

SCHOOL OF ENGINEERING AND NATURAL SCIENCES

Department of Electrical and Electronics Engineering

ASELSAN A.Ş. Internship Report

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Student’s Advisor :

Date : 17.08.2020 – 14.09.2020

# Overall Description of the Activities/Projects Involved

[Here give an overall description of your internship for the duration of 6 weeks. State what you have done in general, what you have accomplished, and what you have gained from the internship. Moreover, state which coursed you have taken have helped you the most and the parts that you had no idea about but had to learn during the internship. This part should be limited to one page only. ]

# About the Company

[Here mention the general info about the company. Its history, accomplishments, market presence, and its goals for the project you got involved with. In a paragraph also, state what you would do for the project if you were the CEO or the company’s president. This part should be limited to one page. ]

**Manager’s Name and position within the company**:

**Contact Info**: Telephone and email

# Internship Activities

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| **Week 1** | | | **Date** | 17.08.2020-21.08.2020 |
| **Tasks Planned for the Weeks** : | | | | |
| **Weekly Activity :**  **Day 1:** Internship documents were delivered to the human resources department. The identification badge was received. A briefing was made on how to complete online occupational health and safety training.  **Day 2:**  Online occupational health and safety training was made without being in the company. This training was include first aid, technical issues etc. After that, electrostatic discharge topic protection training was made.  **Day 3:**  Online occupational health and safety training was completed. Afterwards, orientation about Aselsan was given as online.  **Day 4:**  Every intern was dispatched to their department according to their interests. I was assigned to the “Process design and Product Development” department under the “Radar and Electronic Warfare Systems”. The production workplace in the department were introduced and a brief information was given about the devices produced and the ongoing projects. The anechoic room [1] was visited and observed. Environmental Stress Screening Test Laboratory [2] was visited and test devices which are found in that laboratory such as climatic, solar, salt fog, humidity and temperature were studied and investigated.  **Day 5:** Printed Circuit Board (PCB) Manufacturing Laboratorywas visited and PCB production was examined step by step. During the observation, the information about the devices which are used in the manufacturing processes was obtained. The usage purposes and working principles of the devices were explained. These devices were the following, respectively; Jet Printer[3], reflow oven[4], PCB cleaning[5], optic inspection[6], 3D optic inspection[7], selective solder machine[8], environmental test chamber[9], X-ray PCBA analyzer[10], Flying Probe Test[11] and conformal coating[12]. | | | | |
| **Completed Tasks for the Week**: | | | | |
| **Manager** |  | **Sign, Seal, and Date** |  | |

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| **Week 2** | | | **Date** | 24.08.2020-28.08.2020 |
| **Tasks Planned for the Weeks** : | | | | |
| **Weekly Activity :**  **Day 1:**  I got medical report for this day.  **Day 2:**  Detailed research has been done on what is a jet printer, how to use it, how does it work, what are its features that make it stand out in the sector, what are its functions.  **Day 3:**  The connectors, whose first measurements were made, were taken to the environmental test laboratory for temperature testing. Ten cycles were applied here with a temperature change from -45 degrees to 100 degrees. While waiting for the test to be completed, literature search has been done on what are the s parameters[13], how are these parameters measured, what is a vector network analyzer[14], how does it work, what is the spectrum analyzer[15], what are the main differences between these two analyzers, and the qualification tests of PCB.  **Day 4:**  The connectors which were put to the temperature tests in the environmental test laboratory were taken for post-test measurements. The s parameter values of optic torna, suhner, optic connector and sri jet connector were collected by using PNA network analyzer. Then, the capacitance values of the capacitors from the temperature test were measured and recorded.  **Day 5:**  A detailed research was conducted on the working principles, advantages and disadvantages of vacuum vapor phase soldering [16]. The solution search for the tombstone problem [17] which is frequently encountered after the manufacturing of the PCB in this device has been completed. | | | | |
| **Completed Tasks for the Week**: | | | | |
| **Manager** |  | **Sign, Seal, and Date** |  | |

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| **Week 3** | | | **Date** | 31.08.2020-04.09.2020 |
| **Tasks Planned for the Weeks** : | | | | |
| **Weekly Activity :**  **Day 1:**  I got  **Day 2:**  Detailed research  **Day 3:**  The  **Day 4:**  The  **Day 5:** Printed Circuit | | | | |
| **Completed Tasks for the Week**: | | | | |
| **Manager** |  | **Sign, Seal, and Date** |  | |

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| **Week 4** | | | **Date** | 07.09.2020-11.09.2020 |
| **Tasks Planned for the Weeks** : | | | | |
| **Weekly Activity :**  **Day 1:**  I got medical report for this day.  **Day 2:**  rapor teslimi  **Day 3:**  rapor teslimi  **Day 4:**  The connectors  **Day 5:**  sunum | | | | |
| **Completed Tasks for the Week**: | | | | |
| **Manager** |  | **Sign, Seal, and Date** |  | |

**[1] The Anechoic Room (Chamber)**

An anechoic chamber is a shielded room that has absorbing material applied to the walls, ceiling, and floor. Chambers may be table top sized enclosures, but are normally room sized enclosures where engineers can enter and work. Anechoic means without echoes. Simply put, it is a chamber (a box or room) without reflections from the walls, ceiling, or floor. It may be an acoustic anechoic chamber, where the walls are treated with fiberglass sound absorbers to suppress echoes. In RF study, we are talking about a shielded room, where the inner surfaces have been treated with radio wave absorbers. Typical absorbers may be foam pyramids loaded with carbon which is for frequencies above 500 MHz, or ferrite tiles which are for frequencies below 500 MHz. In RF engineering, the anechoic chamber is used for “Over the Air” (OTA) measurements, as opposed to “conducted” (in coax) measurements. The RF anechoic chamber environment allows antenna patterning and radiated measurements from antennas or devices with embedded antennas without reflections or ambient radio signals.

The Anechoic Chamber Far-Field Test Facility is uniquely designed to accommodate large test articles, such as spacecraft mockups with antennas mounted on them. The microwave material that covers the wall and door surfaces adsorbs electromagnetic energy, thereby allowing the Anechoic Chamber to simulate a space environment. The Chamber is air-conditioned, has artificial lighting, shielded personnel doors, and a shielded sliding high bay door that allows for easy entry and exit of large mockups. The Chamber has the capability to accommodate lower frequency testing down to 200 MHz in an effort to bring all testing from 200 MHz to 40 GHz indoors.



**[2] Environmental Stress Screening Test Laboratory**

In this process for product reliability, materials and products are subjected to high-speed temperature cycles to reveal possible defects and make necessary corrections. Testing at the physical environmental conditions (shock, vibration, temperature, altitude, humidity, etc.) which simulate those encountered over the operational life of the component. Random vibration and temperature cycling have proven to be the most successful forms of environmental testing in terms of effective flaw precipitation. It refers to the process of exposing a newly manufactured or repaired product or component typically electronic to stresses such as thermal cycling and vibration in order to force latent defects to manifest themselves by permanent or catastrophic failure during the screening process. The surviving population, upon completion of screening, can be assumed to have a higher reliability than a similar unscreened population.

A stress profile is developed and applied and the profile simulates the environmental conditions encountered during transportation, storage, handling, and operational use phases. Environmental testing is the measurement of the performance of equipment under specified environmental conditions, such as climatic, solar, salt fog, humidity and temperature.

**[3] Jet Printer**

Jet printing is a non-contact printing process that applies solder paste directly onto the PCB pad, without the need to use any stencil tooling. Small solder paste deposits are placed at a rate of over 1 million dots per hour, to accurately construct the optimum solder paste typography for each and every pad position on the board. Such close control allows us to obtain the optimum reflow conditions first time and every time. Jet printing removes the limitations of traditional stencils, to deliver a new level of reliability for rigid and flexible substrates, board cavities, package-on-package, QFNs and new components with small process windows. By optimizing the solder paste process we are able to remove the typical production errors, such as floating QFN devices, excessive and insufficient solder, that lead to poor production yields, higher build costs and the inevitable time delays. Assured delivery times can be achieved without the constraints of using stencils. We are able to adopt a lean, fast and cost-effective approach to SMT/PCB production, regardless of lead-time and complexity.

With its highly accurate, on-the-fly solder paste jet printing, it allowed the most demanding manufacturers to achieve optimal solder joints of any shape and size – on demand. The Jet Printer allows you to produce complex boards with unmatched precision at a speed of more than one million dots per hour. It handles flexible substrates, board cavities and package on package applications with ease. Its high-precision, non-contact nozzle ensures perfect solder paste deposits to reduce re-work and increase overall throughput.

Features of the device can be ordered as design freedom, superior quality, software driven, fast NPIs, no stencils and repeatability, quick offline programming, reduced lead times, increased product quality and increased profitability. There are many benefits of the jet printer as elimination of manual data as needed ones, fast BoM to cad comparison, fast setup for new projects, gaining time from the manual machine teaching, the time that is gained from the teaching and offline programming is used to build more boards, engineering changes are fast and central management of part number databases.