

**The A Team**

**Image Processing Tool for**

**Leidenfrost-Ratchet Systems**

**Test Plan Document for Version 2.0 (First Draft)**

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**1. Introduction/Overview**

The test plan document details the test plan for the testing phase of the software development cycle. This document set the scope of various tests to be conducted, the activities to be completed, the general resources required, and the process to be use to test the before release final product.

1.1 Purpose of Test Plan Document

The test plan document will overview the intended testing process, unit testing, integration testing, and test cases report.

1.2 Product Overview

The software's current capacity is to efficiently track a drop of liquid and record measurements through images gathered from a high speed camera as it falls from an injection needle and travels along a ratchet surface.

1.3 Test Types

This is the list of types we follow.

* **Unit Testing** – This is a white box testing to find any incorrect code within each class. The programmer does the unit testing.
* **Integration Testing** – This is a black box testing to see functionality of the user interface. Test case is required to check every possible expected result from the user interface. The tester does the integration testing.
* **System Testing** – This is a testing to see how all the forms are being put together. The tester doe the system testing.
* **Validation** – This testing and system testing is done simultaneously. It is to make sure the products meet the requirements. The tester does the validation through the test cases. If test case has fail the tester will reject and send the product back to the programmer.

1.4 Testing Process

The flow chart shows the process of the test plan.

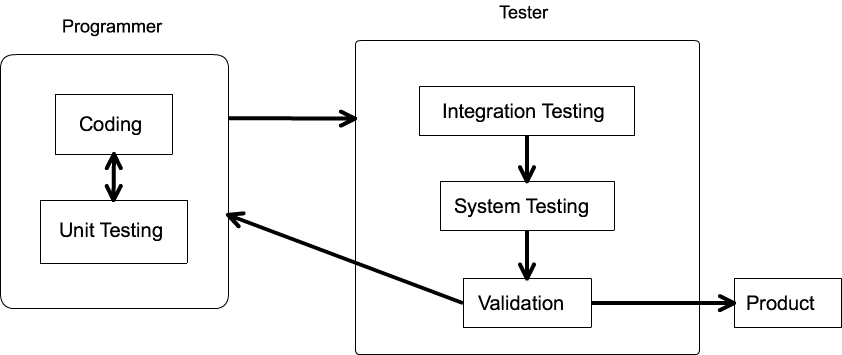


Figure 1. Test Plan Flow Chart

**2. Scope and Objectives**

The scope comprises what we intend to test and nothing more. The software's current capacity is to efficiently track a drop of liquid and record measurements through images gathered from a high speed camera as it falls from an injection needle and travels along a ratchet surface.

2.1 Unit Testing

At agreed upon regularly scheduled intervals, the system’s developmental progress will be subject to peer review. If necessary the testing schedule will correspond to the completion to a system module. The objective of these reviews is to ensure correctness and to test the functional integrity within each individual module. Issues to consider are matching of parameters, arguments, relative attributes, I/O interface and memory management. Symbolic execution will be tested utilizing “basic path testing” also known as “white box” testing, (Sommerville, pg 448).

**Entrance Criteria** - At least one module should be coded and there should be at least 100 lines of code to be tested to schedule a formal review meeting. As the group meets every Monday and Wednesday in a week, the development team will try to code at least 100 lines or at least one module by every Monday and Wednesday so that it can be formally reviewed in the next group meeting.

**Exit Criteria** - All errors identified, during formal reviews and unit testing are fixed and tested.

2.2 Integration Testing

This test proves that all areas of the system interface with each other correctly and that there are no gaps in the data flow. Final integration test proves that system works as an integrated unit when all the fixes are complete. “Test harnesses” will be constructed so that a “dummy” caller can invoke each method, and any database interaction will be with a fictitious database. The actual testing method used for this phase will be the “Black box” method, (Sommerville, pg 443). “Bottom-up testing strategy” will be followed throughout the integration-testing phase, (Sommerville, pg 453).

**Entrance Criteria** – Enough code is developed and unit tested to complete at least one class.

**Exit Criteria** – All high priority errors from Integration tests must be fixed and tested. All low priority errors left non-fixed should be documented.

2.3 System Testing

This test intends to prove that the functionality delivered by the team is as specified by the Mavis team in requirements document. It also assesses the quality of the software and ensures that the software will successfully replace/support the intended business functions required by the client. The testing strategy for the validation of the system as a whole will also utilize the “black box” method. All possible user input must be examined and any deficiencies addressed. Like the integration testing, this phase will be performed in a “bottom-up” manner.

**Entrance Criteria** – All modules and classes are implemented, unit tested and Integration tested. Complete data base is created with actual user input and the system is put into actual working environment.

**Exit Criteria** – All high priority errors from system test must be fixed and tested. If any low-priority errors are left not fixed, they should be documented.

**3. Test Schedule**

For the testing phases, the following schedule will apply, with room for flexibility as needed:

Unit testing: 5 days

Integration testing: 5 days

System testing: 1 day

**4. Resources**

The intended resources require executing the test plan.

4.1 Human

The A-Team consist of:

Sanan Aamir

Romando Garcia

Anne Lam

James Rowe

Hieu Tran

4.2 Hardware

The testing phase will required at least one PC with the following:

32 - bit architecture

at least 1GB of RAM

at least 1GB of Processor Speed

4.3 Software

System test required the following software

Microsoft .NET 2.0 or higher

Windows 7 or higher

**5. Test Cases**

These are the test cases for the User Interface for system integration testing. See Appendix A.

**6. Glossary**

|  |  |
| --- | --- |
| **Term** | **Definition** |
| **Leidenfrost-Ratchet System** | A system involving a ratchet surface heated to a fluid's Leidenfrost point will allow a droplet of that fluid to spontaneous accelerate along that surface, even if it means traveling up slope. |
| **Droplet** | A very small drop of a liquid. |

**7. References**

This document was completed with the guidance from the Mavis and Scors test plan document, Test Plan PowerPoint written by Catherine Stringfellow, a professor at Midwestern State University, and Software Engineering book written by Sommerville.

Appendix A – Test Cases

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test Cases | Step & Input | Expected Results | What is Tested | Actual Results | Pass or Fail |
| **Load Button** |  |  |  |  |  |
| LB 011  Open File Dialog | Click Load Button > Show Open File Dialog | Open File Dialog Should Appear | User Interface |  |  |
| LB 021 Accept Directory .TIF | Find Image Directory > Open .TIF image folder | Accept .TIF Directory | Open File Dialog |  |  |
| LB 022  Accept Directory .BMP | Find Image Directory > Open .BMP image folder | Accept .BMP Directory | Open File Dialog |  |  |
| LB 023  Reject Single File | Find Image Directory > Open single file | Will not show single file | Open File Dialog |  |  |
| LB 024  Reject Other Directory Extension | Find Image Directory > Open other folder directory | Will not allow user to select other extension | Open File Dialog |  |  |
| LB 031 Show Image | Find Directory > Click Open | Will show Image on UI | User Interface / Open File Dialog |  |  |
| LB 032  Enable Run Button | Find Directory > Click Open | Run Button Will Enable | User Interface |  |  |
| LB 033  Enable Calibrate Button | Find Directory > Click Open | Calibrate Button Will Enable | User Interface |  |  |
| **Initial User Interface** |  |  |  |  |  |
| UI 011 Disable Calibrate Button | Click Image Processing Application | Calibrate Buttons disable | User Interface |  |  |
| UI 012 Disable Run Button | Click Image Processing Application | Run Button is Disable | User Interface |  |  |
| U! 013  Disable Black/White Calibration Drop down | Click Image Processing Application | Black/White Calibration drop down is disable | User Interface |  |  |
| UI 014  Enable Load Button | Click Image Processing Application | Enable Load Button | User Interface |  |  |
| UI 015  Enable Frame Rate Input | Click Image Processing Application | Enable Frame Rate Input | User Interface |  |  |
| UI 016  Enable Base/Needle Height | Click Image Processing Application | Enable Base/Needle Height | User Interface |  |  |
| UI 021  Enable File Menu | Click Image Processing Application | Enable File Menu | User Interface |  |  |
| UI 022  Enable Image Menu | Click Image Processing Application | Enable Image Menu | User Interface |  |  |
| UI 023 Enable About Menu | Click Image Processing Application | Enable About Menu | User Interface |  |  |
| **Frame Rate** |  |  |  |  |  |
| FR 011  Enter Frame Rate | Click Up or Down to select frame rate | Let User Choose Correct Frame Rate | User Interface |  |  |
| FR 011  Enter Frame Rate | Click Down to select negative number | Should stop at zero | User Interface |  |  |
| **Base/Needle Height** |  |  |  |  |  |
| BN 011 Enter Base/Needle Height | Enter negative number Base/Needle Height | Should not let user enter negative number | User Interface |  |  |
| BN 012 Enter Base/Needle Height | Enter letter for Base/Needle Height | Should not let user enter alphabetic | User Interface |  |  |
| BN 013 Enter Base/Needle Height | Enter positive Number for Base/Needle Height | Should let user enter positive number | User Interface |  |  |
| BN 014 Enter Base/Needle Height | Enter decimal bumber for Base/Needle Height | Should let user enter decimal number | User Interface |  |  |
| **Black/White Calibration** |  |  |  |  |  |
| BW 011 Black/White Calibration | Click Up or Down to select Black/White Calibration | Should let user click up or down | User Interface |  |  |
| BW 012 Black/White Calibration | Click Down to select negtative number for Black/White Calibration | Should stop at zero | User Interface |  |  |
| **Run Button** |  |  |  |  |  |
| RB 011 Run Button | Click Run Button | Generate excel | User Interface |  |  |
| RB 012 Run Button | Click Run Button > Save File Dialog > Choose Location > Enter Name | Let user choose location and enter a name | User Interface / Save File Dialog |  |  |
| **File Menu Strip** |  |  |  |  |  |
| FM 011  Open File Dialog | Click Load Button > Show Open File Dialog | Open File Dialog Should Appear | User Interface |  |  |
| FM 021 Accept Directory | Find Image Directory > Open .TIF image folder | Accept .TIF Directory | Open File Dialog |  |  |
| FM 022  Accept Directory | Find Image Directory > Open .BMP image folder | Accept .BMP Directory | Open File Dialog |  |  |
| FM 023  Accept Directory | Find Image Directory > Open single file | Will not show single file | Open File Dialog |  |  |
| FM 024  Accept Directory | Find Image Directory > Open other folder directory | Will not allow user to select other extension | Open File Dialog |  |  |
| FM 031 Show Image | Find Directory > Click Open | Will show Image on UI | User Interface / Open File Dialog |  |  |
| LB 041  Enable Run Button | Find Directory > Click Open | Run Button Will Enable | User Interface |  |  |
| LB 051  Enable Calibrate Button | Find Directory > Click Open | Calibrate Button Will Enable | User Interface |  |  |
| **About Menu Strip** |  |  |  |  |  |
| AB 011 Show Information Form | Click About on the Menu Strip | Open an information regarding about the application | User Interface |  |  |