Final Project

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I, the undersigned, certify that the contents in part or whole of my Final Project entitled: "Solder Pad Over Flow" is **my own work, completed without the use of materials that are not permitted and is not the work of another party which I acknowledge as my own work.** All references cited or referred to have been written in full in the bibliography. If it turns out that my statement is not true, I am willing to accept sanctions in accordance with applicable regulations.

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APPROVAL

The Final Project was prepared to fulfill one of the requirements to obtain the degree of Associate Expert in Engineering (AMd.T.)

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SOLDER PAD OVERFLOW

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Abstract— The soldering process (Econo) has error assessment criteria, this all criteria are included in *Quality Control.* Soldering pad overflow is a defect criterion from the process with code, this defect is a result of poor visualization of the soldering and causes the solder to overheat. This case is always obtained by *Dual Module*, there are many reasons why this defect occurs, it could be due to an error in the machine, wrong positioning, wrong jig, and human error. To reduce many defects in the module, it will start by improving the jig and checking the machine temperature by analyzing the percentage of the defects.

Keywords: Solder pad, Machine, JIGS

I. INTRODUCTION

Infineon Technologies AG Cegléd Kft develops, manufactures, and markets a uniquely broad range of semiconductor products for the communications, automotive, and memory markets. As the demand for efficient energy use increases, in Infineon Cegléd the product range is constantly expanding. Currently, semiconductor components are manufactured in Cegléd for use in industrial automation, traction medical equipment, power generation, transport and distribution, and renewable energy [1].

The ambitious business goals of the company could only be realized if all ten sites were able to achieve the same level and quality of output. This would be possible, the manager felt, if valuable expertise were easily, continuously, and freely accessible, as and when the problems arose, and not only sporadically, as had been the pattern in the past. To this end, they initiated the Knowledge Exchange Networking (KEC) project in 1990, cooperating with the Knowledge Management Department of Siemens Central Technology Division [2].

Starting from the Econo department basic from the creation of the module *DCB*, they have many divisions like DCB Breaking, making Chip, Vadu Line, Frame bond, and End Test. We have a focus on the Vadu Line, in this case, Vadu Line is engaged in soldering modules, and the module want to sell is *DCB*. By using error codes we can find the damage from the
Module.

Based on the background description, the authors examine the problem that includes is:
1. How to find error soldering in the module?
2. How to avoid many errors soldering from the module?
3. How to make good and correct soldering results?

The purpose of this project for the author is to avoid many errors soldering from the module, and create a good module with process quality control standards to achieve the target output according to the company's demand [2]. employees must know about carrying out this soldering process, to reduce the occurrence of LT 61 errors, namely soldering overflow. if there is an error in the module that has been soldered, employees must check again using visual inspection, if there is an opportunity to be repaired, the module is put back into the jig and the soldering process will be carried out again to get good results. one way to produce good soldering is to check the equipment and materials to be used before working.

The author will make several benefits for the company, the campus, and public learning. Several of the benefits coverage are:
1. To minimize the errors in soldering of the module
2. To produce a good product with the classification standard of the company
3. To recognize how the defect code of a soldering fault works

The problem limitation in this project is to avoid errors soldering of the module by checking for errors in the machine,
jig, and solder pad on *DCB*.

II. METHOD

Qualitative Research

Qualitative research Analysis is a method that can be used with qualitative data to deepen understanding of soldering overflow. qualitative research collects data through Methodological assumptions and background from the formation of the company to the division of the production distribution development department. by interviewing the manager about the background of the company to the control process of the module to be produced. these results will be collected as information in the development of qualitative research data until a discussion occurs that will produce the main ideas for solving the problem [6].

A. Design

This design is how the soldering machine process is used, starting from inserting modules into jigs and placing jigs onto forms, following the soldering process steps:

Figure 1. Flowchart of process soldering

1. **Start**, and prepare all of the items on the workspace.

2. **Put Modul on the jigs**, every single module has to be put on the jigs, and how to place the dab module into the jig must be precise to the jig spacing, to prevent the dub from being lifted and unbalanced.

3. **Put the jigs on the form**, the jigs must be put on the form in placing the jig onto the form, the tip of the jig should not come out of the length of the form, it must be placed properly, this is to avoid the failure of the soldering process in some jigs, if the jigs are not placed properly then some single jigs will not oven or not soldered.

4. **Machine Running**, The machine will burn the solder pad that will make the DCB module and baseplate fused, this machine can accommodate 4-5 forma in it

5. **Good Result**, if the result is good the process will continue, if the result is not good and the solder is overflow, the operator must scan the WT and check the failure, the failure has to register in error code LT 61.

6. **Put On the WT**, every module soldered must be put on the WT and the WT bring with the trolly.

7. **Continue to Rontgen Process**, if the module has a good result, the module must be checked with the Rontgen machine to check for another error.

8. **Finish,** the good module quality products will be delivered to the next process section.

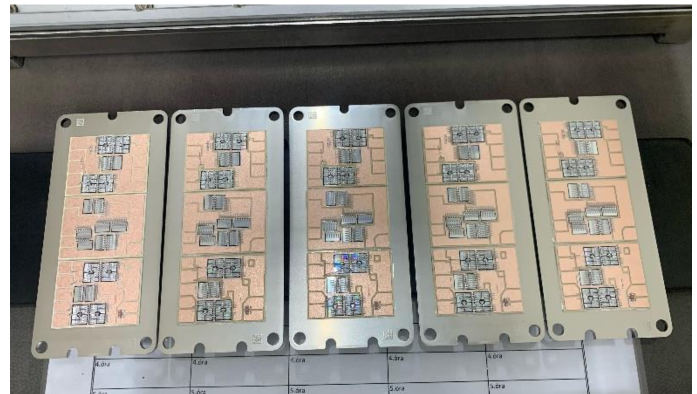


Figure 2. Final result after soldering

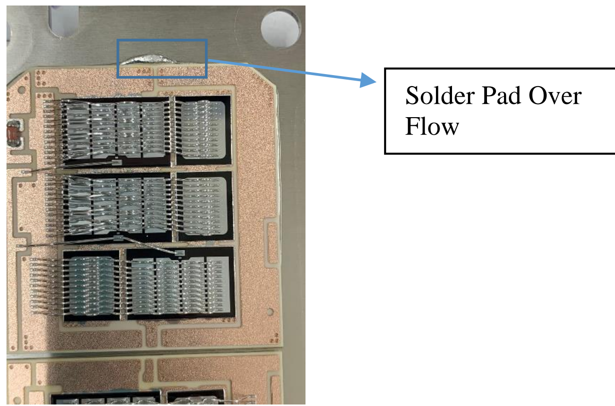


Figure 3. Final result Not Good Soldering

B. . Tools and Materials

The soldering system process has the following **tools** and materials in its implementation:

- Vakum, This vacuum is used to take single modules, solder pads, and NTC.
- Flip Tray, This is used to invert the tray on top of which is DCB
- Jigs, used to place the module, solder pad, and baseplate on its surface
- Black Rubber, This is the place to put the module that has just been soldered by the machine.
- WT, is a transit point for modules to be transferred to the next process

Materials:

- DCB, this is a single module that will be soldered on a machine that can also be called *Nutzen*
- Solder Pad, is a thin swath copper pad used to connect electronic components, namely DCBs.
- Yellow Sticky, to mark WT with charge number
- Baseplate, which will be the base on the module to be soldered

C. Register the wrong module

This method is done if the employee finds an error in the module, such as solder pad overflow, please note that this is very important because this will be reported on the data that will be issued by the computer. this data will be recorded on the company's output and target every day, if there are too many errors in the module, it will have an impact on the performance of the Infineon company that has cooperation with other companies. The company fully supports preventing the occurrence of errors in the module. Here are the steps for registering a defective module:
1. Check errors, to ensure that the module has errors
2. Scan WT, to register modules with errors, do not register all modules in WT, depending on how many modules have errors
3. Check by computer, by re-scanning so that you can see again whether it has been registered or not registered, this is a way to be detected by x-ray
4. Finally, Put the errors module in the black box, and the engineer will check it.

D. Failure of Soldering overflow

errors in error code LT 61 have a cause and effect, soldering overflow can be caused by machines, human errors, bad materials, doing the wrong method, and measurements that are not considered in the Eway book.

III. Result and Discussion

In this case, the author found a result that is very much the center of attention, many causes cause this solder pad overflow to occur. in general, this defect occurs because the operator is not careful. there is also caused by the wrong jig assembly and even material errors in the base material.

A. . Result of Human Error

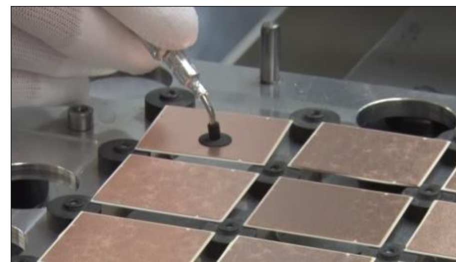


Figure 3. Laying Nutzen

errors caused by the operator himself by not paying attention to the drawing and not paying attention to the direction of the nutzen, Nutzens can only be placed in the soldering mold with a vacuum clamp. It is forbidden to insert the nutzens into the nests of the soldering mold by hand.

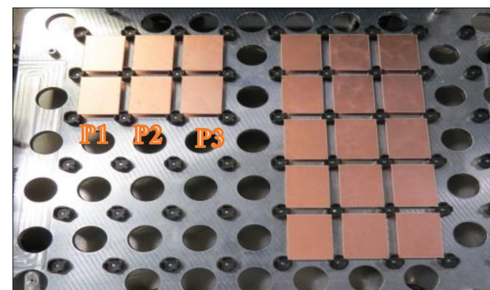


Figure 4. Type of Nutzen

The different nutzens (P1, P2, P3, parts) are located next to each other on the flipper.
The sequence in this nutzen follows the p1, p2, and p3 materials that have been adopted by the material database, following the existing drawings by adjusting the lines and benchmarks on the drawing.

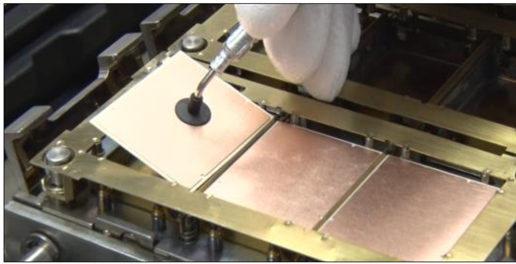


Figure 5. How to put the right Nutzen

In this case by following the loading order of the nutzens:
the integrity of the chips and wires is preserved
the module will be built according to the drawing.
Cramped, obliquely inserted nutzens result in poor soldering,
this is one of the reasons solder pad overflow occurs.

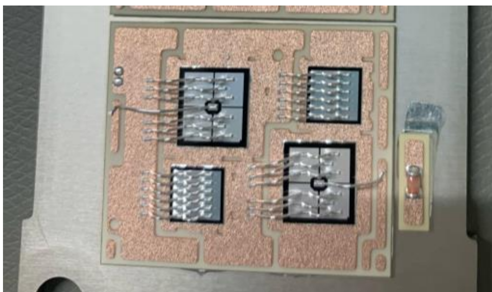


Figure 6. NTC Solder Pad Over Flow

Laying errors that are not precise by the jig will result in damage to the soldering parts, as well as in addition to the nutzen that must be considered, the laying of ntc on the jig must also be considered to make good results not like the picture above.

B. Result of Jig Assembly

the soldering jig is the place where the DCB module is placed, the jig has many types such as dual Econo, Pack + B, Pack + D, Pim 2, Dual, Steck 3, Steck 2, and Econo 3. This module certainly has an unequal jig, some 1 jig has 5 single jigs, some jigs have 10 single jigs, and some jigs only have 2 single jigs, depending on the module that has been determined by the shift leader. This jig will be the cover and place in the soldering process, this stage is a process that must require accuracy and accuracy in laying the DCB, if you enter the DCB in an uneven state on the surface of the jig, the results that come out will not be good and will result in errors in the solder, and will create error codes.

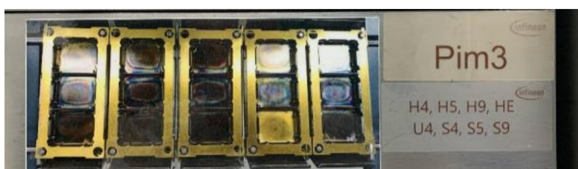


Figure 7. Jig PIM 3

PIM 3 is the type of jigs and also the module, Each EconoPIM 3 module integrates a rectifier bridge, a brake chopper, and an inverter stage. The Econo housing features a copper base plate for optimized heat spread and includes a thermistor (NTC). The Econo modules are available with solderable pins or with pins and an increasing number of Econo modules are available already.

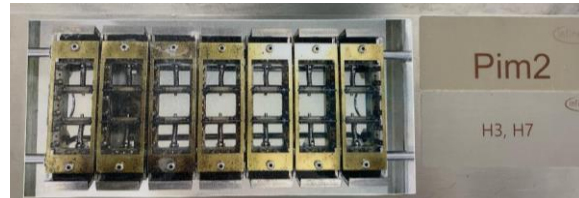


Figure 8. Jig PIM 2

Pim 2 is a module that is small in size, usually, this jig has 2 different types, namely pim 2 long size and short size, for pim 2 short size contains 7 single jigs. pim 2 certainly has a different baseplate from Steck 2, which is certainly small in size, which is certainly different from Pim 3.

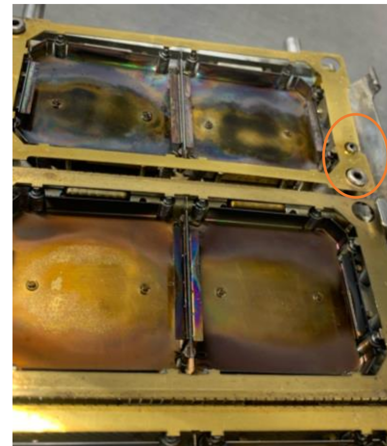


Figure 9. Broken Jigs

in this case, the jig is in bad condition because the solder splash leaking preventive part is bent, this will cause the results on the module to be imperfect and will result in a defective module, to avoid this from happening, the operator must first visually see the shape of the jig that will be used if the jig is not good then it must be reported so that the jig maintainer can fix the error on the jig.

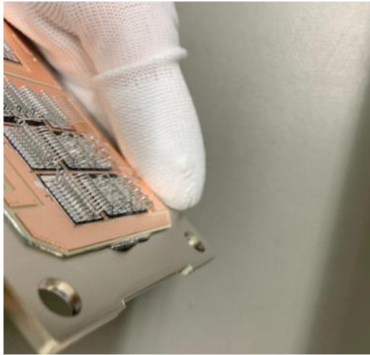


Figure 10. Errors Module

C. Result of Machine

Soldering process where this process is soldering the DCB part on the baseplate using the material, namely the solder pad, in this process of course many tools are used in the process of soldering the module, namely by inserting the DCB module into the surface of the jig. not only that, the placement of the DCB module is certainly very concerning in the soldering technique, because if the DCB module and solder pad are not placed on the surface evenly, of course, the soldering results will not be optimal. After all of this has been done, the jig will be put in the form and the form will be entered into the machine and process soldering.

Figure 11. Machine of System Soldering

1. in this case the error on the machine is also something that must be considered, damage to the machine has many types, namely when the operator has entered the Fauf number on the machine but the conveyor carrying the form does not work, this must be reported to the line area leader so that the maintenance officer checks the damage to the machine.
2. the result of damaged modules is also caused by unstable temperature in the machine, the good heat for soldering to be melted in the first phase is below 241°C. and in the second phase, heat the whole part by joining the base plate on the solder pad and nutzen with a temperature below 331°C. and the third phase is cooling on the module, This is certainly the center of attention because if there is no cooling, the module will continue to heat up if placed on top of black rubber, The problem obtained if the cooling fan is damaged then the conveyor does not run and the form will stop, this will also have an impact on the quality of the module.

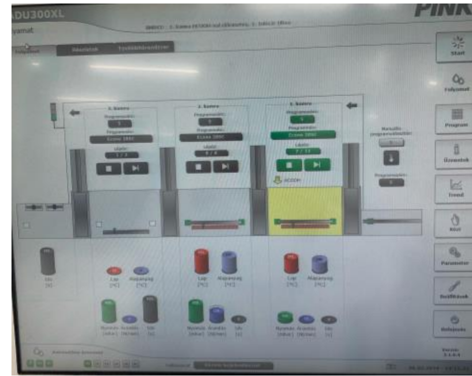


Figure 11. SPC Heat Program

3. module results are not good also because the leaking test fluid on the machine is not replaced on every replacement date, usually the maintenance officer will check the leaking test fluid on the SPC monitor on the machine, if the leaking test fluid is not replaced the machine does not work properly, which often happens is the module is not soldered.

In this discussion from the many defects obtained in the module due to human error, jigs, and machines, the company continues to make observations to reduce defects in the module to create zero defects.

The author investigates defects in modules by discussing with the Lead Technologist line area, solder pad overflow defects are often experienced by CW serial modules, the occurrence of solder that melts on this module due to the material and materials contained in Nutzen, his special company engineers are conducting many experiments and developments to reduce the defect rate in each module.
The company also insists that every employee is not negligent in doing their work because this will have an impact on the final fabrication results that will be produced and distributed to other companies that have cooperated with Infineon. The thickness size can also affect the results of the module, so the author contributes in the form of a suggestion so that the thickness of the solder pad can be checked before doing the soldering process.

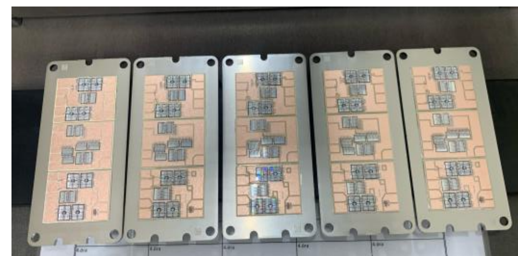
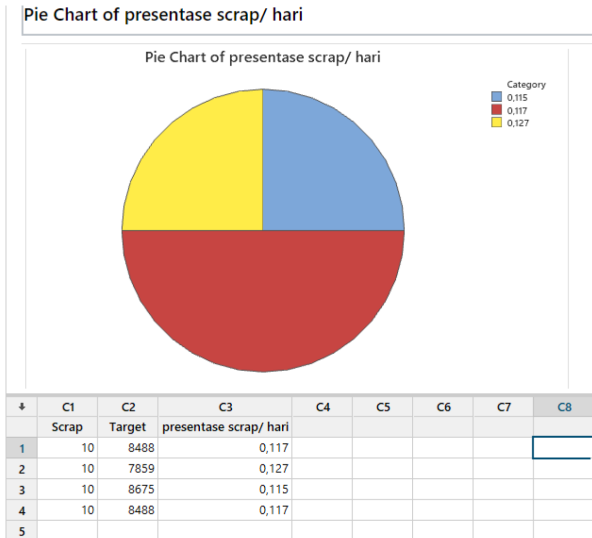


Figure 13. Module Good result

D. Result Data for Scrap



↓	C1	C2	C3	C4	C5	C6	C7	C8
	Scrap	Target	presentase scrap/ hari					
1	10	8488	0,117					
2	10	7859	0,127					
3	10	8675	0,115					
4	10	8488	0,117					
5								

Figure 14. Pie chart

IV. Conclusion

the conclusion in this project that the author can produce is to reduce defects in modules that are influenced by the soldering process and reduce the rate of solder pad overflow in the production of these modules. improve quality with company standardization and consumer demand, and produce good modules with zero defect technician stability.

V. Thanks to

as the author I would like to thank Infineon Technologies Cegled, which has allowed the author to be able to carry out an internship program in this company, the author is also grateful to the leader and team, the supervisors, and of course, the head of the production who provide support and knowledge for the author to complete this graduation requirement.

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