

# **INTERNSHIP REPORT**

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## **INTRODUCTION:**

This report is an overview of my internship experience at SYRMA SGS TECHNOLOGY LTD from 25.06.2024 to 25.07.2024. I gained Hands on experience about the EMS (Electronics manufacturer services), With real working professionals. This experience has helped me increase my knowledge in the Field. This document gives a detailed explanation about my learning outcomes and knowledge gained from the esteemed organisation.

## **SMT LINE: (UNIT-1)**

### **WHAT IS SMT?**

Surface Mount Technology is the process of mounting electrical components directly to the surface of the Printed Circuit Board(PCB).

The SMT components are referred as SMD(Surface Mount Device).

In industry, this approach has largely replaced the through-hole technology construction method of fitting components, in large part because SMT allows for increased manufacturing automation which reduces cost and improves quality.

An SMT component is usually smaller than its through-hole counterpart because it has either smaller leads or no leads at all. It may have short pins or leads of various styles, flat contacts, a matrix of solder balls (BGAs), or terminations on the body of the component..

BGA-Ball Grid Array is a type of surface-mount packaging (a chip carrier) used for integrated circuits.

## **SMT PROCESS:**

### **1. PCB LOADER:**

PCB loader is machine in which the PCB is loaded for the further processes.

For each product or design, the PCB is provided by the customer to the company depending on the quantity required.

### **2. SCREEN PRINTING:**

In this process a Solder Paste is printed on the PCB loaded according to the design of the product. The paste is printed in places required on which the components is places further.

The solder paste is mixture of Powder and Flux. The Flux serves as a temporary glue to hold the surface mount components in place as well as cleansing the soldering surfaces of impurities and oxidation.

The solder paste consists of 88.5% of powder and 11.5% of flux.

There are types of **SOLDER PASTE**

#### **1. Leaded :**

Leaded solder paste provides extra shining and holds the components to the board. The leaded paste melts at lower temperature than leaded free temperature.

But metals like lead(Pb), Mercury(Hg), and Cadmium (Cd) are hazardous and needs to be carefully handled.

#### **2. Lead free :**

The alternative solder paste is Lead free paste. This is also called as SAC 305 → consisting Tin (96.5%), Silver (3%), Copper (0.5%).

The paste melts completely around 217 °C.

### **3. SOLDER PASTE INSPECTION**

The solder paste printed on the PCB is inspected using Automated Machine which programmed to check for the existence of the solder paste in the required paste according to the design of the product.

In some places the solder paste might be missing in such cases the next process.

### **4. PICK AND PLACE**

The work or purpose of the machine is as its name suggests that is to pick and place the SMD's on the board where it is programmed by the programmer.

SMD products come in the form of reels. The capacitors and resistors and ICs are in range the scale of millimetre only.

The input to the machine is the SMD components in the form of reels, which are placed on PCB above the solder paste.

### **5. REFLOW OVEN**

After the placements of the components the board moves to the next stage, that is to the REFLOW OVEN.

The reflow oven has three stages:

#### **1. PREHEAT ZONE:**

In zone the temperature is increased gradually throughout the oven. The whole zone is divided into many subzones which has raised temperature than the previous one.

This is done in order to protect the cracking of components due to sudden rise in the temperature.

## 2. SOAK ZONE:

The zone where the solder paste gets activated. Throughout the oven the supply of Oxygen is completely cutoff. This is achieved by applying Nitrogen to the oven, this also cleans any contamination in the board.

## 3. REFLOW ZONE:

Solder pastes melt completely and is present in liquid state.

The maximum temperature is reached in the reflow zone.

The board passes through Coolants, where the board and component are sticks together through the solder pastes.

The board comes out soldered.

## 6. AOI

AOI stands for AUTOMATIC OPTICAL INSPECTION. The machine checks for placement of components or missing components by comparing a good sample with the present board.

In AOI there different defects found:

1. Thumb stone – Any components are shifted to 90°
2. Solder filled – Dry solder (less solder paste)  
Less solder( no solder pastes at all)

Excess solder

**3. Bill board – Shift in components pad placements**

## **7. PCB UNLOADER AND FINAL VI**

The PCB is finally unloaded and is sent for Final Visual Inspection.

The Final VI is done manually using microscope, in this stage the solder pastes if any on the Golden Finger is removed, excess solder balls are removed.

In case if the board fails the tests, it is sent for Rework Process.

After passing the Final VI the PCB batch is sent for labelling.

## **WAVE LINE: (UNIT- 1)**

### **WHAT IS THT?**

Through Hole Technology is a manufacturing scheme in which leads on the components are inserted through holes drilled in printed circuit boards (PCB) and soldered to pads on the opposite side, either by manual assembly (hand placement) or by the use of automated insertion mount machines.

Components which cannot be mounted through SMT process, are fixed by through hole process.

The size of the component determines the process of mounting, if the components is heavy, tall which cannot be picked up by the machine, it soldered through hole.

## **WAVE SOLDERING:**

Wave soldering is a bulk soldering process used for the manufacturing scheme in which leads on the components are inserted through holes drilled in printed circuit boards (PCB) and soldered to pads on the opposite side, either by manual assembly (hand placement) or by the use of automated insertion mount machines.

The Soldering metal is same as for the SMT process but instead it is the form of a metal bar which liquified by heating and later pumped up as standing wave through which the board is passed for soldering.

## **WAVE PROCESS:**

### **1. PREFORMING:**

The components for THT are present as single pieces.

Before stuffing each component is performed in the Wave Store.

Preforming→ The components are preformed according to the customers requirements. The dimension and value of the component is tested and mended. In case of dimensions, they are cut and preformed according to the customer requirements.

## **2. STUFFING:**

Stuffing is done manually. Stuffing has different stages, the components are separated according the stages, in each stage each component is stuffed to the PCB.

The components stuffing lead should around 1.2mm to 1.5mm.

Stuffing is also important process any mistake in the stage might lead to complete rejection of the board itself. Example, if a component is missed while stuffing during the next stage the solder liquid enters the board through the hole of the missing component.

## **3. FLUX SPRAY:**

Unlike in SMT the soldering materials does not consist of flux in itself. Therefore, the Flux is sprayed on the surface of the board before being sent to the wave soldering.

Flux is a performance enhancer. By removing oxides from electrical contacts and prepping the PCB surface, solder flux sets the stage for a robust metal-to-metal bond.

## **4. WAVE AND MANUAL SOLDERING:**

Next the board is sent for wave soldering. In this process of soldering, we get solder waste DROSS also. Dross is nothing but Solder + Sand. This can be recycled and used again.

Wave soldering in itself has two types, LAMDA WAVE, CHIP WAVE. Lambda wave is for soldering THT components. While the Chip wave is used for soldering GLUED SMT, where the glue and chip soldering provides more adhesive to the components of the board.



Few components like battery, super capacitors, and cable wires are fixed through manual soldering only.

#### **5. VISUAL INSPECTION:**

After soldering the leads are cut and the board is cleaned using brush. Later it is sent for visual inspection, where each board is checked manually.

Golden Sample is the sample of the product with which the whole production is compared with.

### **FINISHING: (UNIT – 1)**

#### **LASER PRINTING:**

The laser printer is used to print the model's name and other details required by the customer on the BGA. Marking Builder Software and YJ Linker software are used to programme the laser printer.

#### **ROUTER MACHINE:**

The machines Cutts a panel into boards in the desired shape. Each panel has 6 boards in it.

#### **X-Ray :**

The X-Ray of the machine is compared with that of good product. The internal defects of the components are found out through the X-Ray machine.

## **BACKEND PROCESSES: (UNIT – 1)**

Backend process is the process in which the board is TESTED and QUALITY is assured for the product manufactured.

Each product has different backend process.

### **TPE:**

Total Power Europe, these boards are used to supply power to coffee makers, heaters, etc.

Steps of processing the TPE board:

- 1. PROGRAMMING STAGE:** Program is uploaded to the IC of the board .
- 2. FUNCTIONAL TESTING:** In this test the customer provides the Input test cases and each Input must give the expected Output. Each case needs to be passed for the board to be sent to the next stage.
- 3. L BRACKET ASSEMBLY**
- 4. HIGH POT TESTING :** The Input is High Voltage around 2500KV. This testing is to ensure that the board works even in case of some calamities.
- 5. BURN IN TESTING:** The test is done in BURN IN CHAMBERS, where the Input is 24V,3A for an hour or 30 minutes. The values must remain same even after the given time period, if not the product is not good.

**6. REWORK ANALYSIS:** In case of any rejection or failure in any stage of testing in the backend process, in this stage the cause of failure is found reworked.

## **7. VISUAL INSPECTION**

**8. FQA:** Final Quality Assurance, after this stage the product is directly sent to packing process.

After each testing the product is labelled, conforming that the board has passed the test.

## **DANFOSS LINE:**

The products or board manufactured are used inside OVEN, VENDING MACHINES, SERVERS etc.

The company itself has different models manufactured.

Steps of processing a Danfoss board:

**1. SOLDERING TOUCHUP:** Through manual soldering external connectors are placed. These external extensions depend on the model and design of the product.

**2. ICT MACHINE TESTING:** In circuit Tester, is used to check if each component is working and their values are correct. To analyse the defect in the board.

For each product the fixture of the pogo pins are changed. Pogo pins are used to connect the board's test points.

**3. FUNCTIONAL TESTING:** In this test the customer provides the Input test cases and each Input must give the expected Output. Each case needs to be passed for the board to be sent to the next stage.

**4. COATING:** The boards are coated in order to protect from oxidation. The coating is done only the places specified by the customer. And spots where the program is loaded and input output is obtained are not coated. Coating process depends upon on the product, either it is done manually or through machine. In machine the top and bottom of the board are coated separately.

## **IT PRODUCTS: (UNIT – 3)**

### **ADATA**

ADATA is manufactured for HP.

ADATA has types 1.DRAM 2. SSD

### **ESSENCORE**

Essencore also manufactures DRAM and SSD

### **SSD:**

After SMT and WAVE process and the board is further processed and tested:

1. K1 TESTING
2. RDT CHAMBER TESTING
3. K2 STAGE
4. PARTITION TESTING
5. BURN IN TESTING
6. CRYSTAL TESTING
7. LABELING
8. CASING
9. K3 STAGE
10. QUALITY CHECKING

**DRAM:**

DRAM – Dynamic Random Access Memory, is manufactured for 16GB, 8GB each in UDIM(CPU) and SODIM( laptop)

Backend process for DRAM:

1. SPD(serial presence detect ) File uploading
2. Labelling
3. Memory test 1(Intel core CPU)
4. Memory test 2(AMD Riser CPU)
5. Burn in test
6. SPD verification
7. Visual Inspection

**WIRING HARNESS: (UNIT – 3)**

From the receiving store the required cable is verified using the Buy-off sheet, using various identifications like AWG ( American Wire Gauge), UL Marking Style.

After verifying the wires, the wiring process is done through machine and manually using separate machines.

The automated machine all the process by itself and gives the processed wire, whereas in manual processing each step of operation is done manually and then taken to the next stage.

Steps of process:

1. **CRIMPING:** The wire is cut according to the measurements given by the customer. Example to manufacture a part of a Drilling machines connection, the length is given by the customer itself.
2. **STRIPPING:** The insulation is stripped from both sides for 2mm and 4mm respectively.
3. **CRIMPING:** To the side of 2mm strip the crimp is attached
4. **TINNING:** To the side of 4mm strip, it is tinned using lead free paste.
5. **PULL LOAD TEST:** A wire is pull load tested twice, once before tinning the wire and next after inserting the connector. Without connector the wire must with stand 3KG, and with connector the wire must with stand at least 1KG.
6. **VISUAL INSPECTION:** Bending of crimping and measurements of the crimp is inspected in this stage.
7. **CONNECTOR INSERTING:** It can also be called as HOUSING ASSEMBLY. The connector part is attached to the wire.
8. **HST SLEEVE INERTING:** The Heat Shrinkable Sleeve is inserted to provide grip and insulated protection to the two wires combine together.
9. **HEAT SHRINKING:** Using the Blowers Temperature the HST wire is shrunk. It is must that the wire and shrunk HST wires remains straight.

**10. FORMING:** The tinned side of wire which is of 4mm is formed to 3mm as that is the final required length. This process can also be called as Lead Cutting.

#### **11. CONTINUITY TESTING**

#### **12.QUALITY AND VISUAL INSPECTION**

### **STORES: (UNIT – 1)**

Raw materials are stored in the stores. If the required raw material for a production is not present then the Supply Chain Management (SCM) is responsible for placing the order, later the Purchase Order(PO) is generated. And the stores are filled again.

Storing also has a process to follow:

- 1. RECEIVING STORES:** Here the physical Invoice is matched with the data stored in the system. SAP ( System Administrative Process) is used to check or verify the bill with the data.
- 2. GRN AND BATCH NO. GENERATION:** Later the Goods Receipt Note is generated along with the Batch number.
- 3. IQC:** Incoming Quality Control, the stage where the quality of the goods received is verified. In every material label, manufacturer part number, manufacture name is matched with the SAP details.

Parts are divided as STANDARD and NON- STANDARD parts.

For various components depending on their method of mounting dimensions and specifications are checked.

4. **BINDING:** Placing the parts in the location using PD machine. It is called binding because the material and location are bound with each other.
5. **KITTING:** Collecting the material according to the kit sheet generated, from the bound location of the material.
6. **CUT-REEL:** Components in reels are left buffer components as small components might fall off during these long processing.
7. **QUALITY BUY OFF**

## **RFID PRODUCTION: (UNIT – 2)**

The RFID produced is used inside Philips Electric Brush for tracing purposes. The product might look very small in the shape and size if ring but it goes under a long process to finally get the desired part of the brush.

1. **WINDING:** With a raw metal wire, a Coil with 12 turns is coiled. The wire has AWG = 38. The shape and number of turns varies according to customer requirement. More the turns less are the range of frequency. The range of frequency is around (12.5 – 14.5)
2. **LEAD FREE PASTE TINNING**
3. **SOLDERING OF CHIP:** The chip supplies from the customer side itself.
4. **TESTING**
5. **EPOXY COATING:** Food grade epoxy is used. The coil is inserted in the epoxy coated mould
6. **CURING OVEN:** (85° – 90°) FOR 2 Hours is the curing time.



## **7. POTTING MACHINE II**

## **8. AUTO INSECTION:**

The frequency, UID are under Electrical Inspection

Physical measurements are under Mechanical Inspection

Visual Inspection are under Aesthetic Inspection.

The same process is done manually as well as using automated machine also.

## **CONCLUSION:**

During my internship period at *SYMA SGS TECHNOLOGY LIMITED* I gained Hands on experience about the EMS (Electronics manufacturer services), With real working professionals. This experience has helped me increase my knowledge in the Field. I am grateful for the guidance and support from the mentors during this period.

**SIGNATURE:**

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04.07.2024