Equipment Validation Plan/Results

<table>
<thead>
<tr>
<th>Project:</th>
<th>High Speed Placement SMD System Installation - China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Numbers/Products that will use this equipment:</td>
<td>Various</td>
</tr>
<tr>
<td>Equipment/Process to be Validated:</td>
<td>XPF-L</td>
</tr>
<tr>
<td>Process/Product ECN Number:</td>
<td>N/A</td>
</tr>
<tr>
<td>Date Required:</td>
<td>11/1/2016</td>
</tr>
<tr>
<td>Project Manager(s):</td>
<td>Jamie Dobravec / Alfred Sham</td>
</tr>
<tr>
<td>Team Member(s):</td>
<td>Matthew Wong, Michael Yip, Franky Tang, Lina Yan</td>
</tr>
</tbody>
</table>

This form is used to approve new equipment for product. This form is provided as a base to describe “what” and “how” of the validation. Sections may be added at the discretion of the project manager or engineer.

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1. Introduction

A new FUJI XPF-L High Speed SMC Placement System machine has been purchased to assist in the production of the various PCBA’s at Grayhill’s Shenzhen facility. This plan will aid in the proper installation and validation of the new equipment.

1.1. Objective

Receive, install, and qualify the new placement machine for use in all China PCBA assembly.

1.2. Reference Documents

- FUJI XPF-L Installation Documentation
- FUJI XPF-L Operator Manual
- FUJI XPF-L Technical Manual

2. Validation Plan

2.1. Installation Qualification Plan

The machine was delivered to the Shenzhen, China facility on 2016.08.29. An electrician wired the machine before Grayhill’s installation team arrives on 2016.09.01. The electricity run to the breaker box next to the machine will able to produce 200 VAC, 3 phase, 50-60Hz power. Operating conditions will be between 20 and 30C.

2.2. Operational Qualification Plan

After the machine is completely installed, all specifications located in the user manual will be verified. All potential profiles will be run to ensure each profile is operational within the program and the wave solder machine. The FUJI XPF-L System machine will be added to eMaint for preventative maintenance.

2.3. Performance Validation/Qualification Plan

A representative sample PCBA will be processed through the placement equipment. Nominal settings to ensure a good process will be used. After placement of the components, location of components to nominal will be measured on a minimum sample of 32 pieces. Cpk values should be in the acceptable range (>1.33) for the process.
3. Results

3.1. Installation Qualification Results

- Verify Environmental requirements:
  - 20 – 30°C
  - 30 – 80% Humidity
  - 60 – 80 Decibals

- Ensure floor is capable of holding 1500kg and level level
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- Ensure space is capable of supporting System

<table>
<thead>
<tr>
<th></th>
<th>Length</th>
<th>Depth</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1500mm</td>
<td>1607.5mm</td>
<td>1419.5mm</td>
</tr>
</tbody>
</table>

- The environment is clean
- Verify power is available for 200V, 50 or 60 Hz, 3 Phase 30 AMPS

- Verify a pneumatic supply of clean, non lubricated air which should maintain:

  Air supply 0.5MPa

Input voltage: 198V
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☑️ Verify data transmission wire correct connection (network)
Verify the PCB handling I/F transmitting signal connection.

Verify the MFU materials plate bracket installation.
- Verify the height of MFU, adjust the height of the MFU: 23 mm

- Verify material fixed station installation
Machine preparation transit brackets and screws removal
Verify emergency Stop buttons function
3.2. Operational Qualification Results

Operational testing will qualify system hardware and software functionality

- Verify the following:
  - **Placement capability**: 25000 components/hr
  - **Placement tact time**: 0.144 seconds/component
  - **Placement Accuracy**: Chips ±0.050mm
    - Leaded parts ±0.040mm
  - **Conveyor loading time**: 1.8 sec

- Verify the Nozzles fit correctly and tape feeder handles reel size
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- Verify width capability as follows:

<table>
<thead>
<tr>
<th>Board Specifications</th>
<th>Metric</th>
</tr>
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<tbody>
<tr>
<td>Width (XPF-L) Min</td>
<td>50*50mm</td>
</tr>
<tr>
<td>Max</td>
<td>457*356mm</td>
</tr>
</tbody>
</table>

- Verify XPF-L I/O diagnostic capability
Verify XPF-L the placement accuracy test

*Training*

The following associates have been properly trained.

- _Franky tang_ __________________________
- _Pen Huihua_ __________________________
- _Wang guangquan_ _______________________
3.3. Performance Qualification Results

Ran one representative PCBA order of 88 pieces through all processing following the pick and place operation. Placement of the components on the PCBA’s were visually inspected with no abnormalities. Assemblies using these PCBA’s were built and tested with no electrical issues.

CpK data collected for location of components.

FUJI XPF-L chip shooter X-Direction CPK: 1.57

<table>
<thead>
<tr>
<th>组内</th>
<th>总体</th>
<th>实际</th>
</tr>
</thead>
<tbody>
<tr>
<td>STDEV</td>
<td>0.010356</td>
<td>0.010273</td>
</tr>
<tr>
<td>CPK</td>
<td>1.579</td>
<td>1.592</td>
</tr>
</tbody>
</table>
FUJI XPF-L chip shooter Y-Direction CPK: 2.20

Verifie the placement and quality following reflow.
4. Conclusion

Following installation of the new XPF-L high speed placement machine, all functions of the equipment were found to be normal and production utilizing this equipment was found to be without error.

**Approvals**

<table>
<thead>
<tr>
<th>VP – Global Quality</th>
<th>October 17, 2016</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>October 17, 2016</td>
<td>Date</td>
</tr>
<tr>
<td>Operations BUL/VP</td>
<td>October 17, 2016</td>
<td>Date</td>
</tr>
</tbody>
</table>