Deflection | | | 2 | 2 | 2 |
| <input type="checkbox"/> | 1009-Batt | Battery Reliability Analysis | | | 7 | 7 | 7 |
| <input type="checkbox"/> | 1010-Batt | Battery Load Dynamics Test | | | 6 | 6 | 6 |
| <input checked="" type="checkbox"/> | 1011-Batt | Battery End-to-End Test | | | 14 | 12 | 12 |
| <input type="checkbox"/> | 1012-FTS | FTS Mass Properties | | | 7 | 7 | 5 |
| <input type="checkbox"/> | 1013-FTS | FTS Design and Construction | | | 3 | 3 | 3 |
| <input type="checkbox"/> | 1014-FTS | FTS Load Deflection | 10/20/2019 | 11/6/2019 | 8 | 8 | 8 |

Indicates
Requirements
have been
Removed from
the EIS

Verification Report: 1017-FTS

Flight Termination System Performance Test

Requirement Details

Requirement Number: CA-013

Requirement Name: Nozzle Control Actuator Single Point Failure

Requirement Description: The Nozzle Control Actuator shall undergo an analysis that demonstrates as a fault tree analysis or a failure modes effects and criticality analysis

Verification Evidence: Test Report 123, Page 99

Deviation Report Number:

Waiver Number:

Status:

Met

Not Met

Partial

Not Tested

Verification Approach: Specific data monitors were sampled to verify correct levels

Event Requirement Result Signatures

Requirement: CA-013 Event: 1017-FTS

Responsible Engineer Approval:

Sign Off

Customer Approval:

Sign Off

?

Back

Update

Result Sign-Off

Result Hyperlinks

| Name | Hyperlink | |
|---------------------|--|--|
| Compliance Artifact | http://localhost/pro_1/Hyperlinks/risetime.png | <div><div>New...</div><div>View</div><div>Delete</div></div> |

Session Results

Verification Report: 1017-FTS

Flight Termination System Performance Test

Session Details:

Signatures

Back

Update

Lock Session

Session Hyperlinks

Name

Session Requirements

Requirement N...

CA-007

CA-013

CA-010

CA-002

CA-011

CA-016

CA-021

CA-022

Result Signatures

1017-FTS

Event Developer Results Approval:

Ray Della

09/22/2020 03:33 PM

Remove

Event Conductor Results Approval:

Joe Dunn

09/22/2020 03:42 PM

Remove

Customer Results Approval:

Angel Martinez

09/22/2020 03:43 PM

Remove

?

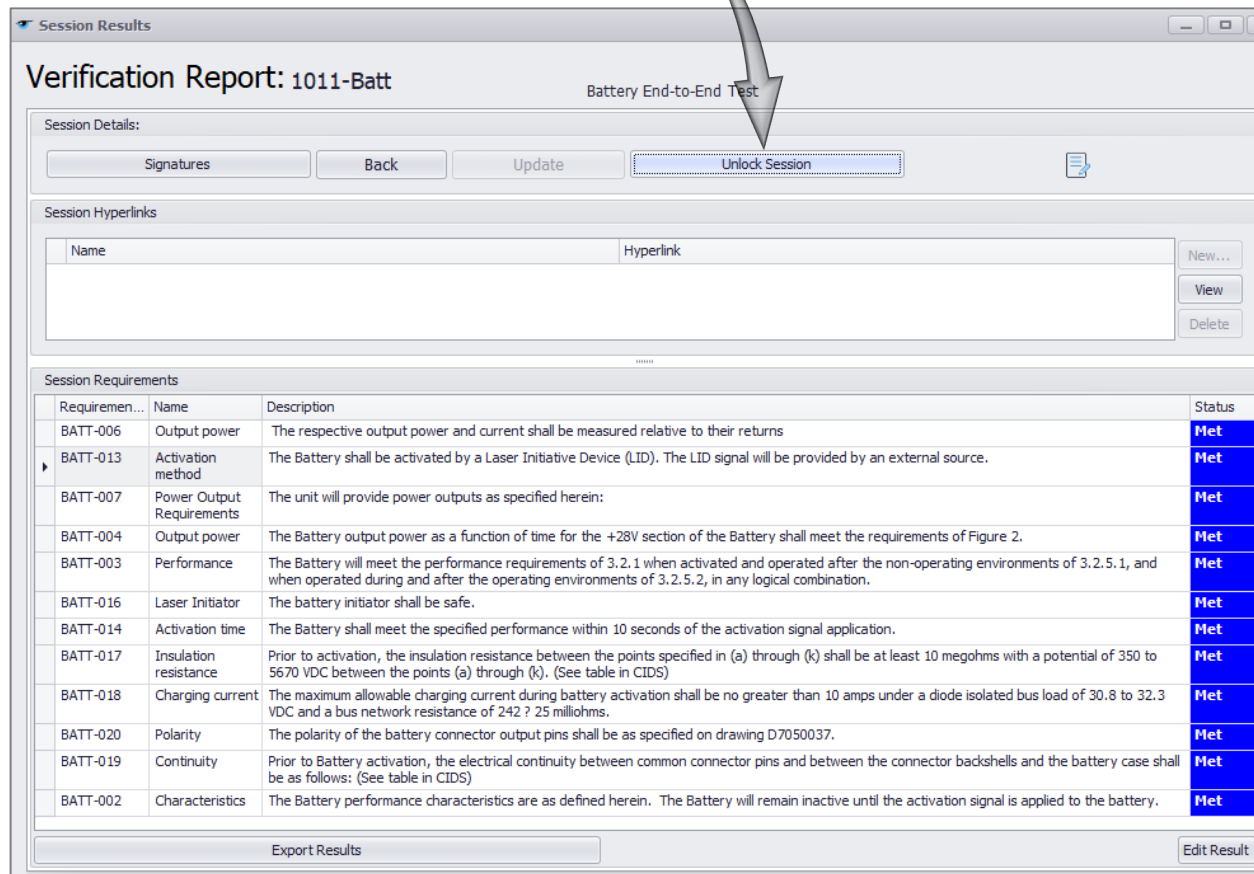
Close

| | | | |
|--------|---|---|-----|
| CA-010 | Mass Properties | effects and criticality analysis. The actuator shall weigh less than TBD pounds. | Met |
| CA-002 | Nozzle Control Actuator Sizing | The actuator shall be sized to guarantee valve closure at the specified torque and/or thrust requirement as indicated by the valve manufacturer or supplier. The actuator must be adequately sized to provide the torque required to operate the valve at 90% of the nominal voltage. The operating speed shall provide valve closing and opening at approximately 12 inches per minute for gate valves, 4 inches per minute for globe valves and as indicated in the valve list for quarter turn valves. Quarter-turn valves shall be furnished with mechanical stops that restrict the valve/actuator travel. | Met |
| CA-011 | Nozzle Control Actuator Activation time | b. The output data interface, including BIT, shall be present within 2 seconds after application of all input power and system clock. | Met |
| CA-016 | Nozzle Control Actuator Sneak Circuit | With all components functioning nominally, the Nozzle Control Actuator analysis shall demonstrate that there are no latent paths that could cause an undesired event or inhibited function. | Met |
| CA-021 | Nozzle Slew Rate | The slew rate shall exceed XX°/sec in each axis, for all four nozzles acting simultaneously, retract or extend, for a greater than X° nozzle step command. | Met |
| CA-022 | Nozzle Torque | The nozzle torque values shall not exceed XXXX in-lbs. | Met |

Export Results

Edit Result

iRIS Administrators and Event Owners can Lock the Results Session When Data Entry is Complete



The screenshot shows the 'Session Results' window for a 'Verification Report: 1011-Batt'. The window title bar includes standard OS controls. The main content area is divided into several sections:

- Session Details:** Contains buttons for 'Signatures', 'Back', 'Update', and 'Unlock Session'. An arrow points to the 'Unlock Session' button.
- Session Hyperlinks:** A table with columns 'Name' and 'Hyperlink', and buttons 'New...', 'View', and 'Delete'.
- Session Requirements:** A table listing various requirements and their status.
- Export Results:** A button at the bottom left.
- Edit Result:** A button at the bottom right.

Session Requirements Table:

| Requirement... | Name | Description | Status |
|----------------|---------------------------|--|--------|
| BATT-006 | Output power | The respective output power and current shall be measured relative to their returns | Met |
| BATT-013 | Activation method | The Battery shall be activated by a Laser Initiative Device (LID). The LID signal will be provided by an external source. | Met |
| BATT-007 | Power Output Requirements | The unit will provide power outputs as specified herein: | Met |
| BATT-004 | Output power | The Battery output power as a function of time for the +28V section of the Battery shall meet the requirements of Figure 2. | Met |
| BATT-003 | Performance | The Battery will meet the performance requirements of 3.2.1 when activated and operated after the non-operating environments of 3.2.5.1, and when operated during and after the operating environments of 3.2.5.2, in any logical combination. | Met |
| BATT-016 | Laser Initiator | The battery initiator shall be safe. | Met |
| BATT-014 | Activation time | The Battery shall meet the specified performance within 10 seconds of the activation signal application. | Met |
| BATT-017 | Insulation resistance | Prior to activation, the insulation resistance between the points specified in (a) through (k) shall be at least 10 megohms with a potential of 350 to 5670 VDC between the points (a) through (k). (See table in CIDS) | Met |
| BATT-018 | Charging current | The maximum allowable charging current during battery activation shall be no greater than 10 amps under a diode isolated bus load of 30.8 to 32.3 VDC and a bus network resistance of 242 ± 25 milliohms. | Met |
| BATT-020 | Polarity | The polarity of the battery connector output pins shall be as specified on drawing D7050037. | Met |
| BATT-019 | Continuity | Prior to Battery activation, the electrical continuity between common connector pins and between the connector backshells and the battery case shall be as follows: (See table in CIDS) | Met |
| BATT-002 | Characteristics | The Battery performance characteristics are as defined herein. The Battery will remain inactive until the activation signal is applied to the battery. | Met |