Body to ground improvement at trim and form machine in end-of-line process

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ABSTRACT - The purpose of this study is to make an improvement on the design of the Jig for the Dpak trim and form machine which is one of the End-of-Line (EOL) process at Infineon Technologies (Malaysia) in Melaka. The objective of this research is to improve the design of the Jig so that the trim and form machines number of rejected units could be reduced. The target of improvement is to reduce the Body to Ground (BTG) problem and yield losses from 0.12% to 0.02%. The objective is to achieve an output target of 99.7% as per organization target. The focus of this study is the output track at the off-loading of the machine. The study has made suggestions to improve the track design. The track design has been improved by inserting a jig into the off-loader track. The jig will sort the rejected BTG unit. The cycle time for BTG detection have been improved tremendously into 60 seconds. The redesigned jig has also saved the cost from high rates of rejects.

1. INTRODUCTION

Stabilization is achieved through absorption of stabilizing molecules on the pigment surface, so that repulsive forces prevent other particles from approaching close enough for the attractive van der Waals forces to cause agglomeration. There are two principal mechanisms for the stabilization of pigmented dispersions [2]: (a) Electrostatic stabilization (b) Steric stabilization. However, this study only focuses on the electrostatic stabilization. Classic colloidal science explains electrostatic stabilization in terms of an electrical double-layer. A charge is generated on the pigment surface, and a more diffuse cloud of oppositely charged ions develops around it. As two particles approach each other the charge effectively provides a barrier to closer particle interactions. Stabilization increases along with the thickness of this layer.

1.1 Problem Statement

The auto vision inspection area which is the process after trimming and form is another BTG process which the vision will sort it and send it into the reject tube for lead dimension failure. The BTG problem always happened and it is a continuous problem. Detection at auto vision is already too late as damage already has been done and the unit will be segregated into the reject tube which contributes for 0.2 % yield loss of the overall Dpak product.

2. LITERATURE REVIEW

2.1. Jigs

Jigs have a direct effect upon machining quality, productivity, and the cost of products. Indeed, the costs associated with jig design and manufacture can account for 10 - 20% of the total cost of a manufacturing system [1]. Hence, there are significant benefits to be reaped by reducing the design costs associated with jigs.There are two approaches that have been pursued with this aim. One has concentrated on developing flexible jig systems, the other on simplifying the design process [2].

2.2 Standoff

Li Xun Ping et al., 2010 [3] study the influence of the standoff height, pad size and isothermal aging on the microstructure and shear fracture behaviour of Cu/Sn-3.0Ag-0.5Cu/Cu BGA structured interconnects using the lap-shear test. The experimental results show that the thickness of intermetallic compounds layer at the solder/Cu interface increases with decreasing standoff height of the joints

3. METHODOLOGY

3.1. BTG Jig Design

In order to overcome the problem stated, Figure 1 shows the jig which was implemented at Fico MTF001 machine off loader. Figure 2 shows example of good and bad BTG.

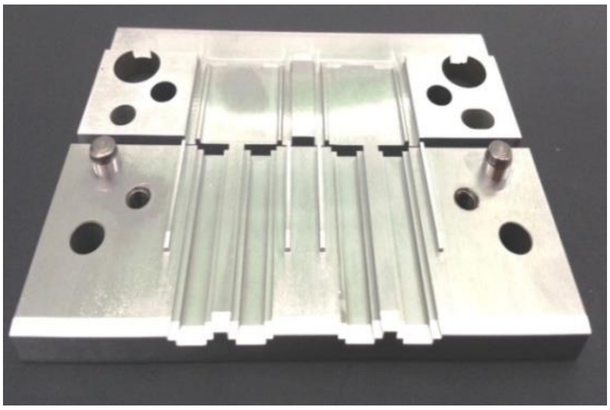

Figure 1 Actual Jig implemented (Inside look of the Jig)

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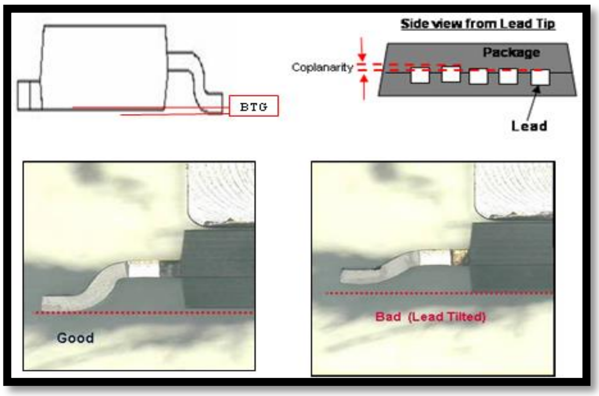

Figure 2 Good and Bad BTG

4. RESULTS & DISCUSSION

4.1 Cycle Time Improvement

Before the jig was implemented, the BTG is detected at auto vision after 2 hours of the trim and form process.

Cycle time = 2 hours X 60 minutes X 60 second
= 7,200 second

After the jig was implemented, the BTG is detected at trim and form itself within 1 minute.

Cycle time = 1 X 60 second
= 60 second

Cycle time Improvement = 7200 – 60
= 7140 second

This is good improvement as the cycle time had been improved to 7140 second.

4.2. Cost Analysis

Table 1 shows the scrap value per unit from week 33 to week 36 from the MTF001 trim and form machine. Week 33 has the highest reject during the study. Week 36 has less rejects after the jig was implemented. Table 2 shows the yearly cost saving after all 9 trim and form BTG jig are implemented.

Table 1 Waste cost analysis

No	Week	Quantity	Price/unit	Waste (RM)
1	33	4689	RM1	4689
2	34	3665	RM1	3665
3	35	2202	RM1	2202
4	36	1432	RM1	1432

Table 2 Cost saving

No	Week 33	Week 36	Qty Saved	Qty Machine	Yearly saved (RM)
1	4689	1432	3257	9	351,756

4.3 Yield Improvement

Table 3 shows that there is a yield loss improvement from 0.23% to 0.08%.

Table 3 Yield improvement percentage

Week	Total btg loss	MTF001	%
W33	20,078	4689	0.23
W34	28,810	3,665	0.13
W35	17,199	2,202	0.09
W36	29,234	1,432	0.08

5. SUMMARY

As a summary the jig design has improved the cycle time for BTG detection tremendously into 60 second. The redesigned jig also shows a significant cost saving yearly. Yield improvement from 0.23 percent to 0.08 percent shows that the target 0.05 percent could be be achieved. The redesigned jig is recommended to be implemented at all the trim and form machine at Infineon Technologies (Malaysia) in Melaka as this can improve yield target and reduce rejects and effective for cost saving.

6. REFERENCES

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