The art of managing diagnostic/repair operation in PCBA manufacturing Company

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Abstract

In printed circuit board assembly (PCBA) manufacturing operation, it is unavoidable to have rejects that need diagnostic (troubleshooting) follow by repair. For complex electronic products such as high complex PCBA, carefully manage the rejects is a very important task. Otherwise, these rejects will eventually piling up and it will affect the quality of product, delay shipment and the worse case, it becoming permanent damage and eventually becoming scrap.

About the Author

HK Sim has more than 30 years of experience in Research and Development and high volume electronic product manufacturing in Singapore.

Introduction

Printed Circuit Board Assembly is one of the important operation of building an electronic product which involve putting electronic component such as micro-processor, memory, capacitor, resistor … etc on to a printed circuit board . In modern world, the PCBA is getting much more complex in terms of functionality, complexity and much smaller in size. In PCBA manufacturing operation, it is unavoidable to have reject . Due to the special knowledge is required to perform the work and require to manage a team of specialized people, effectively manage the diagnostic/repair team become an important task for every company.

Under normal situation, there will be a group of diagnostic/repair team which is certified to perform the troubleshooting and repair work. The cause of rejects is generally due to : bad components, assembly machine/process reject or human handling error. To handle these reject effectively, the following items need to be considered :

•Qualified expertise to analyze the rejected product

•Feedback to the respective operation for improvement to reduce future reject

•Effectively repair the product and release back to operation

Who's responsibility ?

Depending on the company's policy, the diagnostic/repair group can be belong to the production team or test engineering team.

Report to production

As production is building the product, when the diagnostic/repair group report back to production, production will have the ownership of the rejects and therefore they will be more careful when they start seeing increasing in rejects. The disadvantage is that as production is not so technical incline, the amount of technical supervision given to the diagnostic/ repair team will be minimum.

Report to test engineering

The reverse situation when this team report to test engineering, due to sufficient technical supervision is given, the repair efficiency is normally high . The problem is manufacturing may not see the rejects and therefore they may not feel the pinch when there is abnormal high reject occur.

In general, no matter who the diagnostic/repair team report to, the following items must fulfill :

At beginning , manufacturing must be responsible for the making of reject product.

The direct supervisor of the diagnostic/repair team must be a technical person

Management must give this team good support when problems are highlighted

Repair report must be published daily/weekly to relevant departments.

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Important Mind set

The important mindset in diagnostic/repair operation is not to have more repair technical staff when the reject goes high but to solve the problem out front to reduce reject. Manufacturing , who make the product, has the overall responsibility of making the rejects. At high reject situation, Engineering is responsible to find out the root cause of the product and implement corrective action to reduce the reject rate to acceptable level. This require senior management's support and understanding as it take time to analyze the problem that cause high reject.

When a serious problem is noticed,normally at visual inspection station or test station, immediate feedback to manufacturing must take place to stop the line from building more and more rejects.

Reject situations

Usually there are two type of situation, suddenly high reject or all the time high reject

Suddenly high reject

This situation is relatively easy to handle as it occurs suddenly and therefore there must be some factors from the manufacturing process (equipments , operators … etc) or components being use. Engineers from process engineering, mechanical engineering , electronics engineering have to work together to solve the problem. But this will not likely be design related as the high reject does not occur before.

All the time high reject

This is much more complex as the cause of problem can be design, material, manufacturing process.

Possible areas to look into :

a) Some design may be more easlier to cause manufacturing reject.

b) Material such electronic component may have quality problem. Sometime it can be seen that one approved supplier may have more reject than others.

c) Equipment problem such as jig and fixture design problem may damage the component. For example, if the power pin, ground pin and signal pins are of the same length ,it will cause some percentage of components being damage at loading.

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How to get quick result

Sort out failure by category

Specialize people for each category

Easy to repair failure first

Technical staff troubleshooting, operator change failure component and get back to the technical staff

From repair database , relate failure mode with components changed to zoom into the problem area.

How to handle repair data

All reject PCBA must be tag with a repair tag which consists of the following information :

•Date of reject

•Date of repair

•Time start / time stop (optional)

•Repairer

•Component changed

Repeat the above 4 items for 3 times.

Any single product reject more than 3 times will hav to handle offline by engineering staff. This normally is hard core problem which is not easily be repaired by normal repair process.

When a product, after repairing, pass the test. This tag will then be removed and data on the tag will be fully entered into a database created for repair purpose.

In order to get immediate information rather than waiting for the product to pass and then enter the repair data, one can do both daily enter of repair data and also enter the data on to the tag. This is particular applicable for company who has computerize and automated the repair data entry process.

For company which does not have a real time system, a form can be created for each repairer to enter the daily repair data and than manually enter the data into a database for data summary.

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