

# **FAMU/FSU College of Engineering**

## **Department of Electrical and Computer Engineering**

### **Targets**

#### **Team 304: FPL ATS Training Application**

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## Targets & Metrics

### **Inform User of ATS Hazards and Warnings**

Metric: Binary

Value: Yes/No

Justification: Verify that the application informs user of the different Safety-Alert Messages and displays the appropriate messages during training as seen in the Installation and Operation Instruction Sheet

Importance: Moderate

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the specific information found in the Installation and Operation sheet. It is of Moderate Importance because knowledge of the safety ATS Hazards and Warnings is a necessity for FPL employees. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Inform User on Automated Transformer Switch (ATS) Functionality & Components**

Metric: Binary

Value: Yes/No

Justification: Verify that the application informs users of the different ATS components and how each one of them function/are used when given a scenario that can occur in the field.

Importance: High

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Conduct Training in a Virtual Manner**

Metric: Binary

Value: Yes/No

Justification: Verify that the application is compatible with IOS devices(Mac OS, iPad, etc) and give Trainees a user-friendly/intuitive experience to use/practice repetition on an ATS.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the need to do training virtually due to COVID-19, thus making it a critical target. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Assess the User's Knowledge**

Metric: Binary

Value: Yes/No

Justification: Verify that the application challenges and tests the knowledge of the trainee. It is verified by a quiz at the end of the module.

Importance: High

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train and test FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge and perform well with the knowledge obtained, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Provide feedback during simulations and assessments**

Metric: Binary

Value: Yes/No

Justification: Verify that the application gives user-friendly/supportive feedback when a trainee decides to implement virtual maintenance on the device given a scenario on the ATS. Gives feedback regardless if the answer/implementation is correct or incorrect.

Importance: Moderate

Discussion: This target is driven by the scope of the project which is to train and test FPL employees on the ATS device, however, this requirement was something that the team came up for as an addition to the project as FPL did not specifically demand this from us and only helps to meet the requirements of other targets, therefore this is of moderate importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Display Virtual model of ATS and allow user to interact with model**

Metric: Binary

Value: Yes/No

Justification: Will provide user various important information about the ATS ranging from how it works, the function about each part, and how to perform maintenance

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train and test FPL employees on the ATS device as well as create a virtual environment of the device itself, therefore this is of critical importance. Unity, Maya, and Auto-Cad are needed to complete the virtual model. If it is included in the scope of the project then it will be validated.

### **Educate and demonstrate Normal In-Service Operation**

Metric: Binary

Value: Yes/No

Justification: Will provide information about the normal operation of an In-Service ATS. It should demonstrate what the ATS looks like when it's functioning properly.

Importance: High

Discussion: This was mentioned by the Sponsor, they wanted the training simulation to have a section that provides information about the ATS when it is running in normal operation. So the employee using the simulation will know how the ATS looks and operates when it is functioning properly.

### **Simulate Normal In-Service Operation**

Metric: Binary

Value: Yes/No

Justification: Will provide a demo of how the ATS works normally, along with the information provided this will give a user more insight of how the ATS works. Implemented in a scenario, It would let the user manipulate and play with ATS as needed.

Importance: High

Discussion: This was also mentioned by the Sponsor, they wanted the training simulation to have a section that provides information along with a simulation about the ATS when it is running in normal operation. So the user of the simulation will know how the ATS looks and operates when there aren't any errors

### **Educate and demonstrate ATS Operation during Permanent Fault**

Metric: Binary

Value: Yes/No

Justification: Provide information that will discuss what can cause a permanent fault, and how it can happen. This is help users know determine if the ATS will need service

Importance: High

Discussion: This is very important this is one of the sections that the Sponsor mentioned multiple times, the whole point of the simulation is to train users into how to service an ATS and knowing what can cause a permanent fault will help users identify if the ATS needs service or not.

### **Simulate ATS Operation during Permanent Fault**

Metric: Binary

Value: Yes/No

Justification: Showing a demo of what can cause a Permanent fault or how it can happen will help Users see specifically what conditions will cause the ATS to need maintenance

Importance: Critical

Discussion: This is very important this is one of the sections that the Sponsor mentioned multiple times, the whole point of the simulation is to train users into how to service an ATS and knowing what can cause a permanent fault will help users identify if the ATS needs service or not, adding in a simulation of what a permanent fault looks like will provide a user even more information to identify ATS's that need maintenance.

### **Educate and demonstrate ATS Operation during Temporary Fault**

Metric: Binary

Value: Yes/No

Justification: Verify the employee or trainee retained information through a quiz to confirm knowledge was delivered and received. Specific questions about this operation will be included.

Importance: High

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Simulate ATS Operation during Temporary Fault**

Metric: Binary

Value: Yes/No

Justification: Verify that the user is able to simulate taking the necessary steps and procedures to operate the ATS during a temporary fault. This simulation should be interactive with the user driving the simulation.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Educate and demonstrate Non-Reclose Lever Operation**

Metric: Binary

Value: Yes/No

Justification: Verify the employee or trainee retained information through a quiz to confirm knowledge was delivered and received. Specific questions about this operation will be included.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Simulate Non-Reclose Lever Operation**

Metric: Binary

Value: Yes/No

Justification: Verify that the user is able to simulate taking the necessary steps and procedures to perform operations with the Non-Reclose Lever. This simulation should be interactive with the user driving the simulation.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Educate and demonstrate Manual Open Procedure**

Metric: Binary

Value: Yes/No

Justification: Verify the employee or trainee retained information through a quiz to confirm knowledge was delivered and received. Specific questions about this operation will be included.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Simulate Manual Open Procedure**

Metric: Binary

Value: Yes/No

Justification: Verify that the user is able to simulate taking the necessary steps and procedures to manually open the ATS. This simulation should be interactive with the user driving the simulation.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Educate and demonstrate Visual Open using Operating Ring**

Metric: Binary

Value: Yes/No

Justification: Verify the employee or trainee retained information through a quiz to confirm knowledge was delivered and received. Specific questions about this operation will be included.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Simulate Visual Open using Operating Ring**

Metric: Binary

Value: Yes/No

Justification: Verify that the user is able to simulate taking the necessary steps and procedures to perform a visual open using the operating ring on the ATS. This simulation should be interactive with the user driving the simulation.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Educate and demonstrate Manual Close**

Metric: Binary

Value: Yes/No

Justification: Verify the employee or trainee retained information through a quiz to confirm knowledge was delivered and received. Specific questions about this operation will be included.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Simulate Manual Close**

Metric: Binary

Value: Yes/No

Justification: Verify that the user is able to simulate taking the necessary steps and procedures to manually close the ATS. This simulation should be interactive with the user driving the simulation.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Educate and demonstrate user of proper troubleshooting procedures**

Metric: Binary

Value: Yes/No

Justification: Verify that the application educates the user of troubleshooting the ATS when the semaphore is showing green indicating that the vacuum interrupter is in the open position. Furthermore, the application instructs the user on the proper steps to be taken when this scenario occurs. The information provided should be as seen in the ATS Tutorial Video.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.



### **Simulate troubleshooting procedures**

Metric: Binary

Value: Yes/No

Justification: Verify that the user is able to simulate taking the necessary steps and procedures to troubleshoot the ATS when the semaphore is displaying green. This simulation should be interactive with the user driving the simulation.

Importance: Critical

Discussion: This was specifically requested by the customer, therefore we know this is a target to implement within our design. This target is driven by the scope of the project which is to train FPL employees on the ATS device, however, it is up to the employee to obtain the knowledge, therefore it is of high importance. It does not require any tools to measure its success, if it is included in the scope of the project then it will be validated.

### **Manage Information**

Metric: Binary

Value: Yes/No

Justification: Verify that the application is correctly able to perform all I/O requests with the user and store the necessary internal data and information. This will be done by ensuring that there are no memory leaks and potential for the application to crash unless subjected to external faults.

Importance: Critical

Discussion: This target is derived from the basic nature of the final design. Software must be able to effectively and efficiently manage the information within the design. Lack of execution in this target could lead to critical failure of the design as the application would simply not function.

## **Critical Targets**

The critical targets identified directly correspond to the critical needs and functions of the final design as outlined by Florida Power and Light. The targets identified as critical mainly consist of procedures that must be educated on and simulated within the final application. These operations are critical to performing maintenance on the ATS, and thus are critical within our design. The other critical target, managing information, is designated as such due to software design practices. Management of information with a software application is crucial to prevent critical failure.

## **Summary**

The targets and metrics identified were generated to identify the main functions and procedures that the application will contain, as well as a method to verify completion of each target. Many of the targets are direct functions that the application must perform as relayed to the team by Florida Power and Light, with others being inferred or being necessary targets in software development. In a broad sense, the application must educate and simulate various ATS maintenance and troubleshooting procedures. These generalized functions were broken down into the different procedures that must be included within the application and a target was made for each. The outlined targets and metrics will provide the team with various functions that we must include within the final design and also assist in future procedures such as concept generation. The target catalog on the next page includes all of the discussed targets, metrics, importance and method of validation.

## Target Catalog

Table 1 : Target Catalog

| Metric No. | Need   | Metric | Imp.     | Units | Marginal Value | Ideal Value |
|------------|--|--------|----------|-------|----------------|-------------|
| 1          | Inform User of ATS Hazards and Warnings                            | Binary | Moderate | N/A   | N/A            | N/A         |
| 2          | Inform User on ATS Functionality & Components                      | Binary | High     | N/A   | N/A            | N/A         |
| 3          | Conduct training in a virtual manner                               | Binary | High     | N/A   | N/A            | N/A         |
|            | Assess the user's knowledge  |        | High     | N/A   | N/A            | N/A         |
| 4          | Provide feedback during simulations and assessments                | Binary | Moderate | N/A   | N/A            | N/A         |
| 5          | Display Virtual model of ATS and allow user to interact with model | Binary | Critical | N/A   | N/A            | N/A         |
| 6          | Educate and demonstrate Normal In-Service Operation                | Binary | High     | N/A   | N/A            | N/A         |
| 7          | Simulate Normal In-Service Operation                               | Binary | High     | N/A   | N/A            | N/A         |
| 8          | Educate and demonstrate ATS Operation during Permanent Fault       | Binary | Critical | N/A   | N/A            | N/A         |
| 9          | Simulate ATS Operation during Permanent Fault                      | Binary | Critical | N/A   | N/A            | N/A         |
| 10         | Educate and demonstrate ATS Operation during Temporary Fault       | Binary | Critical | N/A   | N/A            | N/A         |
| 11         | Simulate ATS Operation during Temporary Fault                      | Binary | Critical | N/A   | N/A            | N/A         |
| 12         | Educate and demonstrate Non-Reclose Lever Operation                | Binary | Critical | N/A   | N/A            | N/A         |
| 13         | Simulate Non-Reclose Lever Operation                               | Binary | Critical | N/A   | N/A            | N/A         |
| 14         | Educate and demonstrate Manual Open                                | Binary | Critical | N/A   | N/A            | N/A         |

|    | Procedure   |        |          |     |     |     |
|----|---|--------|----------|-----|-----|-----|
| 15 | Simulate Manual Open Procedure                                    | Binary | Critical | N/A | N/A | N/A |
| 16 | Educate and demonstrate Visual Open using Operating Ring          | Binary | Critical | N/A | N/A | N/A |
| 17 | Simulate Visual Open using Operating Ring                         | Binary | Critical | N/A | N/A | N/A |
| 18 | Educate and demonstrate Manual Close                              | Binary | Critical | N/A | N/A | N/A |
| 19 | Simulate Manual Close   | Binary | Critical | N/A | N/A | N/A |
| 20 | Educate and demonstrate user of proper troubleshooting procedures | Binary | Critical | N/A | N/A | N/A |
| 21 | Simulate troubleshooting procedures                               | Binary | Critical | N/A | N/A | N/A |
| 22 | Manage Information  | Binary | Critical | N/A | N/A | N/A |

## References

S and C Instruction Sheet

<https://www.sandc.com/globalassets/sac-electric/documents/sharepoint/documents---all-documents/instruction-sheet-465-500.pdf?dt=637369490850137704>