Reduces the high reject chip die in the FOL area

Final Project

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Approval

The Final Project is prepared to be used as a work plan for the implementation of the Final Project

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Reduce the high reject chip in the FOL area

The high chip die in the FOL area has the highest ranking, so I choice made it the project title. One of the causes of high chip die projects in the FOL area is contact between the dies during the pick & place attachment process due to variations in adhesive tape stretching during wafer loadingand imperfect needle installation.

The company has a goal to reduce production costs by 30% of the total production costs at FOL. The cost saving factors in the team work area that influence the choice of theme include the materials used in the die attach area, in this case the machine equipment used during the material processing

and Impact of Choosing a Theme on the Company

Reduce production costs in the Front Of Line area, especially in die attach, reduce delay time due to the large amount of material that must be 100% inspected 3rd optical due to reject chip die, reduce down time due to machine repairs, Increase customer satisfaction(1) due to better material quality and fast delivery.

Using statistical process control techniques(2) which aim to monitor andimprove quality and prevent errors.

The background to the high chip die in the die attach area is the high cycle time(3) used for 100% inspection in the 3rd opt and the large number of customer complaints due to chip die rejects ordie cracks.

The target for high chip die rejects in the FOL area can be reduced by 83%. This reduction target is very realistic

Keyword : SPC (Ststistik Process Control)

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Chapter1. Introduction

1.1 Background

As for the definition of customers themselves within PT. UNISEM has two terms, namely external customer and internal customer. External Customers are customers who order products from PT.UNISEM and will receive the ordered product after it has been processed. Meanwhile, Internal Customers are customers who receive product results from the previous department or produc - on area. So each area has an obligation to provide products of good quality to each customer, so that it will be accepted by end users, namely external customers, as a quality product. Some things that result in complaints from external and internal customers include:

1. There is a delay in the delivery of production results from the time specified by the internal customer. This will directly impact delays in the delivery of production results to external customers.

2. There is a reduction in production quantities from what has been determined. This is due to defects or defects produced during the production process. This will have the impact of reducing customer confidence in the quality of the material produced. The two factors mentioned above are closely related to the tasks of production, maintenance or technicians and the engineering process.

The two factors mentioned above are closely related to the tasks of production, maintenance or technicians and the engineering process At UNISEM the assembly process can be divided into three main areas as follows:

1. Front OF Line Manufacturing (FOL Manufacturing)
2.End Of Line Manufacturing (EOL Manufacturing)
3.Test Department
FOL (front of line) work area sequence
Wafer Mount - Wafer Saw - 2nd opt - Die Attach - Epoxy Cure – Wire bond – 3rd opt And this project will solve the Die attach(4) problem, a production area which has the task of processing the first time after the wafer cutting process (wafer saw), where the semiconductor die is taken from the wafer automatically and places it back on the lead frame using epoxy as an adhesive.

The highest problem is in the Die attach area with hight die chips in the FOL area.

1.2. Problems

1.2.1 In selecting the theme to be taken, use the brainstorming technique of the problem to be solved. Problems in the front of line area with the following result

Table1. problem

Problem	Problem
High level of epoxy deficiency when the epoxy runs out	High epoxy on die when epoxy shifting
The height of the chip die in the Die Attach area	Height The height of the epoxy on die when the die drops
The frequent problem of wrong magazine orientation in DA	High die chip problems in misplaced die units
High reject lifted wedge in out gassing material	High reject damage wire in lead frame pad shift
High chip die in Wafer Saw area	Frequent wrong processing of materials with SCR
High chip die in Wire Bond area	High chip die in Wafer Mount area
High skipped die problem in DA	High excess epoxy when inconsistent epoxy
High wire clearance problem in the angular die unit	High reject DA during material handling

1.2.2 Affinity Diagram

From the problems obtained, then take the data and also group the problems into severalparts in the following Affinity Diagram

Table2. Affinity diagram

PROBLEM IN THE FRONT OF LINE AREA			
High Chip die in FOL area		High Human Error in DA	
The height of the chip die in the Die Attach area	High Chip die in Wafer Saw area	The frequent problem of wrong magazine orientation in DA	High skipped die problem in DA
High chip die in Wire Bond area	High chip die in Wafer Mount area	Frequent wrong processing of materials with SCR	High reject DA during material handling
High problem of epoxy in die attach		The high number of WB rejects is due to the DA process	
High level of epoxy deficiency when the epoxy runs out	High epoxy on die when epoxy shifting	High wire clearance problem in the angular die unit	High reject lifted wedge in out gassing material
High excess epoxy when inconsistent epoxy	Height The height of the epoxy on die when the die drops	High die chip problems in misplaced die units	High reject damage wire in lead frame pad shift

1.2.3 Table matrix

Analyze with a matrix table with selection criteria

Table3. Table matrix

No	Faktor penyebab	Selection criteria					Total	Rangking
		A(x5)	B(x4)	C(x3)	D(x2)	E(x1)		
1	High level of human error in DA	20	12	9	10	3	54	3
2	High chip die in FOL area	25	20	12	10	5	68	1
3	The high number of WB rejects is due to the DA process	15	8	15	6	4	48	4
4	High problem of epoxy in die attach	25	16	9	10	5	65	2

Table4. Theme selection criteria

Level scale		Theme selection criteria		
1	Does not meet the criteria	A. Cost	Reduce production costs	x5
2	Not enough meet the criteria	B. Quality	Increase the quality of unit produced	x4
3	Meet the criteria	C. Delivery	Accelerate material cycle time at FOL	X3
4	Completely meets the criteria	D. Priority	This a problem that must be addressed immediately	X2
5	Most meet the criteria	E. Ability	Team members area able to complete	X1

Based on the theme selection matrix table above, it was found that the **high chip die in the FOL area had the highest ranking,** so the team made it the project title.

1.3. Objectives

The target is to reduce the high number of die rejected chips at the Front of Line and the target to reduce the number of die rejected chips in the die area

1.4. Advantages Benefit

1. Reduce production costs in the Front Of Line area, especially in die attachments (costs due to rejected chip die = US $20467.2)
2. Reduced delay time due to the large amount of material that must be inspected 100% in the 3rd optic due to rejecting dead chips (number of dead LDA chips = 22 lots, total delay time = 55 hours)
3. Reduce down time due to machine repairs (average down time for machine repairs = 429 Hours /week)
4. Increase customer satisfaction due to better quality materials and fast delivery.(Total customer complaints due to dead chip rejects = 5 cases).

1.5 Limitations

The background to the high chip die in the die attach area is the high cycle time used for 100% inspection in the 3rd opt and the large number of customer complaints due to chipdie or crack die rejects for 6 weeks (W52'08-W05'09)

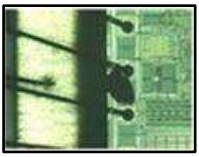
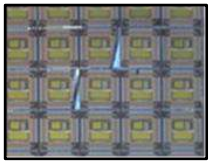
	
Height of the chip die in the Die Attach area	High chip die in Wire Bond area
	
High Chip die in Wafer Saw area	High chip die in Wafer Mount area

Figure1. the background

1.6 Work Breakdown Structure (Optional)

The role of each member – IQC team Project

Table5. The role of each member

No	Name	Duties and Responsible in the team
1.	Chrisna Waluyanto **(Fasilitator)**	Equipment Engineering
2.	Angela Ninta .W.A **(Leader team)**	Supervisor Font of line
3.	Agus Susanto (Member)	Process Enginering – Die attach
4.	Ika N. Setiawan (Member)	Equipment Enginering - Die attach
5.	Moh. Rois (Member)	Equipment Enginering - Wire bond
6.	Abdurohmat (Member)	Industrial Enginering - Project

1.7 Schedule of activities

Figure2. Schedule of actifities

Chapter 2. Literatur Review

The collected data on the high number of chip die rejects at the front of line for 6 weeks from 21Dec'08-1Feb'09 (W52'08 - W05'09) with the results

Table6. Causative factor

No	Causative factor	PPM reject Chip die (ww52'08 ww05'09)			
		PPM	%	Kum	Kum(%)
1.	Height of the chip die in the Die Attach area	25	33%	25	36%
2.	High Chip die in Wafer Saw area	19	25%	44	58%
3.	High chip die in Wafer Mount area	16	21%	60	79%
4.	High chip die in Wire Bond area	16	21%	76	100%
	Total	76			

The team collected data on the high number of chip die rejects at the front of line for 6 weeks from 21Dec'08-1Feb'09 (W52'08 - W05'09) with the results.

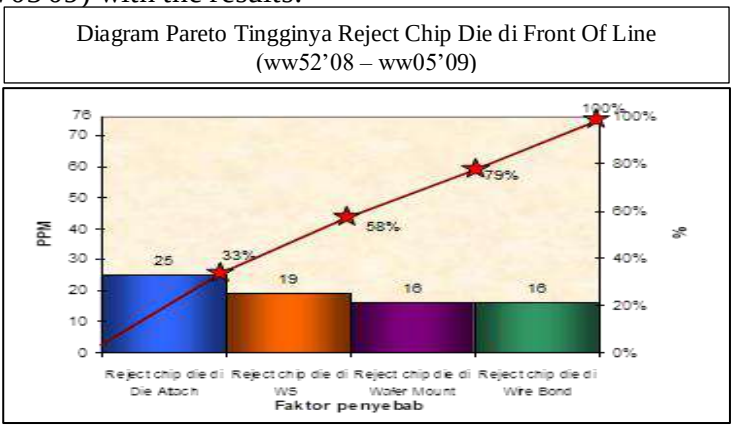
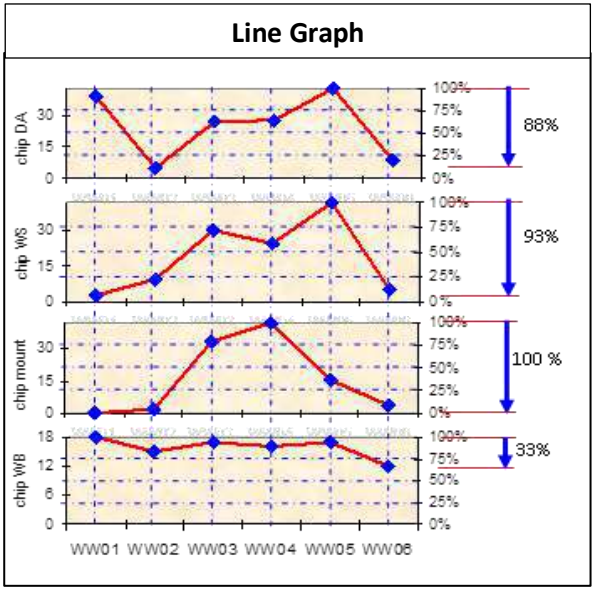


Figure3. Diagram Pareto

Data source:
AIT Batam Report and Central PE and data base system period (ww52'08 – ww05'09)

Based on the graph , it can be seen that the high number of ***chip die rejects in the Die Attach area is ranked first***. Therefore, the team agreed to take this problem to be resolve

Target Determination
The team re-checked the data that had been collected from W52'08-W5'09 which was used in determining the target for reducing the high number of rejected chip dies in the Front of Line area using the following Line grap.



Data source:
AIT Batam Report and Central PE and data base system period(ww52'08 – ww05'09)

Figure4. Line graph

Calculation of expected reductionDeduction : $100\% - \frac{(100\% \times (\text{Lowest value}))}{\text{The highest score}}$

So the expected reduction of each causal factor is:

1. Die chip reject factor in die attach (factor1): 88%
2. Chip die reject factor in wafer saw (factor2): 93%
3. Chip die reject factor in wafer mount (factor 3): 100%
4. Chip die reject factor in wire bond (factor4): 33%

Based on the Line Graph, determining the expected reduction target from the causes of high chip die rejects at the front of line as we can see in the following table

Table7. Reduction target

No	Causative factor	Initial response	Expected decline	New response
1	Height of the chip die in the Die Attach area	25	88% = 22	3
2	High Chip die in Wafer Saw area	19	93% = 18	1
3	High chip die in Wafer Mount area	16	100% = 16	0
4	High chip die in Wire Bond area	16	33% = 5	11
		76	80.20%	15

The target for reducing the high number of chip die rejects in the Front of Line is 80.2%, while the target for reducing chip die rejects in the die attached area is 88%.

Chapter 3. Method

3.1 Design - Fish bond diagram

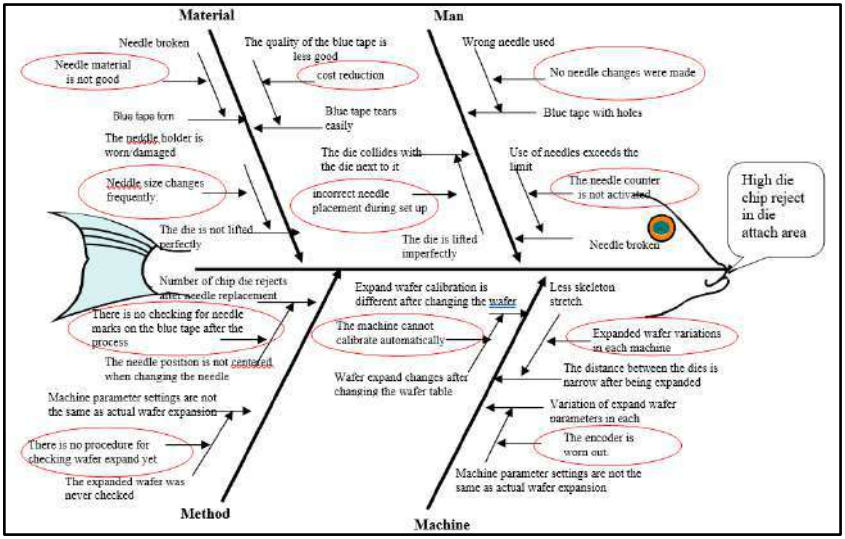


Figure5. Fish bond

3.1.1. Assessment of the dominant cause

Table8. Assessment of the dominant cause

No	Dominant cause	Amount	%	Information	Confirmation
1	Neddle size changes frequently	5	28	Verified	Confirm
2	The machine cannot calibrate automatically	4	22	Verified	Confirm
3	The encoder is worn out	4	22	Verified	Confirm
4	Expanded wafer variations in each machine	2	11	Verified	Confirm
5	There is no procedure for checking wafer expand yet	2	11	Verified	Confirm
No	**Dominant cause**	**Amount**	**%**	**Information**	**Confirmation**
6	Needle material is not good	1	6	Verified	Not Confirm
7	Cost reduction	0	0	Verified	Not Confirm
8	There is no checking for needle marks on the blue tape after the process	0	0	Verified	Not confirm
9	Needle placement is incorrect during set up	0	0	Verified	Not confirm
10	No needle changes were made	0	0	Verified	Not confirm
11	The needle counter is not activated	0	0	Verified	Not confirm
		18	100	Verified	Not Confirm

Based on verification, the dominant causal factorsare the causal factors in ranks 1 to 5 namely:

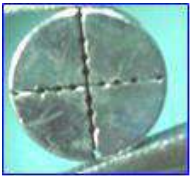
1. Needle size changes frequently
2. The machine cannot calibrate automatically
3. The encoder is worn out
4. Expanded wafer variations in each machine
5. There is no procedure for checking wafer expand yet

3.2 .Tools and Materials

The following are the steps taken for each factor to confirm the dominant cause

1. Needle size changes frequently Method:
Survey and observation on the production

<table>
<tr><th>Analysis</th><th>Material</th></tr>
<tr><td>1. During the process of the material being attached to the die, needle changes are often made in terms of needle size or needle configuration depending on the die size being processed.</td><td> 
Figure 6. Needle</td></tr>
<tr><td>-Needle configuration
<table><tr><th>Die size (DS)</th><th>Needle konfigurasi</th></tr><tr><td>< 160 mils^2</td><td>Single</td></tr><tr><td>DS < 160mils^2 & others DS > 160 mils^2</td><td>Dual die</td></tr><tr><td>>160 mils^2</td><td>Multiple</td></tr></table></td><td>-Needle size selection:
<table><tr><th>Die size (DS)</th><th>Needle size</th></tr><tr><td>< 30 mils^2</td><td>30 um</td></tr><tr><td>30mils^2 <DS<60 mils^2</td><td>125 um</td></tr><tr><td>>60 mils^2</td><td>250 um</td></tr></table></td></tr>
</table>

2. Needle holders can be used for a variety of needle configurations and needle sizes	Material
Mistakes in needle selection can occur because 1 holder can be used with various needle size	 **Figure 7. Needler holder**
Hole Needle holder becomes worn/damaged so that the needle position changes during the process and causes chip die. The following is the number of needle holders.	

Needle holder type	jumlah
Single	50
Dual die/multiple	11

Illustration

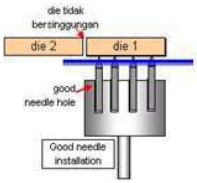
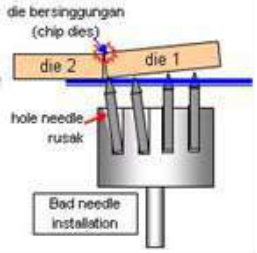
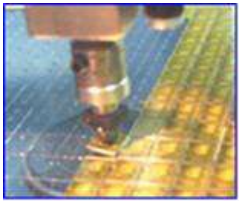
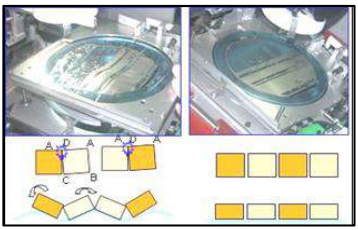
Good needle instalation	Bad needle installation	Chip die during process
		
Based on the verification above, frequent changes in needle size confirmation can cause		

Figure8. Installation needle

2. The machine cannot calibrate automatically

Method: Survey and observation on the production line

Analysis	Material
1. The material processed in die attach has 3 types of wafer frames, namely 6 inch, 8 inch and 12 inch. In general, the wafer table can be replaced according to needs. Therefore, changing the wafer table cannot be avoided, especially when loading a lot of material.	
2. Changing the wafer table will affect the calibration of the expansion wafer ytable. The machine cannot automatically calibrate the expansion wafer. Therefore wafer table calibration is very necessary. The effect of the wafer table not being calibrated correctly is that the blue tape will not stretch optimally, causing the die to touch each other when the wafer table expands.	 Figure9. Blue tape stretches
Based on the verification above, the machine factor cannot automatically calibrate, which can cause chip die rejection	

3. The encoder is worn out
4. Expanded wafer variations in each machine

Method: Survey and observation on the production line

Analysis
1. The encoder is a tool that regulates the size of the expanded wafer table. The size of the expanded wafer is determined by the expanded wafer table parameters that are defined on the machine. Encoder life span for each machine varies greatly, therefore if the encoder wears out it will cause a difference between the value specified in the machine parameters and the actual
2. Variations in expanded wafers in each machine will cause the blue tape to lack maximum stretch. This causes the distance between the dies to be narrow and there is a risk of them touching during the pick and place process. This variation can be caused by an encoder that is not optimal and also the flexibility factor of the blue tape

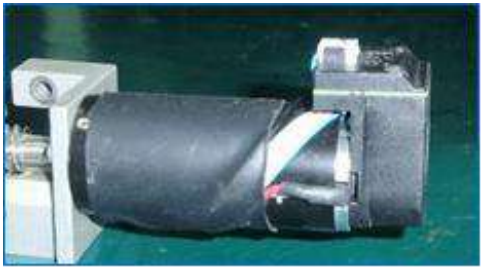
Material


Figure10. Encoder condition

Based on the verification above, the Encoder factor is worn out and variations in wafer expansion in each Confirm machine can cause the chip to die.

5. There is no procedure for checking wafer expand yet

Method: Survey and observation on the production line

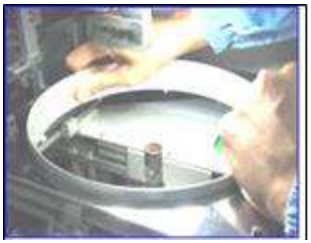
Analysis
1. It is very important to check the actual value of the expanded wafer, this is used to find out whether the machine encoder is in good condition or not so as to prevent contact between the dies.
2. For current conditions, technicians are guided by the results of the materials being set up. If the condition is that no rejects are found, then checking the expanded wafer has not been carried out.
Material
 The technician makes manual adjustments if the parameter settings cannot be maximized

Figure11. manual adjustment

Based on the verification above, the factor that there is no procedure for checking wafer ekspand confirmation can cause chip die rejection

3.3 Test the dominant causal factors

1. Needle size changes frequently
2. The machine cannot calibrate automatically
3. The encoder is worn out
4. Expanded wafer variations in each machine
5. There is no procedure for checking wafer expand yet

The correlation formula below aims to determine the relationship between one variable and another.A correlation value between -1 or +1 means that the relationship is strong

1. Data collection results: Needle size changes frequently changing needle size with set up, change device, change needle
Data source: Unisem Batam Report
Information:
Indicator X: Frequency of changing needle size
Indicator Y: Number of reject chip die (PPM)

Calculation of correlation values:

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)\,(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2)-(\Sigma x)^2\}\{(n.\Sigma y^2)-(\Sigma y)^2\}}}$$

Table9. Correlation change needle & reject chip die

n	Lokasi	Change Needle X	Reject Chip Die (PPM) Y	X^2	Y^2	XY
1	Line10	25	2	625	4	50
2	Line11	80	8	6400	64	640
3	Line12	34	2	1156	4	68
4	Line13	47	3	2209	9	141
5	Line14	8	0	64	0	0
Σ		194	15	10454	81	899

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2)-(\Sigma x)^2\}\{(n.\Sigma y^2)-(\Sigma y)^2}}$$

$$r = \frac{[(5 \times 899)]-[(194)(15)]}{\sqrt{\{(5 \times 10454)-(194)^2\}\{(5x81)-(15)^2\}}}$$

$$r = \frac{1585}{1623} = 0.98$$

Conclusion

• The results of the correlation value calculation show a strong positive correlation of 0.98 so that this factor is dominant as a cause of chip die.

• If the needle size is frequently changed, the number of defects will increase

2. Data collection results: The machine cannot calibrate automatically number of chip die cases due to wafer table discrepancy

Data source: Unisem Batam Report

Information:

X Factor Indicator: wafer table change frequency

Y Factor Indicator: Chip Die Reject Unit (PPM)

Calculation of correlation values:

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2)-(\Sigma x)^2\}\{(n.\Sigma y^2)-(\Sigma y)^2\}}}$$

Table10. Correlation change wafer table & reject chip die

n	Lokasi	Change Wafer Table X	Reject Chip Die (PPM) Y	X^2	Y^2	XY
1	Line10	8	3	64	9	24
2	Line11	12	3	144	9	36
3	Line12	9	3	81	9	27
4	Line13	6	2	36	4	12
5	Line14	3	0	9	0	0
Σ		38	11	334	31	99

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)(\Sigma y)]}{\sqrt{[(n.\Sigma x^2)-(\Sigma x)^2]\{(n.\Sigma y^2)-(\Sigma y)^2}}$$

$$r = \frac{[(5 \times 99]-[(38)(11)]}{\sqrt{\{(5 \times 334)-(38)^2\}\{(5x 31)-(11)^2\}}}$$

$$r = \frac{77}{87.66} = 0.88$$

Conclusion

• The results of the correlation value calculation show a strong positive correlation of 0.88 so that this factor is dominant as a cause of chip die.

• If the wafer table is frequently replaced, the number of rejects will increase.

3. Data collection results: The encoder is worn out
   Number of chip die cases due to encoders worn out
   Data source: Preventive Maintenance Logbook
   Information:
   Data source: Preventive Maintenance Logbook
   X Factor Indicator: Number of encoders worn out
   Y Factor Indicator: : Chip Die Reject Unit (PPM)

Calculation of correlation values:

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2)-(\Sigma x)^2\}\{(n.\Sigma y^2)-(\Sigma y)^2\}}}$$

Table11. Correlation encoder & reject chip die

n	Lokasi	Encoder yg Aus X	Reject Chip Die (PPM) Y	X^2	Y^2	XY
1	Line10	11	3	121	9	33
2	Line11	9	2	81	4	18
3	Line12	12	3	144	9	36
4	Line13	9	1	81	1	9
5	Line14	2	0	4	0	0
Σ		43	9	431	23	96

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2)-(\Sigma x)^2\}\{(n.\Sigma y^2)-(\Sigma y)^2\}}}$$

$$r = \frac{[(5 \times 96]-[(43)(9)]}{\sqrt{\{(5 \times 431)-(43)^2\}\{(5x\,23)-(9)^2\}}}$$

$$r = \frac{93}{102} = 0.91$$

Conclusion

- The results of the correlation value calculation show a strong positive correlation of 0.91 so that this factor is dominant as a cause of chip die.
- The more machine encoders wear out, the more unit chip die defects there will be.

4. Data collection results: Expanded wafer variations in each machine

Number of chip die cases due to discrepancy wafer expand

Data source: Preventive Maintenance Logbook

Information

Data source: Die Attach machine parameter

X Factor Indicator: Wafer expansion variation (mm).

Y Factor Indicator: Chip Die Reject Unit (PPM)

Calculation of correlation values:

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)\,(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2)-(\Sigma x)^2\}\{(n.\Sigma y^2)-(\Sigma y)^2\}}}$$

Table12. Correlation variator wafer expand & reject chip die

n	Lokasi	Variasi Wafer Expand X	Reject Chip Die (PPM) Y	X^2	Y^2	XY
1	Line10	22	4	484	16	88
2	Line11	27	5	729	25	135
3	Line12	17	3	289	9	51
4	Line13	25	5	625	25	125
5	Line14	3	1	9	1	3
Σ		94	18	2136	76	402

$$r = \frac{[(n.\Sigma xy)] - [(\Sigma x)(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2) - (\Sigma x)^2\}\{(n.\Sigma y^2) - (\Sigma y)^2\}}}$$

$$r = \frac{[(5 \times 402] - [(94)(18)]}{\sqrt{\{(5 \times 2136) - (94)^2\}\{(5x\,76) - (18)^2\}}}$$

$$r = \frac{318}{321.35} = 0.99$$

Kesimpulan

- Hasil dari perhitungan nilai korelasi menunjukkan korelasi positif yang kuat sebesar 0,99 sehingga faktor ini menjadi dominan sebagai penyebab chip die.
- Semakin tinggi Variasi wafer ekspan maka semakin banyak unit reject chip die

5. Data collection results: There is no procedure for checking wafer expand yet
Number of die chip cases due yet there is a wafer table change procedure
Information:
Data source: results of online observation
X Factor Indicator: number of setups and converts
Y Factor Indicator: Chip Die Reject Unit (PPM)

Calculation of correlation values:

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)(\Sigma y)]}{\sqrt{\{(n.\Sigma x^2)-(\Sigma x)^2\}\{(n.\Sigma y^2)-(\Sigma y)^2\}}}$$

Table13. Correlation procedur wafer expand & reject chip die

n	Lokasi	Prosedur Wafer Expand X	Reject Chip Die (PPM) Y	X^2	Y^2	XY
1	Line10	474	3	224676	9	1422
2	Line11	514	4	264196	16	2056
3	Line12	383	2	146689	4	766
4	Line13	364	1	132496	1	364
5	Line14	113	1	12769	1	113
Σ		1848	11	780826	31	4721

$$r = \frac{[(n.\Sigma xy)]-[(\Sigma x)(\Sigma y)]}{\sqrt{[(n.\Sigma x^2)-(\Sigma x)^2][(n.\Sigma y^2)-(\Sigma y)^2]}}$$

$$r = \frac{[(5 \times 4721]-[(1848)(11)]}{\sqrt{[(5 \times 780826)-(1848)^2][(5x\ 31)-(11)^2]}}$$

$$r = \frac{3277}{4077.61} = 0.80$$

Kesimpulan

- Hasil dari perhitungan nilai korelasi menunjukkan korelasi positif yang kuat sebesar 0,80 sehingga faktor ini menjadi dominan sebagai penyebab chip die.
- Semakin banyak mesin yang di-set up/convert tanpa pengukuran ketinggian wafer table semakin besar reject chip die.

Table of Sequence of Dominant Causes based on Dominant Root Cause Coefficient

Table14. Data Dominant Cause

No.	Dominant Cause	value r	% r	% Cumulative
1	Expanded wafer variations in each machine	0.99	22%	22%
2	Needle size changes frequently	0.98	21%	43%
3	The encoder is worn out	0.91	20%	63%
4	The machine cannot calibrate automatically	0.88	19%	82%
5	There is no procedure for checking wafer expand yet	0.8	18%	100%
Total		4,56	100%	

Pie Chart Sequence of Dominant Causes based on Dominant Root Cause Coefficient

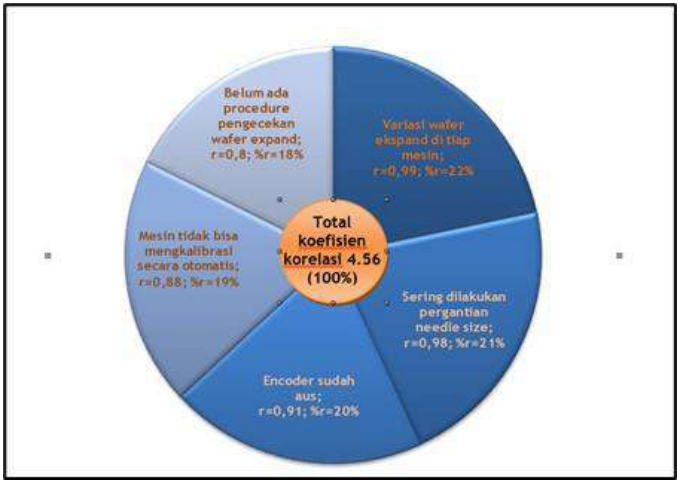


Figure12. Pie chart of dominan causes

Chapter 4. Results and Discussion

4.1 Research Result Data

A. PLAN AND IMPLEMENT REPAIRS

DOMINANT CAUSING FACTORS :

1. **Variasi wafer ekspand**

Why	To ensure that the height of the expanded wafer after changing the wafer table has small variations with the parameters set.
What	Create a tool that can detect variations in wafer expansion after changing the wafer table
How	1. Create a tool/jig design that can determine the actual height of the expanded wafer. 2. Make technical drawings to the Industrial Engineering Department 3. Order from the provider (vendor) 4. Create work instructions 5. Carry out direction and training

2. Frequent needle changes

Why	So that the die attach machine can process dies that have different sizes
What	Strive for a needle holder and ejector needle that match the size of the die to obtain an ideal process
How	1. Create a dedicated needle holder design 2. Make technical drawings to the Industrial Engineering Department 3. Order from the provider (vendor) 4. Create work instructions 5. Carry out direction and training

3. **The machine cannot calibrate automatically**

Why So that die attach machines that do not have an automatic calibration system can ideally process various types of wafers after changing the wafer table

What Conditioning a tool that can be used to calibrate the wafer table manually after changing the wafer table

How
1. Create a design for tools / jigs for calibration
2. Make technical drawings to the Industrial Engineering Department
3. Order from the provider (vendor)
4. Create work instructions
5. Carry out direction and training

4. The encoder is worn out

Why Eliminates differences in ring wafer table height settings for each technician due to the condition of the encoder being worn out

What Conditioning a tool that can detect the condition of the encoder being worn out so that it can be done directl

How
1. Design a tool/jig that can detect the encoder being worn out.
2. Make technical drawings to the Industrial Engineering Department
3. Order from the provider (vendor)
4. Create work instructions
5. Direct the Board Repair technician for replacement

5. There is no procedure for checking expanded wafers yet

Why	To ensure that wafer expansion is checked after changing the wafer table, change device, set up and conversion
What	Develop a procedure used by technicians to check wafer expansion during wafer table change, device change, set up and conversion
How	1. Create work instructions containing work flow or Flow Chart regarding procedures for checking expanded wafers 2. Provide direction and training to die attach technicians

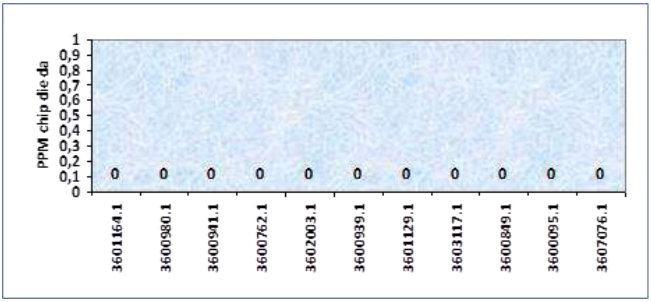
B. Implementation

DOMINANT CAUSING FACTORS :

1. Variasi wafer ekspand

Implementation
1. Design Jig wafer table a. Material • Empty wafer table 6" and 8" b. b. Tool ▪ Vernier measuring instrument, Pencil, Ruler, Paper, Ruler with number hole, Small drill c. Ways of making Measure the height of the ring wafer table on the ideal wafer table, namely the one where the encoder has been replaced with a new one (already calibrated according to the machine 2. Work instructions regarding ring wafer table height calibration Create a work procedure regarding use 2.1 Tool Jig wafer table, pen, paper, ruler 2.2 Ways of making ▪ Set the machine to wafer calibration menu ▪ Set to expand wafer menu and adjust the height of the ring wafer table by rotating it ▪ Move the wafer table jig measuring tool to determine the ideal height ▪ Submit a rough copy of the work instructions to Engineering to request corrections and approval

3. Evaluation Results
After the expanded wafer height measuring tool/jig was completed, the group made observations on 10 die attach machines. (10 monitoring lots found no reject chip die)



4. Direction and Training
i. Create a schedule for briefing and training for all die attach technicians.

ii. carry out instructions and training on ring wafer table height calibration.

iii. Provide an attendance register to request signatures from attending
technicians.

iv. Post work instructions on the notice board at the technician's workplace as a reminder

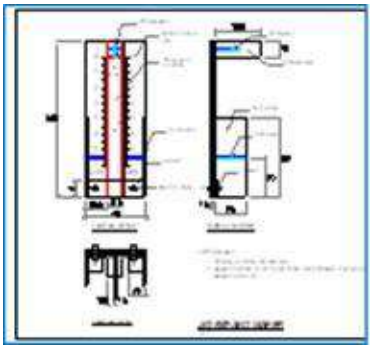
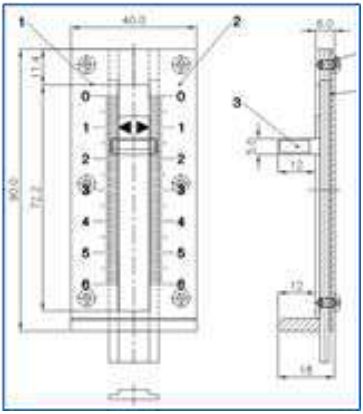
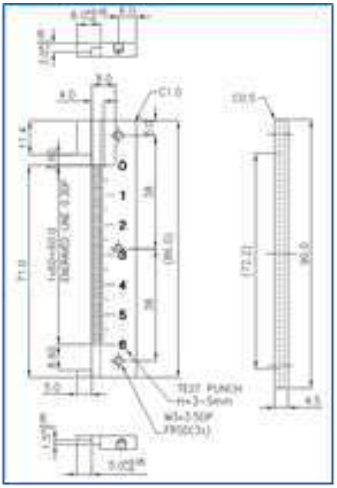
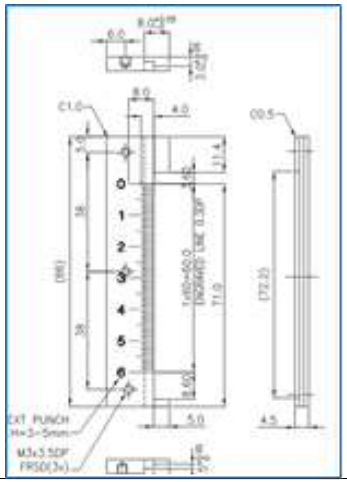
Drawing	
a.The first drawing of the expanded wafer measuring jig design	b. Second drawing of the expanded wafer measuring jig design
	
All side design images	Right scale front miner design image (right rear cover)
	

Figure13. Design jig wafer

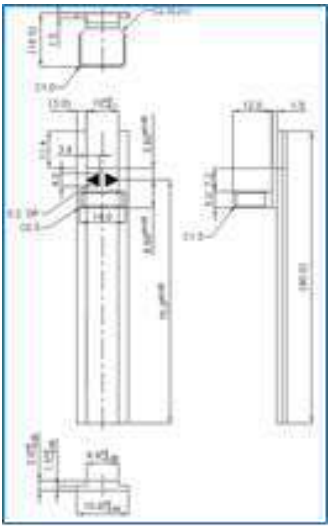
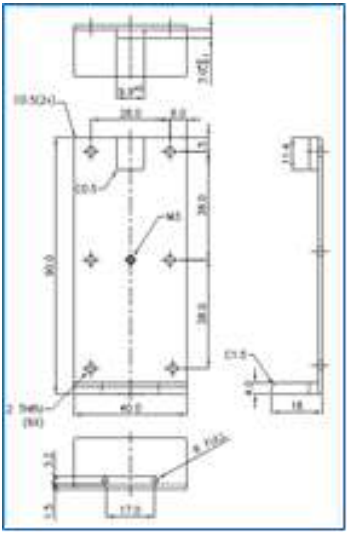
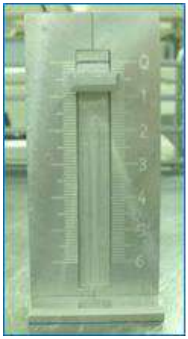
Right scale front miner design image (left rear cover) 	Design drawing of the rod that determines the height of the expansion wafer 
Actual picture of Expand wafer measuring Jig Front view of the expanding wafer control jig 	Actual picture of Expand wafer measuring Jig Image of expanded wafer control jig side view 

Figure14. Actual design jig wafer

2. Frequent needle changes

Implementation

1. Special design for needle holder for size 125 micron

a. Material

Variations in needle size include 70,125 and 250 microns

b. Tool

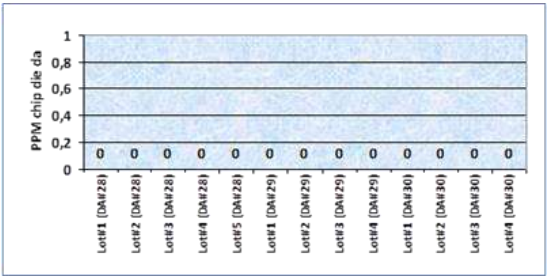
- Vernier measuring instrument, Pencil, Ruler, Paper, Drawing needle documents, Needle holder drawing document

c.Ways of making

- Measure the diameter and length of the needle with reference to the drawing needle.
- Measure the diameter and length of the needle holder with reference to the needle holder drawing.
- Determine the diameter of the new needle and the diameter of the new needle holder hole that will be differentiated.
- Make a rough technical drawing of the new needle shape for size 125 microns
- Make a rough technical drawing of the new needle holder for size 125 micron
- Submit rough technical drawings to the Industrial Engineering Department to create standard technical drawings
- Submit an order to Engineering to place an order with the provider (vendor)

d. Evaluation result

After dedicated needle holders, both single type and multi type
The following are the results of material monitoring using the dedicated needle holder. (10 monitoring lots found no reject chip die)



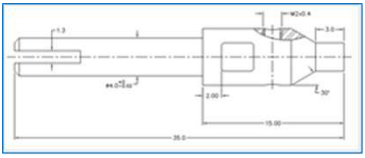
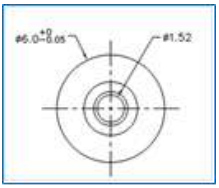
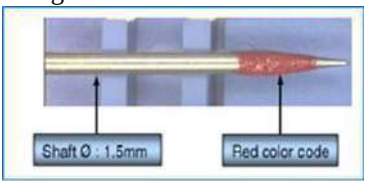
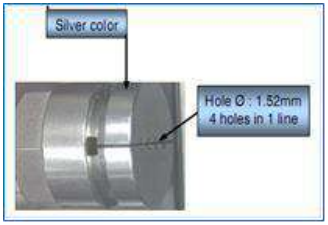
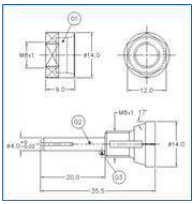
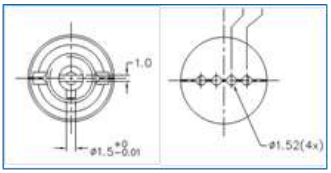
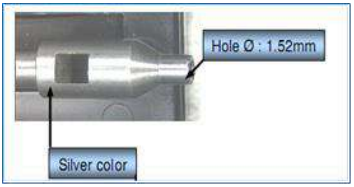
Drawing	
Design image of dedicated needle holder for single configuration (size 125 um) side view image  Image of the front view  Actual image of new needle design size 125  Actual picture of new design needle holder (multi type)  	b. Design image of dedicated needle holder for multi configuration (size 125 um) side view image  Image of the front view  Actual picture of new design needle holder (single type) 

Figure15. Design jig needle holder single

Installing the new needle into the holder (multi type)	Installing the new needle into the holder (single type)
	

Figure16. Instaling the new needle

3. The machine cannot calibrate automatically

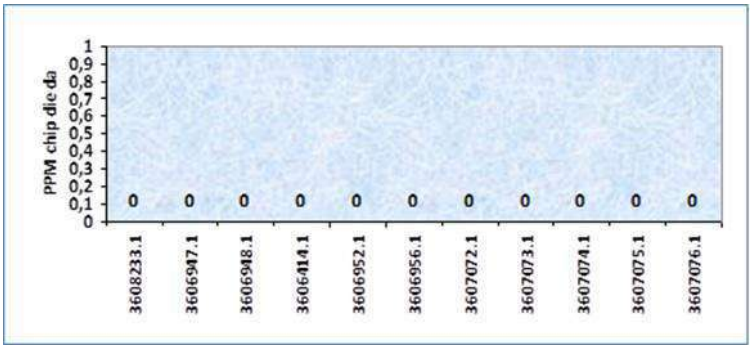
Implementation
1. Wafer table calibration design a. Material • Empty wafer table 6" and 8" • 5 mm thick mica plastic measuring 35x35 cm b. Tool Vernier measuring instrument, Pencil, Ruler, Paper, Drill bit, A compass with a pointed caliper eye, Markers. c. How to repair: ▪ Remove the cable screw securing the wafer table ▪ Install the new wafer table on the machine ▪ Make a center point on the plastic mica and make a small hole with a drill bit ▪ Draw a circle using a compass ▪ Mark the compass marks with a marker ▪ Differentiate the marker color for each wafer table ring Diameter ▪ Remove the mica plastic and set the expand wafer

parameters to a value of 15 mm

- Measure the height of the expanded wafer using an expanded wafer measuring jig

d. Evaluation result

After the expanded wafer height measuring tool/jig is complete Following are the evaluation results on 10 lots after changing the wafer table. (10 monitoring lots found no reject chip die)



Direction and Training

i. Create a schedule for briefing and training for all die attach technicians

ii. carry out instructions and training on wafer table calibration

iii. Provide attendance list

iv. Post work instructions on the notice board at the technician's workplace as a reminder

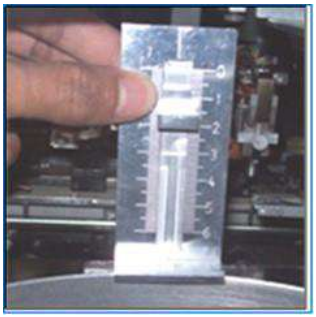
Drawing	
Picture of removing the screw on the wafer table locking cable 	Picture of the process of installing a new wafer table on the machine. 
Draw the mica plastic installation and the center point of the circle 	Draw the expanded wafer parameter set with a value of 15 mm 
Figure measuring the height of the expanded wafer with an expanded wafer measuring jig 	

Figure17. Instaling wafer table

4. The encoder is worn out

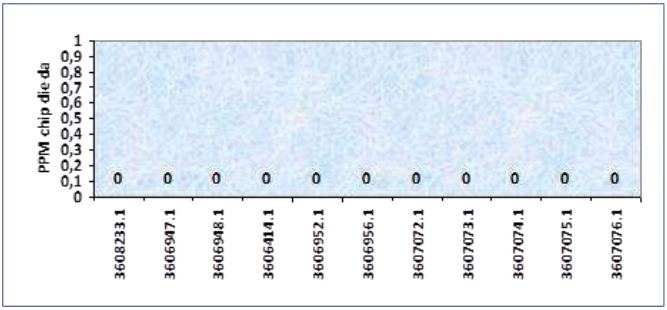
Implementation

1. Design a tool/jig that can detect the encoder being worn out.

a. Material
Wafer tables 6" and 8"
b. Tool
3mm Allen key, Pen, Paper, Ruler

- Set the wafer expand parameter in the machine to a value of 15 mm.
- Check the actual height of the expanded wafer using the expanded wafer measuring jig.
- Repeat the process in steps 1 and 2, if the results are always very different between the machine parameter settings and the scale on the jig, take the encoder on the wafer table.
- Measure the voltage on the encoder motor. If it does not match the specifications then the encoder is worn out
- Replace with a new encoder, install the wafer table in the machine. Measure the actual height of the expanded wafer with an expandable wafer jig, making sure the value matches the machine parameters.
- For each damaged encoder, record it in the PM log book to inform engineering to order a new encoder.

Evaluation result
After the expanded wafer height measuring tool/jig is complete
(10 monitoring lots found no reject chip die)



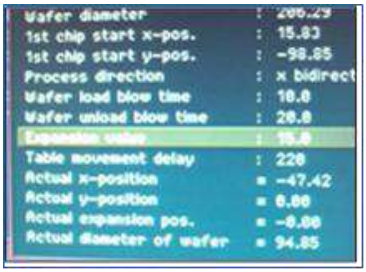
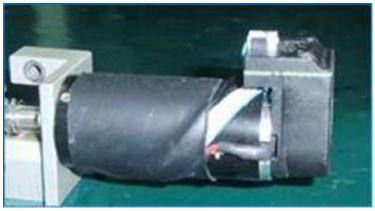
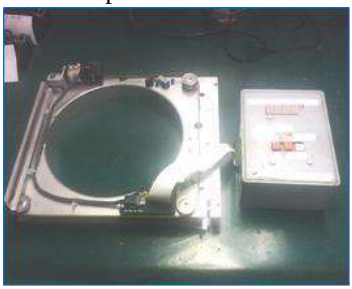
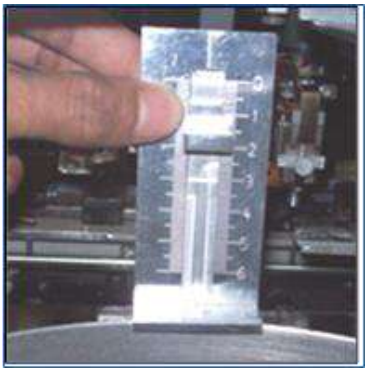
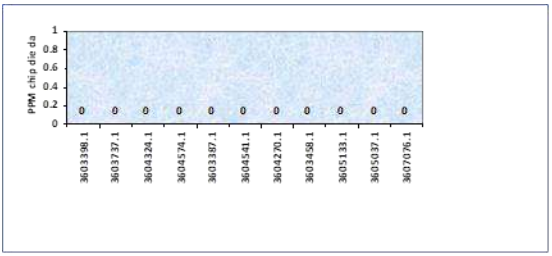
Drawing	
Image of 15 mm expand wafer parameter set  The encoder image is damaged after being removed from the wafer table.  Measuring voltage on the encoder motor using the FOL Tool Box Wafer Expand 	Image of actual measurement of expanded wafer height with expanded wafer measuring Jig 

Figure 18. Encoder

5. There is no procedure for checking expanded wafers yet

Implementation
1. Work instructions on using a jig wafer table to check wafer expansion a. Tool Jig wafer table, Pen, Paper, Ruler b. Ways of making ▪ Set the machine to wafer calibration menu ▪ Set to expand wafer menu and adjust the height of the ring wafer table by rotating it ▪ Move the wafer table jig measuring tool to determine the ideal height ▪ Submit a rough copy of the work instructions to Engineering to request corrections and 2. Direction and Training a. Create a schedule for conducting briefings and training b. provide guidance and training on how to use the jig wafer table to determine the condition of the expanded wafer c. Provide attendance list d. Post work instructions on the notice board at the technician's workplace as a reminder. Evaluation result After creating a procedure for using the expanding wafer height measuring jig. (10 monitoring lots found no reject chip die) 

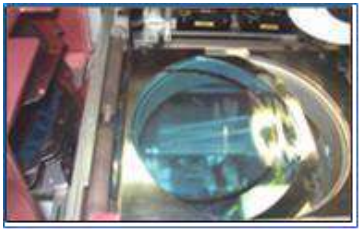
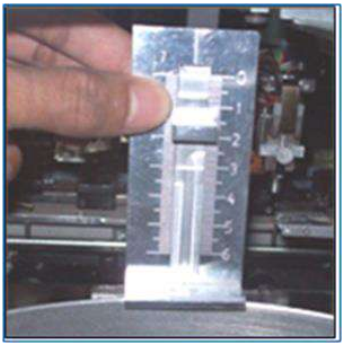
Drawing	
Image of wafer ejection from wafer table  The wafer table image is positioned to the side for easy measurement 	Image of expanding wafer parameter settings to 15 mm 
Image of placing the expanded wafer jig on the expanded wafer plate 	Image of the position of the depth bar touching the wafer expand plate and the scale reading on the jig. 

Figure19. The wafer table

C. TRIAL MONITORING

1. Expanded wafer variations

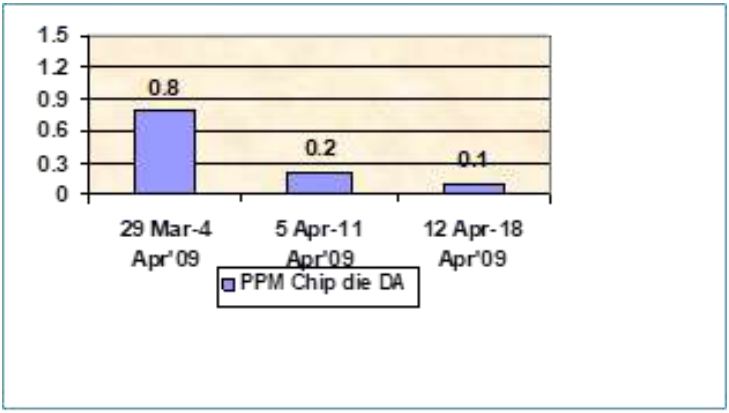
Improvement results
Making a Jig Wafer Table

Function
To determine the height of the ring wafer table under optimal conditions.

The actual condition of the expanded wafer does not occur when the wafer is stretched

Graph Trial Monitoring
Good results. downward graphic trend

Monitoring trials of measuring the height of the ring wafer table on the die attach machine showed good results. rated **SUCCESSFUL**



2. Frequent needle changes

Improvement results

Created a new needle and needle holder design for the 125 micron size.

Function

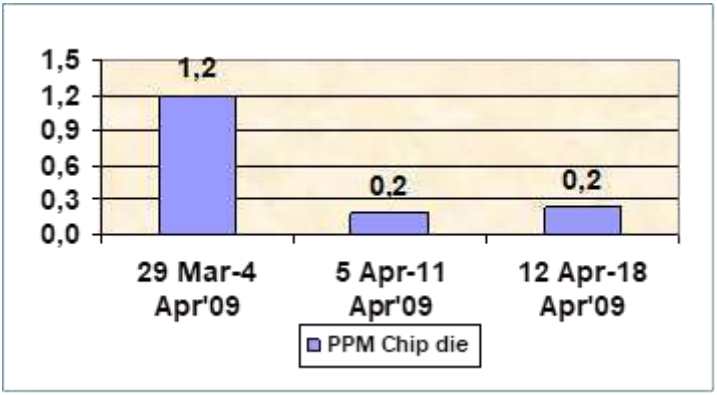
This is done to avoid using the wrong needle for certain materials of a certain size

Avoid damage to the needle holder due to frequent needle changes.

Graph of monitoring trials on the use of new needles and needle holders:

This monitoring was taken from 73 machines that have used new needles

Based on the results obtained from monitoring trials, it shows that chip die rejects can be reduced, so the group states that the improvements taken are rated: **SUCCESSFUL**



3. **The machine cannot calibrate automatically**

Improvement results

Create wafer table calibration aids

Function

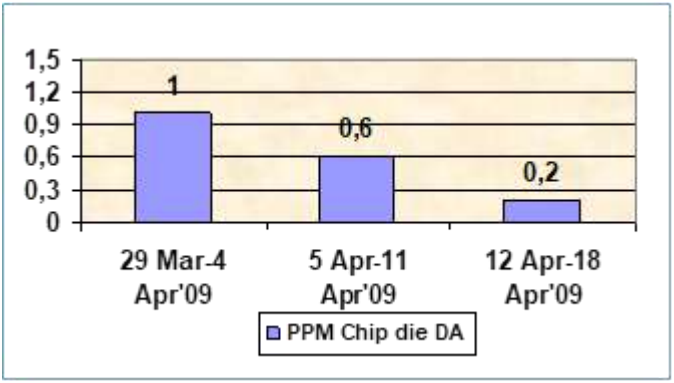
Optimizing the position of the wafer table in the die attach machine when there is a change in wafer size usage

Monitoring trial graph

Chip die rejection still occurs in the second and third weeks because the condition of the wafer table itself has been around for a long time. This can be overcome by always working with Preventive Maintenance in maintaining the wafer table**.**

Carry out monitoring of machines that have been recalibrated. (73 machines)

Based on the results obtained, the more there is improvement, the group states that this improvement is assessed: **SUCCESSFUL**



4. Encoder sudah aus

Improvement results

Making tools/jigs

Function

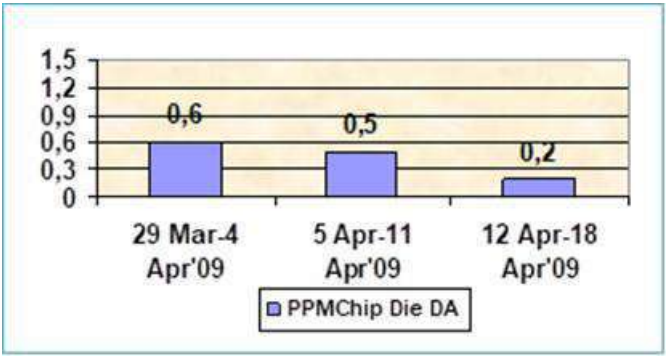
know the condition of the encoder.
This tool is very effective for determining the condition of the encoder,

Graph Trial Monitoring

Reject chip die still occurs.

Even though the PPM is decreasing. This is because the new encoder takes time to order.

The trial results showed decreasing results in the last 2 weeks. Therefore, it is stated that the resolution of this problem is assessed: **SUCCESSFUL**



5. There is no procedure for checking expanded wafers yet

Improvement results

Create a water expand checking procedure. This procedure is very effective

Function

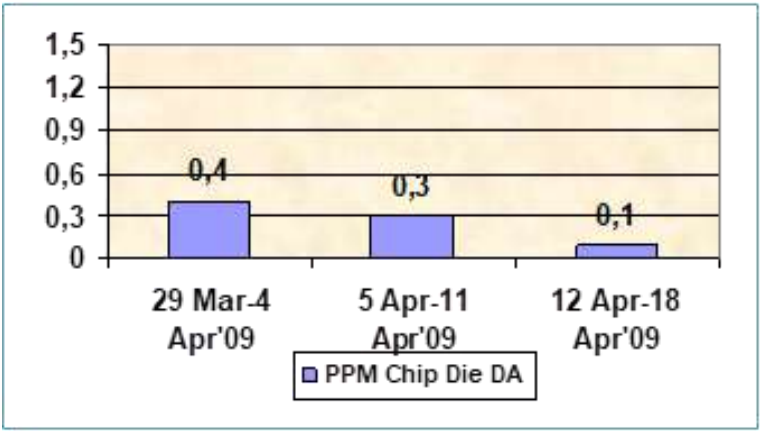
Used by technicians and preventive maintenance when changing the use of wafer tables.

Graph Trial Monitoring

For the first week there were still chip die rejects, this was due to the presence of new technicians so time was needed for learning.

The group can overcome this by providing training by the lead technician regarding expanding wafer checking procedures for new technicians.

Monitoring machines that have followed the check that the solution used is rated: **SUCCESSFUL**



4.2 Discussion

EVALUATION OF DOMINANT CAUSING FACTORS

Comparison table before and after corrective action

Table before corrective action

Table15. Before corrective action

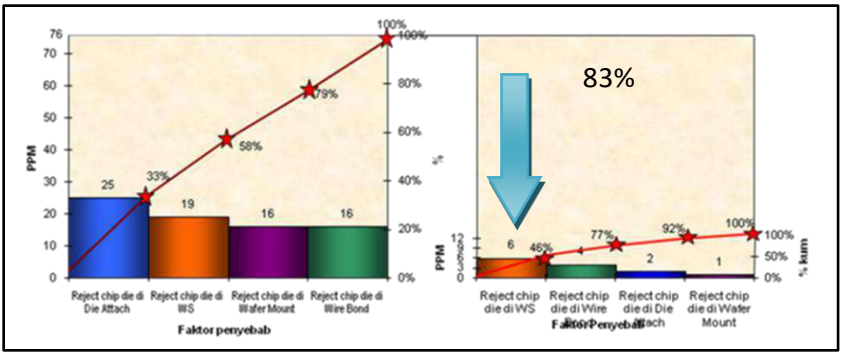
No	Faktor Penyebab	PPM Reject chip die (ww17'09-ww22'09)			
		PPM	%	Kum	Kum (%)
1	Tingginnya reject chip die di Die Attach area	25	33%	25	33%
2	Tingginnya reject chip die di WS area	19	25%	44	58%
3	Tingginnya reject chip die di Wafer mount area	16	21%	60	79%
4	Tingginnya reject chip die di Wire Bond area	16	21%	76	100%
	Total	76	100%		

Table after corrective action

Table16. After corrective action

No	Faktor Penyebab	PPM Reject chip die (ww17'09-ww22'09)			
		PPM	%	Kum	Kum (%)
1	Tingginnya reject chip die di Die Attach area	2	15%	2	15%
2	Tingginnya reject chip die di WS area	6	46%	8	62%
3	Tingginnya reject chip die di Wafer mount area	1	8%	9	69%
4	Tingginnya reject chip die di Wire Bond area	4	31%	13	100%
	Total	13			

Comparison graph before and after corrective action Chapter



5. Results and Discussion
5.1. Conclusion

Table17 .Reasons for target differences

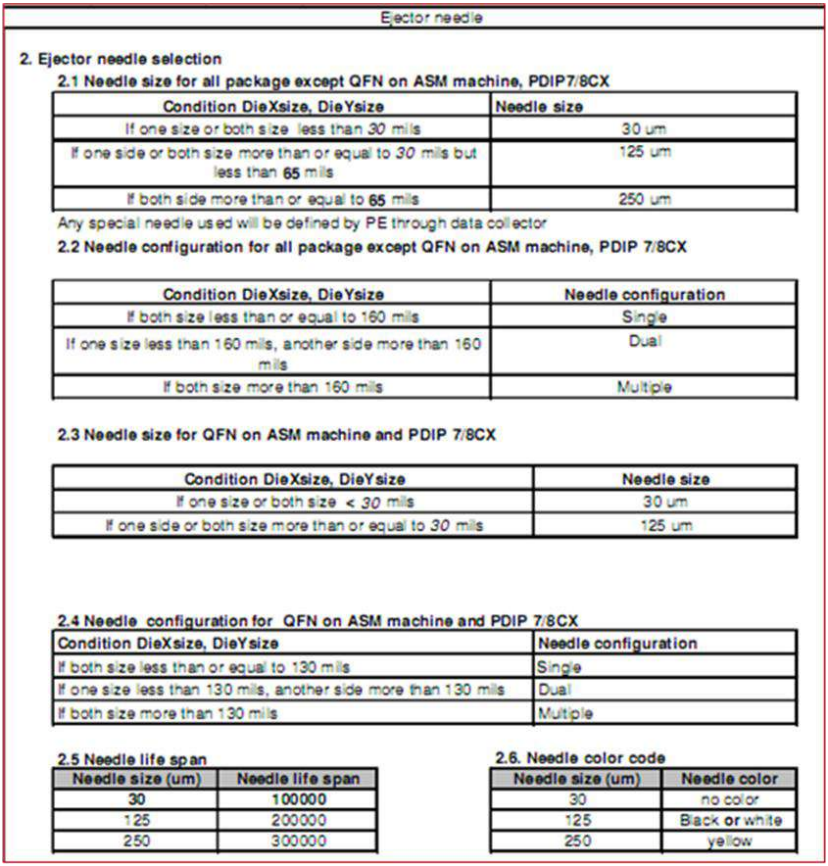
Target set : 80.2%	Target Achived : 83%	Target variance : 2.7%

No	Faktor penyebab	Respon mula-mula	Penurunan yang diharapkan	Respon baru	Penurunan sebenarmya
1	Tingginnya chip die di area Die Attach	25	88%	2	23 (92%)
2	Tingginya chip die di area Wafer Saw	19	93%	6	13 (68.4%)
3	Tingginya chip die di area Wafer Mount	16	100%	1	15(93.8%)
4	Tingginya chip die di area Wire Bond	16	33%	4	12(75%)
	Total	76	80.2%	13	63(83%)

	Target Variance Analysis
1.	The first factor can be reduced by 92%, this is because there is an Expand Wafer Jig which can be used as a tool for calibrating wafer tables, determining encoder conditions and also a dedicated nozzle holder which can reduce die chip rejects in the die
2.	The second factor can decrease by 68.4%, this is due to variations in the thickness of the material being processed, however improvements continue to be made to solve this problem.
3.	The third factor can only be reduced by 93.8%. This is because there are several wafers that have variations in ink thickness so special treatment is needed to carry it out.
4.	The fourth factor can be reduced by 75%. This is achieved due to good coordination between die attach and wire bond in following up material misplaced dies with optimized loop parameters
5.	Based on the target difference table above, the overall reduction in chip die rejects in the die attach area can be achieved with a reduction presentation of 83% or in other words it can be exceeded by 2.7%.

STANDARDIZATION OF SPECIFICATIONS

1. Standardize the selection of dedicated ejector needle and needle holder.



Ejector needle

2. Ejector needle selection

2.1 Needle size for all package except QFN on ASM machine, PDIP7/8CX

Condition DieXsize, DieYsize	Needle size
If one size or both size less than *30* mils	30 um
If one side or both size more than or equal to *30* mils but less than **65** mils	125 um
If both side more than or equal to **65** mils	250 um

Any special needle used will be defined by PE through data collector

2.2 Needle configuration for all package except QFN on ASM machine, PDIP 7/8CX

Condition DieXsize, DieYsize	Needle configuration
If both size less than or equal to 160 mils	Single
If one size less than 160 mils, another side more than 160 mils	Dual
If both size more than 160 mils	Multiple

2.3 Needle size for QFN on ASM machine and PDIP 7/8CX

Condition DieXsize, DieYsize	Needle size
If one size or both size < *30* mils	30 um
If one side or both size more than or equal to *30* mils	125 um

2.4 Needle configuration for QFN on ASM machine and PDIP 7/8CX

Condition DieXsize, DieYsize	Needle configuration
If both size less than or equal to 130 mils	Single
If one size less than 130 mils, another side more than 130 mils	Dual
If both size more than 130 mils	Multiple

2.5 Needle life span

Needle size (um)	Needle life span
30	100000
125	200000
250	300000

2.6. Needle color code

Needle size (um)	Needle color
30	no color
125	Black or white
250	yellow

Figure20. Standarisation

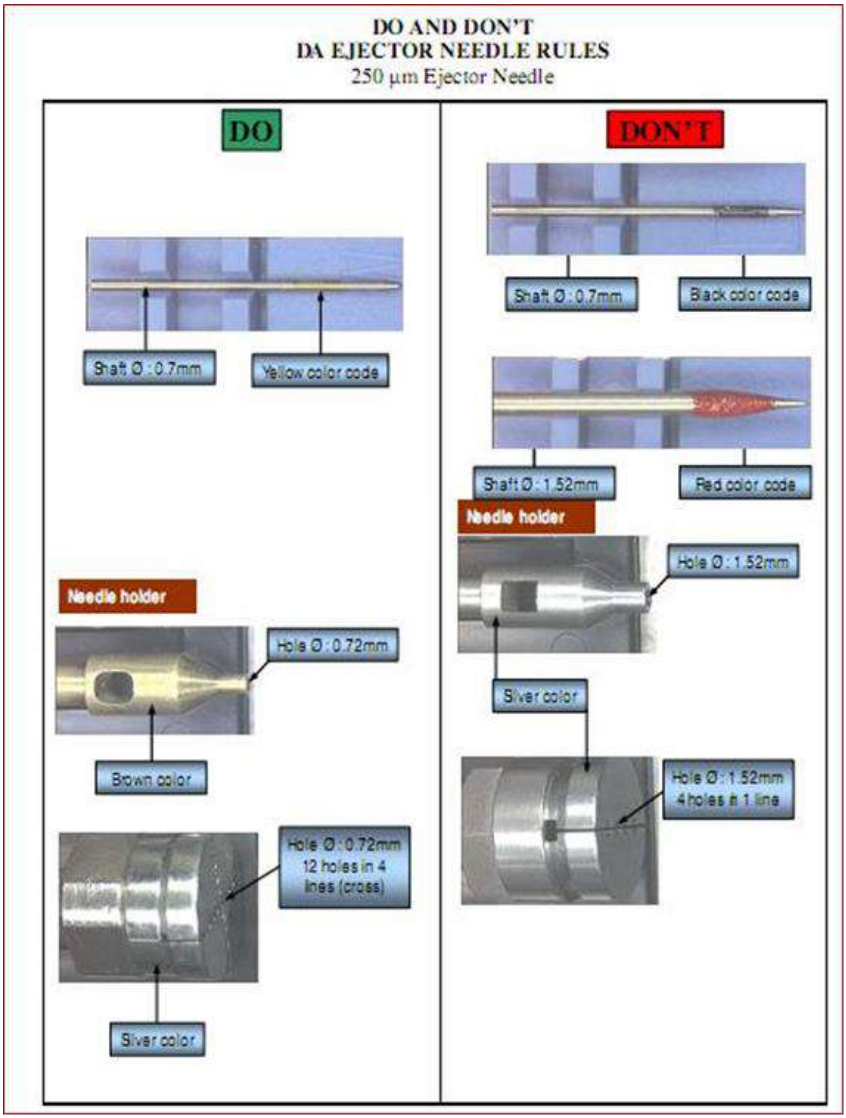


Figure21.Do & Don't ejector needle 250µm

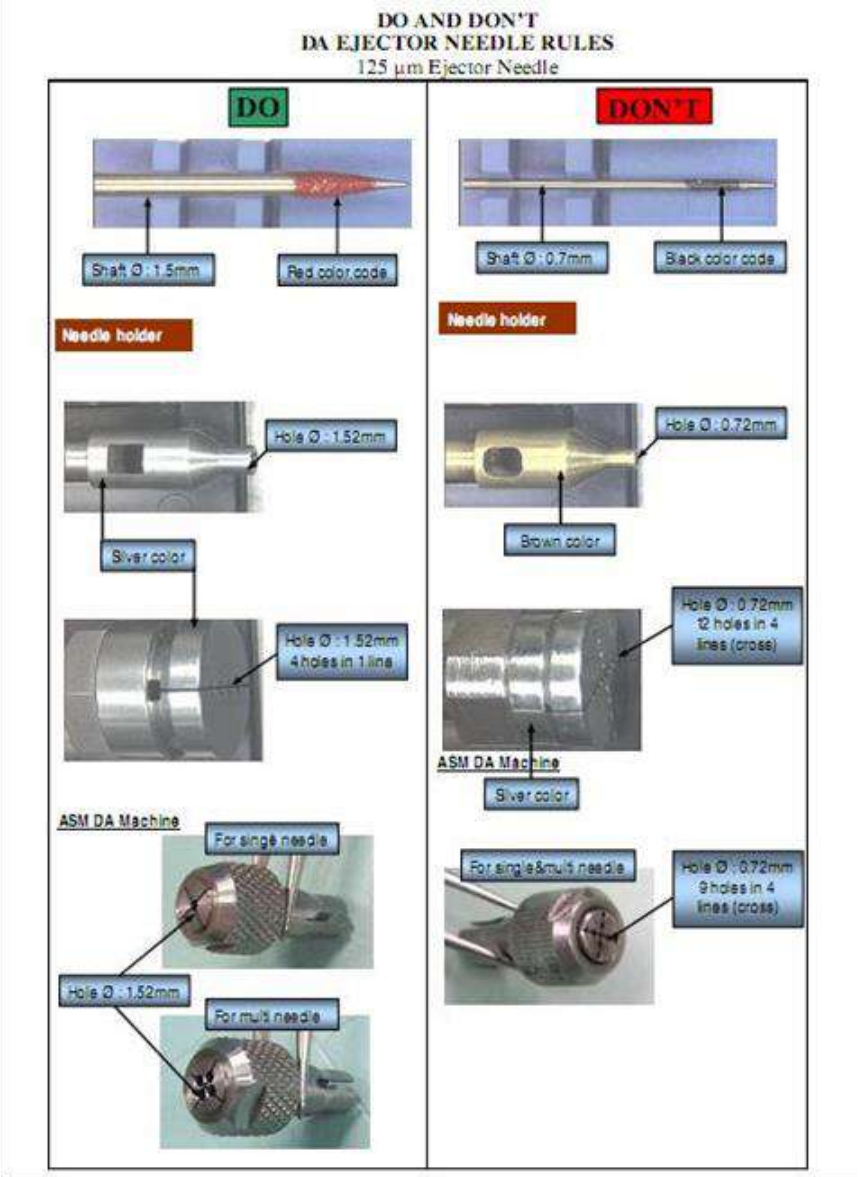


Figure22.Do & Don't ejector needle 125µm

2. Standardization of wafer table expansion checking procedures.

Making Work Instructions for checking wafer table expansion

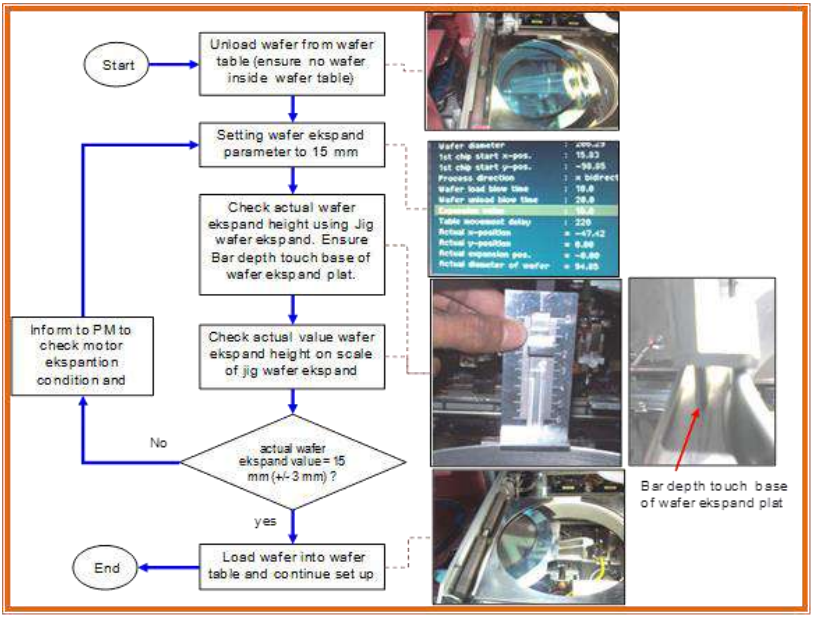


Figure 23. Standarisasi wafer table

Making Specifications at Die Attach for checking wafer table expansion.

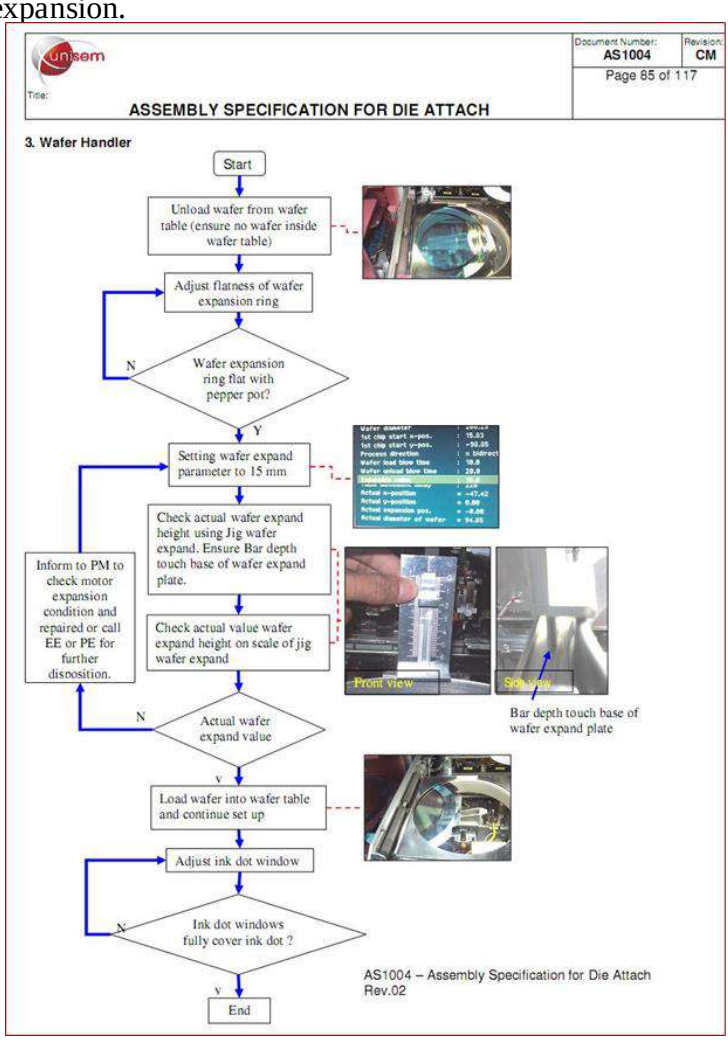


Figure24. Spectification wafer handle

3. Standardization of Specifications at die attach for Change Wafer Table Conversion Procedure at die attach

Making Work Instructions (work Instruction) Change Wafer Table Conversion Procedure in die attached

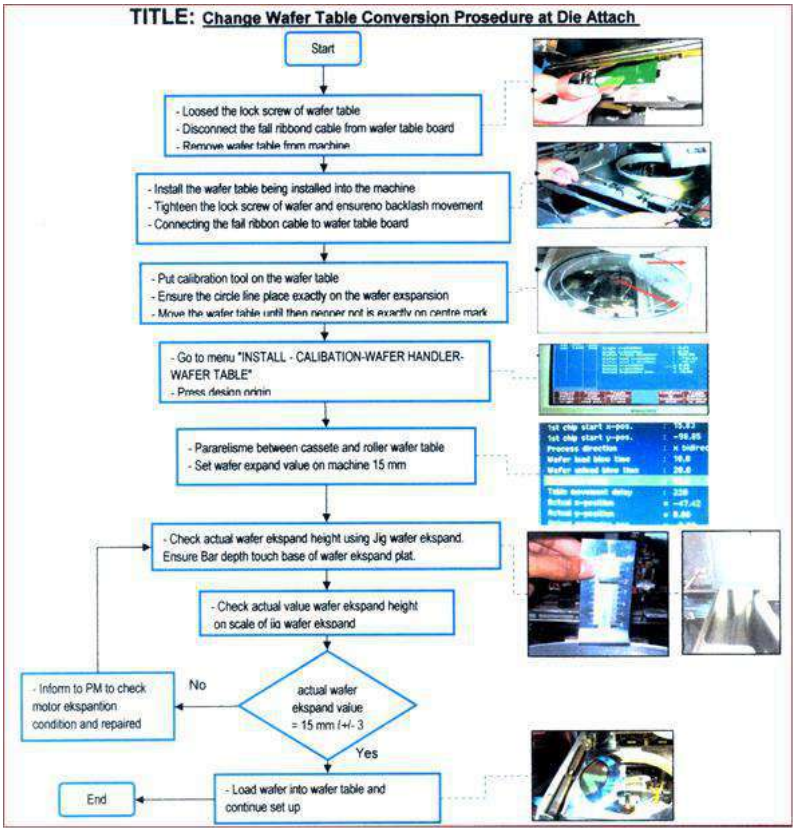


Figure 25 Work Intruction change wafer table

4. Standardization of specifications on die attach for checking encoder condition

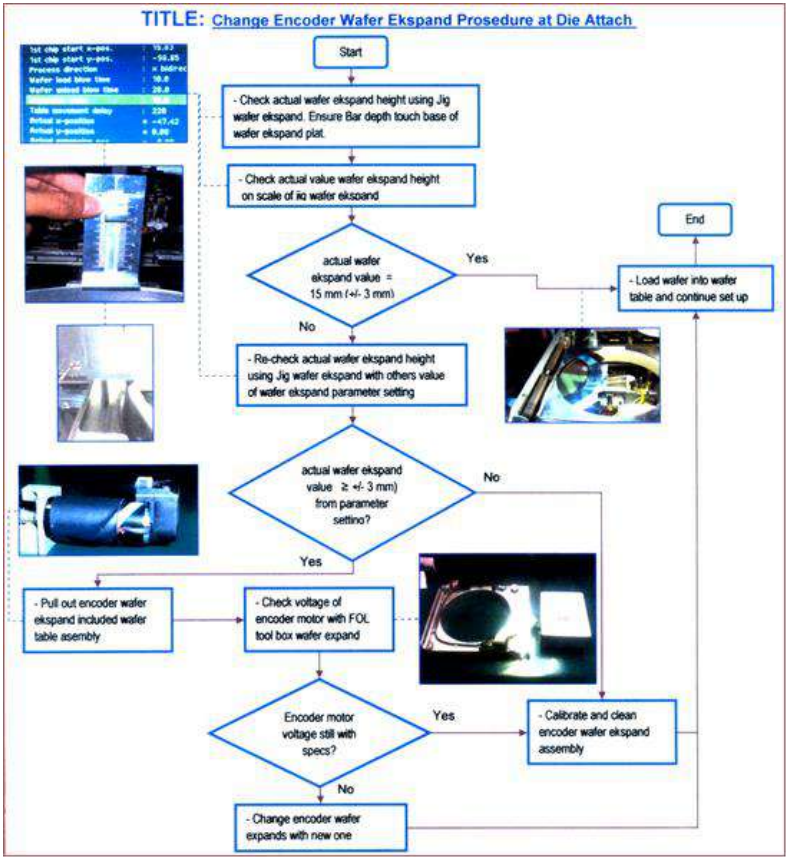


Figure 26. Standarisation endoder condition

5.2. Suggestion

The chip die project this time has 4 causal factors,

1. Height of the chip die in the Die Attach area
2. High Chip die in Wafer Saw area
3. High chip die in Wafer Mount area
4. High chip die in Wire Bond area

And Other causal factors that can be resolved can be looked for, such as:

1. Frequent wafer jamming in the die attached area
2. High chip die problem in excess wafer material

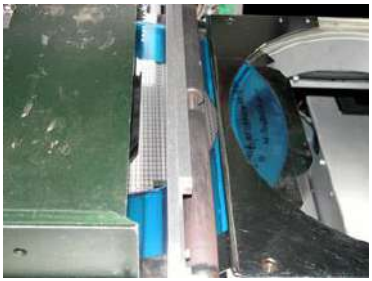
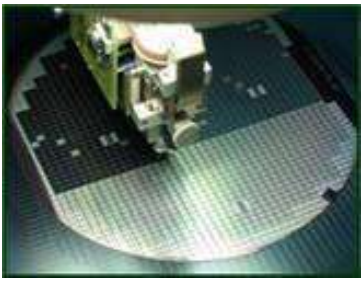
Frequent wafer jamming in the die attached area	High chip die problem in excess wafer material
	

Figure 27. Suggestion

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1. Nigel Hill:" The handbook of Customer Satisfaction and Loyalty Measurement, London 2006"
2. JohnS.Oakland : " Statical Process Control, Amsterdam 1986 "
3. Jenna Koo: "Cycle time, Germany 2020"
4. Richard clark: "Die attach proses, California 2004"

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Junior High School : 1988 -1990 Sang Timur
Senior High School : 1990 -1992 Marsudi Luhur

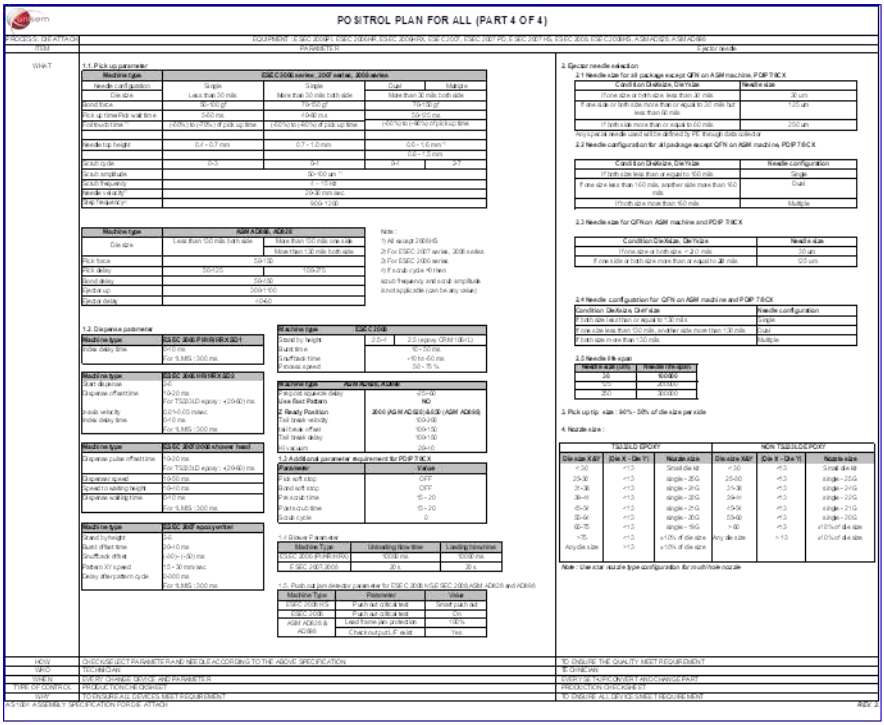
Attachment

A. STANDARDIZATION OF SPECIFICATIONS AND WORK PROCESSES

A1.1. Standardize the selection of dedicated ejector needle and needle holder**.**

Assembly Specification for Die Attach - AS 1004 Revision CM

Appendix 2 – Positrol Plan For All (Part 4 of 4) page 30 of 117.



POSITROL PLAN FOR ALL (PART 4 OF 4)

PROCESS: DIE ATTACH | EQUIPMENT: ESEC 2009FI, ESEC 2009HF, ESEC 2009HRX, ESEC 2100F, ESEC 2007 FD, ESEC 2007 HS, ESEC 2009, ESEC 2100BN, ASM AD829, ASM AD890

ITEM | PARAMETER | Ejector needle

WHAT

1.1. Pick up parameter

Machine type	ESEC 2008 series, 2007 series, 2009 series			
Needle configuration	Simple	Simple	Dual	Multiple
Die size	Less than 20 mils	More than 20 mils both side	More than 20 mils both side	
Bond force	30~100 gf	70~150 gf	70~150 gf	
Pick up time/Pick wait time	5~50 ms	40~80 ms	50~95 ms	
Tail touch time	(40%) to (75%) of pick up time	(40%) to (40%) of pick up time	(40%) to (40%) of pick up time	
Needle dip height	0.4 ~ 0.7 mm	0.7 ~ 1.0 mm	0.6 ~ 1.6 mm * 0.6 ~ 1.8 mm	
Scrub cycle	0~3	0~1	0~1	0~1
Scrub amplitude	30~100 um *			
Scrub frequency	4 ~ 15 Hz			
Needle velocity	20~30 mm/sec			
Ejector frequency	500~1100			

Machine type	ASM AD838, AD839	
Die size	Less than 150 mils both side	More than 150 mils one side / More than 130 mils both side
Pick force	50~70	
Pick delay	50~120	100~215
Bond delay	50~150	
Eject up	300~1100	
Eject delay	~1040	

Note :
1) All except 2009HS
2) For ESEC 2007 series, 2008 series
3) For ESEC 2009 series
4) If scrub cycle =0 then scrub frequency and scrub amplitude is not applicable (can be any value)

1.2. Dispense parameter

Machine type	ESEC 2008 P/HR/HRX/3D1
Wafer delay time	0~10 ms For 5 MS : 300 ms.

Machine type	ESEC 2008 HR/HRX/3D2
Start dispense	0~5
Dispense offset time	10~20 ms For 7530 3D epoxy : +20~40 ms.
Z-axis velocity	0.2~0.05 m/sec
Wafer delay time	0~10 ms For 5 MS : 300 ms.

Machine type	ESEC 2007 2008 shower head
Dispense pulse offset time	10~20 ms For 7530 3D epoxy : +20~40 ms.
Dispenser speed	10~50 ms
Speed to waiting height	10~40 ms
Dispense waiting time	0~10 ms For 5 MS : 300 ms.

Machine type	ESEC 2007 epoxy writer
Stand by height	0~5
Burst offset time	20~40 ms
Snuff back offset	(-40)~(-30) ms.
Pattern XY speed	15 ~ 30 mm/sec
Delay after pattern cycle	0~500 ms For 5 MS : 300 ms.

Machine type	ESEC 2008
Stand by height	2.5~1 (2.5 = epoxy CRM 1064)
Burst time	10 ~ 50 ms
Lay/Pack time	<10 to 40 ms
Release speed	50 ~ 75 %

Machine type	ASM AD838, AD839
Pre-post squeeze Delay	<5~20
Use Rest Pattern	NO
Z Ready Position	2000 (ASM AD829/AD830 (ASM AD838)
Tail break velocity	100-200
Tail break offset	100~150
Tail break delay	100~150
Pin count	29~10

1.3 Additional parameter requirement for PDIP TICX

Parameter	Value
Pick soft stop	OFF
Bond soft stop	OFF
Pre-scrub time	15 ~ 20
Post-scrub time	15 ~ 20
Scrub cycle	0

1.4 Bond Parameter

Machine Type	Unloading time-time	Loading time-time
ESEC 2009 P/HR/HRX	1000 ms	1000 ms
ESEC 2007 2008	20 s	20 s

1.5. Push up pin detector parameter for ESEC 2008/HS/ESEC 2009,ASM AD829 and AD890

Machine Type	Parameter	Value
ESEC 2008 HS	Push up critical test	Small push up
ESEC 2008	Push up critical test	On
ASM AD829 & AD890	Lead frame pin protection	110%
	Check output LIFT exist	Yes

2. Ejector needle selection

2.1 Needle size for all package except QFN on ASM machine, PDIP TICX

Condition Die Size, Die Thick	Needle size
If one size or both size less than 30 mils	30 um
If one side or both side more than or equal to 30 mils but less than 60 mils	125 um
If both side more than or equal to 60 mils	250 um

Any special needle used will be confirmed by PE through data collector

2.2 Needle configuration for all package except QFN on ASM machine, PDIP TICX

Condition Die Size, Die Thick	Needle configuration
If both size less than or equal to 150 mils	Single
If one size less than 150 mils, another side more than 150 mils	Dual
If both size more than 150 mils	Multiple

2.3 Needle size for QFN on ASM machine and PDIP TICX

Condition Die Size, Die Thick	Needle size
If one size or both size < 2.0 mils	50 um
If one side or both size more than or equal to 2.0 mils	125 um

2.4 Needle configuration for QFN on ASM machine and PDIP TICX

Condition Die Size, Die Thick	Needle configuration
If both size less than or equal to 130 mils	Single
If one size less than 130 mils, another side more than 130 mils	Dual
If both size more than 130 mils	Multiple

2.5 Needle life span

Needle type (pcs)	Needle life span
30	100000
125	200000
250	300000

3. Pick up tip size : 90% - 50% of die size per side

4. Nozzle size :

T3 0 3 LD EPOXY			NON T3 0 3 LD EPOXY		
Die size X (if)	Die X ~ Die Y	Nozzle size	Die size X (if)	Die X ~ Die Y	Nozzle size
<30	<1.3	Small die kit	<30	<1.3	Small die kit
25-30	<1.3	single ~ 25G	25-30	<1.3	single ~ 25G
31~36	<1.3	single ~ 21G	31~36	<1.3	single ~ 21G
36~44	<1.3	single ~ 20G	36~44	<1.3	single ~ 22G
45~54	<1.3	single ~ 21G	45~54	<1.3	single ~ 21G
55~64	<1.3	single ~ 20G	55~60	<1.3	single ~ 20G
65~75	<1.3	single ~ 19G	>60	<1.3	ø10% of die size
>75	<1.3	ø10% of die size	Any die size	>1.3	ø10% of die size
Any die size	>1.3	ø10% of die size			

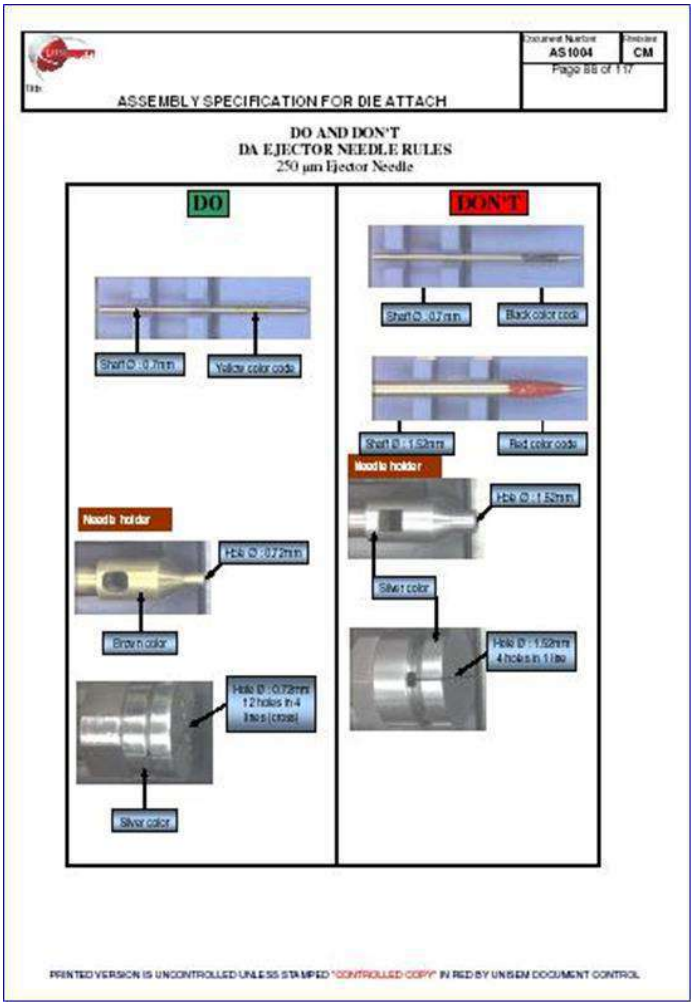
Note : Use star nozzle type configuration for multi hole nozzle

HOW	CHECK EJECT PARAMETER AND NEEDLE ACCORDING TO THE ABOVE SPECIFICATION	TO ENSURE THE QUALITY MEET REQUIREMENT
WHO	TECHNICIAN	TECHNICIAN
WHEN	EVERY CHANGE DEVICE AND PARAMETER	EVERY 2K INSPECTION/ BIT AND CHANGE PART
TYPE OF CONTROL	PRODUCTION SUPERVISOR	PRODUCTION SUPERVISOR
WHY	TO ENSURE ALL DEVICES MEET REQUIREMENT	TO ENSURE ALL DEVICES MEET REQUIREMENT

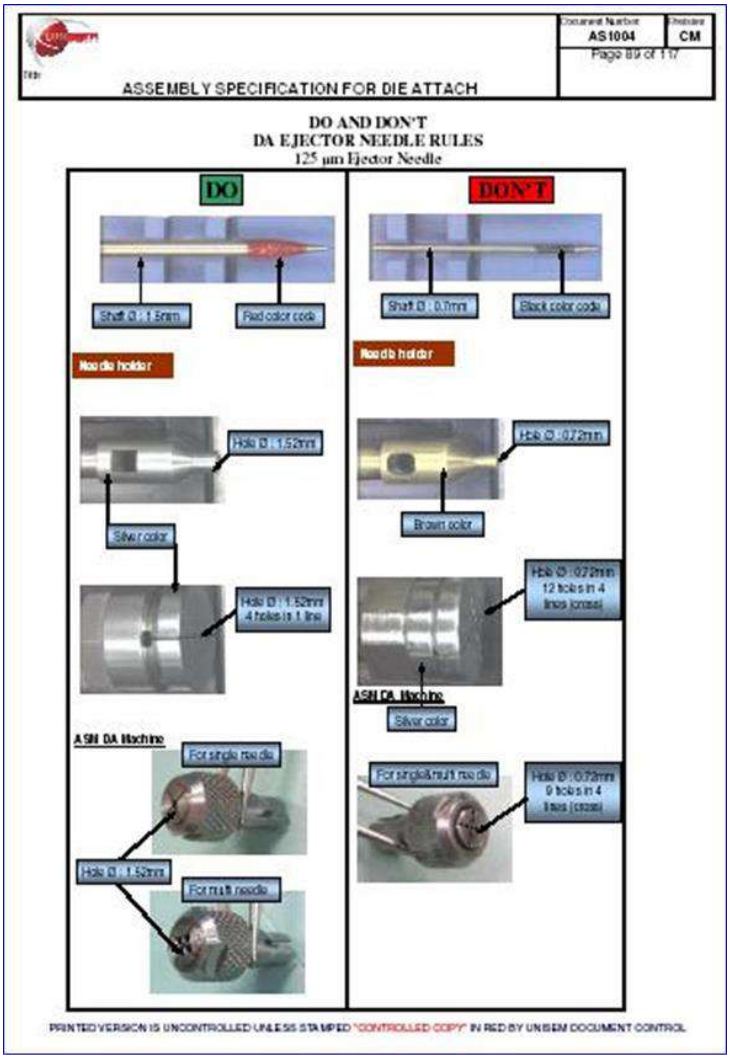
REVISION: ASSEMBLY SPECIFICATION FOR DIE ATTACH | Rev: J

A1.2. Standardization of procedures for installing dedicated ejector needles and needle holders

DO AND DON'T DIE ATTACH EJECTOR NEEDLE RULES (250 UM)
Assembly Specification for Die Attach - AS 1004 Revision CM – DO AND DON'T DIE ATTACH EJECTOR NEEDLE RULES (250 UM) page 88 of 117.

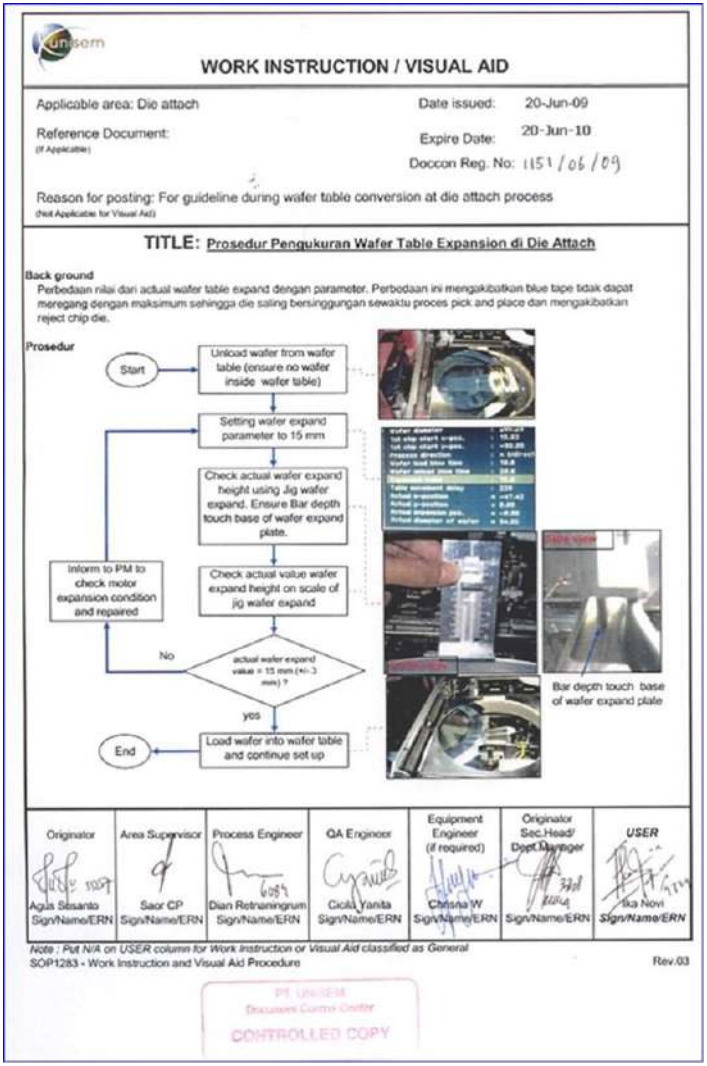


DO AND DON'T DIE ATTACH EJECTOR NEEDLE RULES (125 UM)
Assembly Specification for Die Attach - AS 1004 Revision CM – DO AND DON'T DIE ATTACH EJECTOR NEEDLE RULES (125 UM) page 89 of 117.



A.2. Standardization of wafer table expansion checking procedures.

A.2.1. Instruksi Kerja (work Instruction) pengechekan ekspansi wafer table - Doccon Reg. No : 1151/06/09



WORK INSTRUCTION / VISUAL AID

Applicable area: Die attach

Date issued: 20-Jun-09

Reference Document: (If Applicable)

Expire Date: 20-Jun-10

Doccon Reg. No: 1151/06/09

Reason for posting: For guideline during wafer table conversion at die attach process (Not Applicable for Visual Aid)

TITLE: Prosedur Pengukuran Wafer Table Expansion di Die Attach

Back ground

Perbedaan nilai dari actual wafer table expand dengan parameter. Perbedaan ini mengakibatkan blue tape tidak dapat meregang dengan maksimum sehingga die saling bersinggungan sewaktu proces pick and place dan mengakibatkan reject chip die.

Prosedur

Originator	Area Supervisor	Process Engineer	QA Engineer	Equipment Engineer (if required)	Originator Sec.Head/ Dept.Manager	USER
Agus Sesanto Sign/Name/ERN	Saor CP Sign/Name/ERN	Dian Retnaningrum Sign/Name/ERN	Cicik Yanita Sign/Name/ERN	Chrisna W Sign/Name/ERN	Sign/Name/ERN	Ika Novi Sign/Name/ERN

Note : Put N/A on USER column for Work Instruction or Visual Aid classified as General

SOP1283 - Work Instruction and Visual Aid Procedure Rev.03

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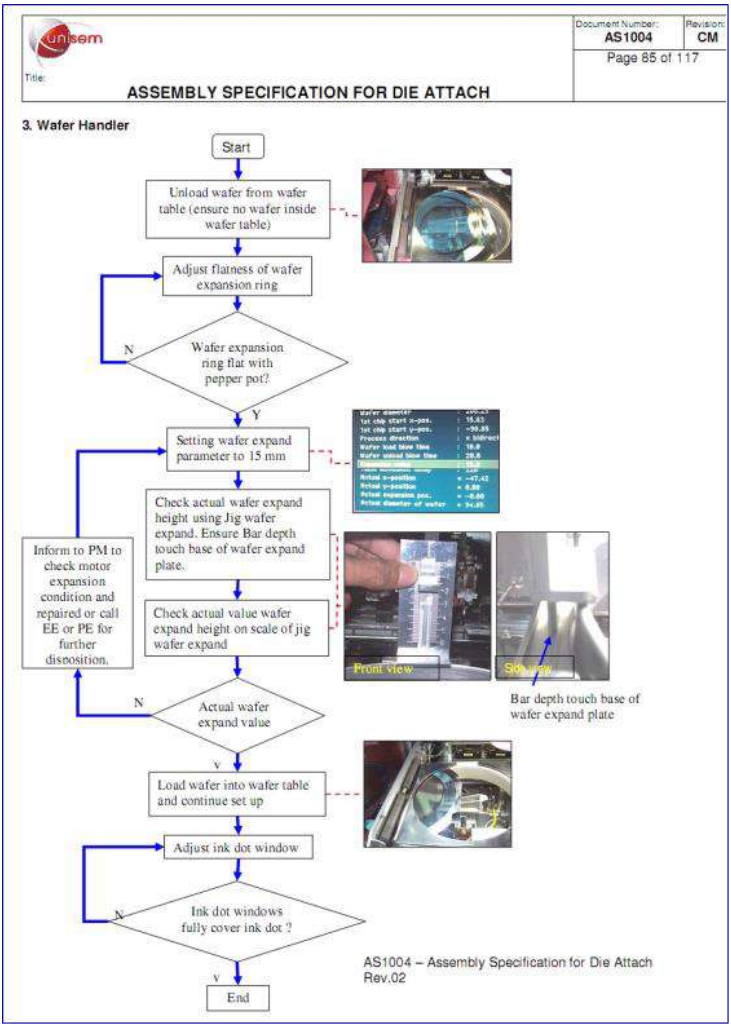
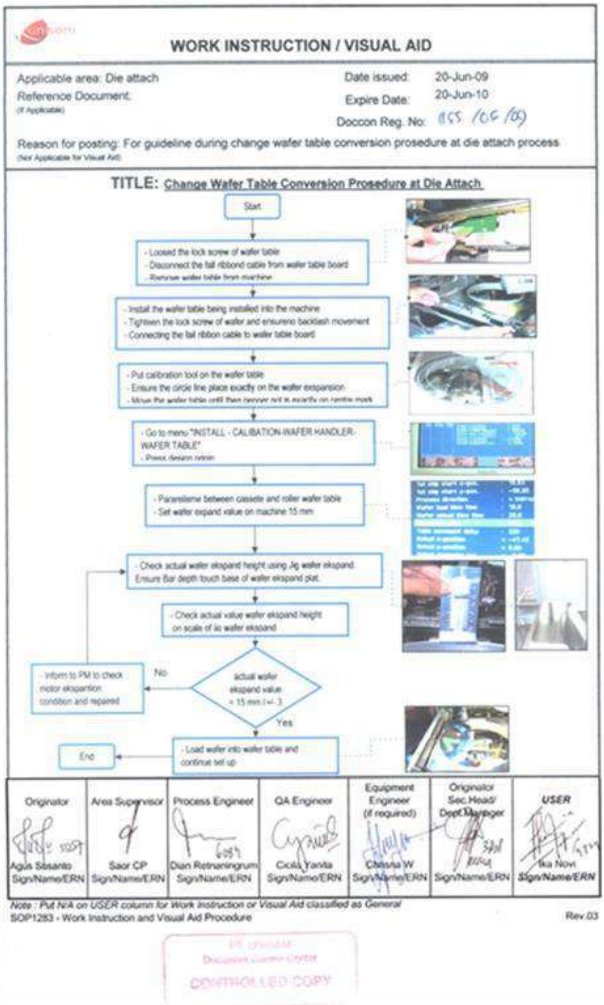
A.2.2. Making Specifications at Die Attach for checking wafer table expansion
Assembly Specification for Die Attach - AS 1004 Revision CM – Die attach set up guide line for wafer handler page 85 of 117



A.3. Standardization for Change Wafer Table Conversion Procedure at die attached.

A.3.1. Making Work Instructions Change Wafer Table Conversion Procedure in die attached | | Doccon Reg. No: 1155/06/09



WORK INSTRUCTION / VISUAL AID

Applicable area: Die attach
Reference Document:
(If Applicable)

Date issued: 20-Jun-09
Expire Date: 20-Jun-10
Doccon Reg. No: 1155 /06 /09

Reason for posting: For guideline during change wafer table conversion prosedure at die attach process
(Not Applicable for Visual Aid)

TITLE: Change Wafer Table Conversion Prosedure at Die Attach

Start

- Loosed the lock screw of wafer table
- Disconnect the fail ribbond cable from wafer table board
- Remove wafer table from machine

- Install the wafer table being installed into the machine
- Tightwen the lock screw of wafer and ensureno backlash movement
- Connecting the fail ribbon cable to wafer table board

- Put calibration tool on the wafer table
- Ensure the circle line place exactly on the wafer exspansion
- Move the wafer table until then pennyer not in exactly on centre mark

- Go to menu "INSTALL - CALIBATION-WAFER HANDLER-WAFER TABLE"
- Press Setzero button

- Parenteseme between cassete and roller wafer table
- Set wafer expand value on machine 15 mm

- Check actual wafer ekspand height using Jig wafer ekspand. Ensure Bar depth touch base of wafer ekspand plat

- Check actual value wafer ekspand height on scale of Jig wafer ekspand

actual wafer ekspand value = 15 mm (+/- 3)

No

- Inform to PM to check motor ekspantion condition and repaired

Yes

- Load wafer into wafer table and continue set up

End

Originator	Area Supervisor	Process Engineer	QA Engineer	Equipment Engineer (if required)	Originator Sec.Head/ Dept.Manager	USER
Agus Sasanto Sign/Name/ERN	Saor CP Sign/Name/ERN	Dian Retnaningrum Sign/Name/ERN	Cicil Yanita Sign/Name/ERN	Chelsia W Sign/Name/ERN	Sign/Name/ERN	Ika Novi Sign/Name/ERN

Note : Put N/A on USER column for Work Instruction or Visual Aid classified as General

SOP1283 - Work Instruction and Visual Aid Procedure

Rev.03

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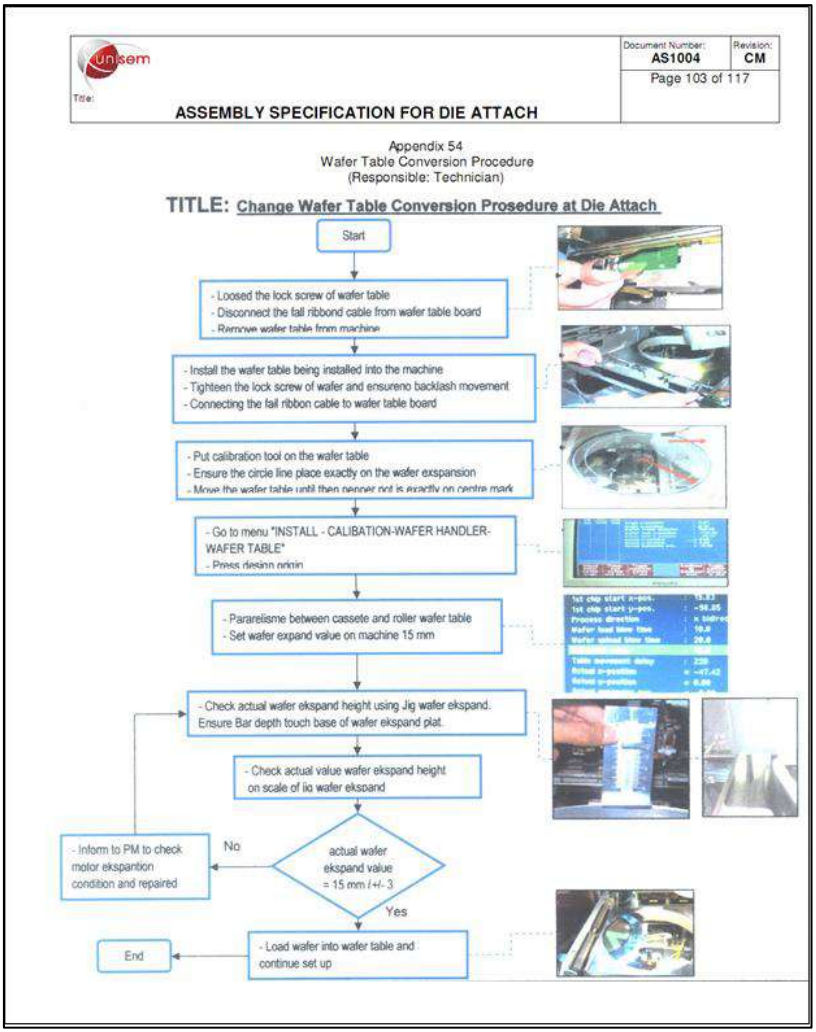
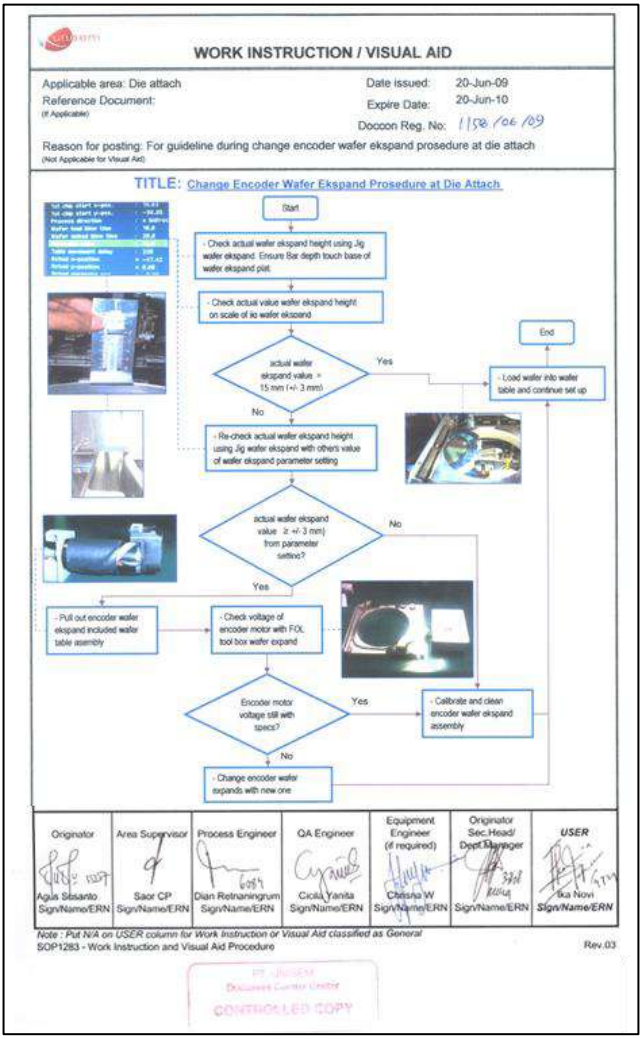
A.3.2. Making Specifications at Die Attach for checking wafer table expansion

Assembly Specification for Die Attach - AS 1004 Revision CM – Change Wafer Table Conversion Procedure at die attach page 103 of 117



A.4. Standardization of specifications on die attach for checking encoder condition

Making Work Instructions, checking the condition of the encoder on the die attached - Doccon Reg. No: 1158/06/09



WORK INSTRUCTION / VISUAL AID

Applicable area: Die attach
Reference Document:
(If Applicable)

Date issued: 20-Jun-09
Expire Date: 20-Jun-10
Doccon Reg. No: 1158/06/09

Reason for posting: For guideline during change encoder wafer ekspand prosedure at die attach
(Not Applicable for Visual Aid)

TITLE: Change Encoder Wafer Ekspand Prosedure at Die Attach

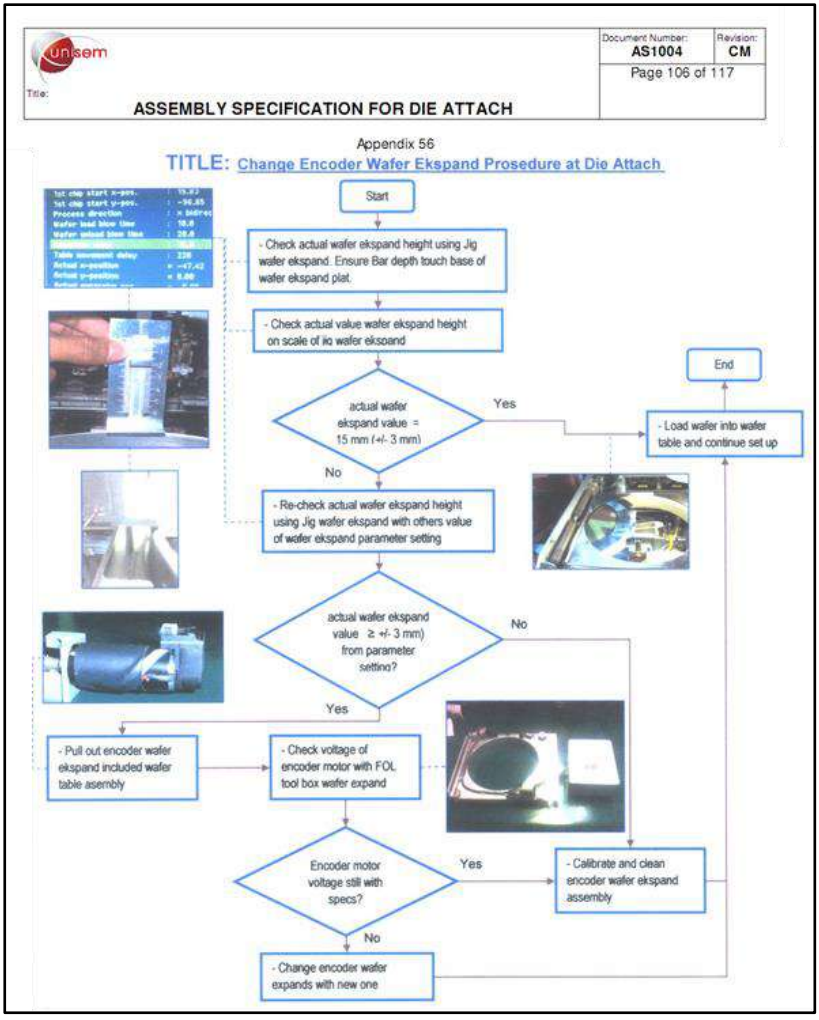
Start
- Check actual wafer ekspand height using Jig wafer ekspand. Ensure Bar depth touch base of wafer ekspand plat.
- Check actual value wafer ekspand height on scale of ito wafer ekspand
actual wafer ekspand value = 15 mm (+/- 3 mm)
Yes
End
- Load wafer into wafer table and continue set up
No
- Re-check actual wafer ekspand height using Jig wafer ekspand with others value of wafer ekspand parameter setting
actual wafer ekspand value (+/- 3 mm) from parameter setting?
No
Yes
- Pull out encoder wafer ekspand included wafer table asembly
- Check voltage of encoder motor with FOL tool box wafer expand
Encoder motor voltage still with specs?
Yes
- Calibrate and clean encoder wafer ekspand assembly
No
- Change encoder wafer expands with new one

Originator	Area Supervisor	Process Engineer	QA Engineer	Equipment Engineer (if required)	Originator Sec.Head/ Dept.Manager	USER
Agus Sasanto Sign/Name/ERN	Saor CP Sign/Name/ERN	Dian Retnaningrum Sign/Name/ERN	Cicilia Yanita Sign/Name/ERN	Chesna W Sign/Name/ERN	Sign/Name/ERN	Ika Novi Sign/Name/ERN

Note : Put N/A on USER column for Work Instruction or Visual Aid classified as General
SOP1283 - Work Instruction and Visual Aid Procedure
Rev.03

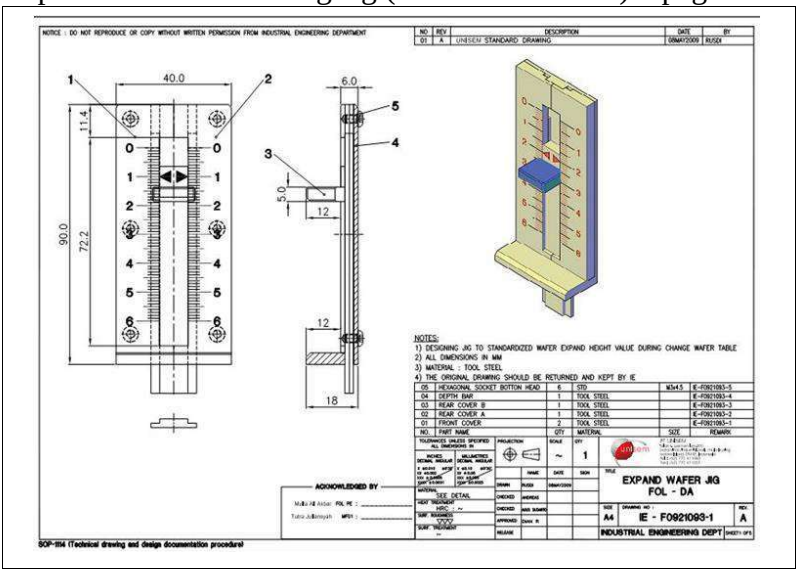
CONTROLLED COPY

Assembly Specification for Die Attach - AS 1004
Revision CM – Change Encoder Wafer Ekspand
Procedure at die attach page 106 of 117

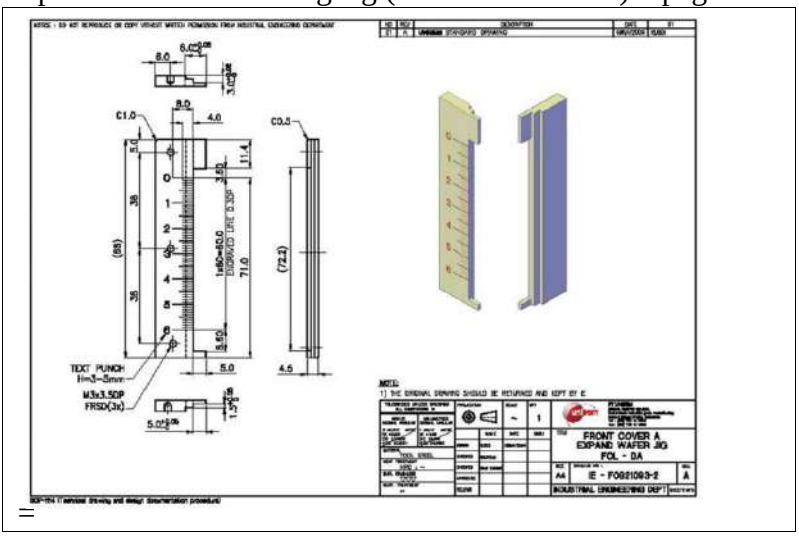


B. Image Standardization

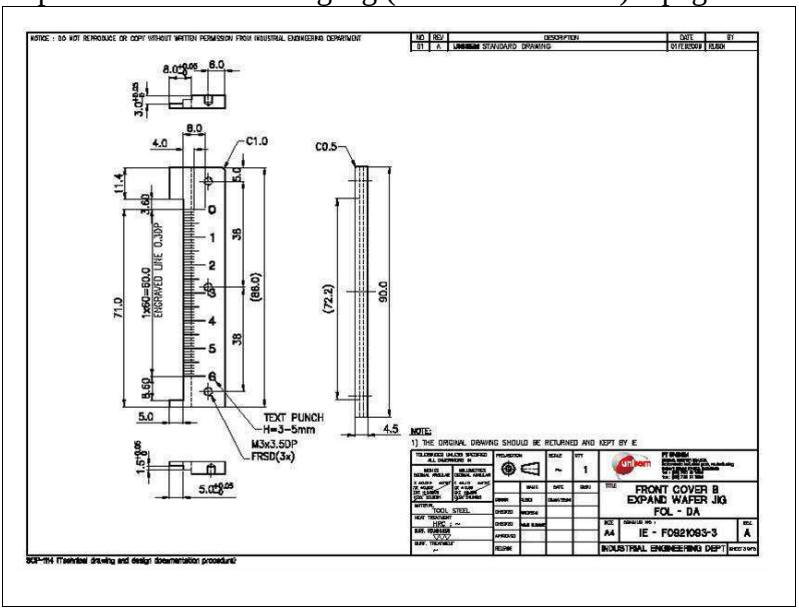
Expand Wafer Measuring Jig (IE- F0921093-01) – page 1



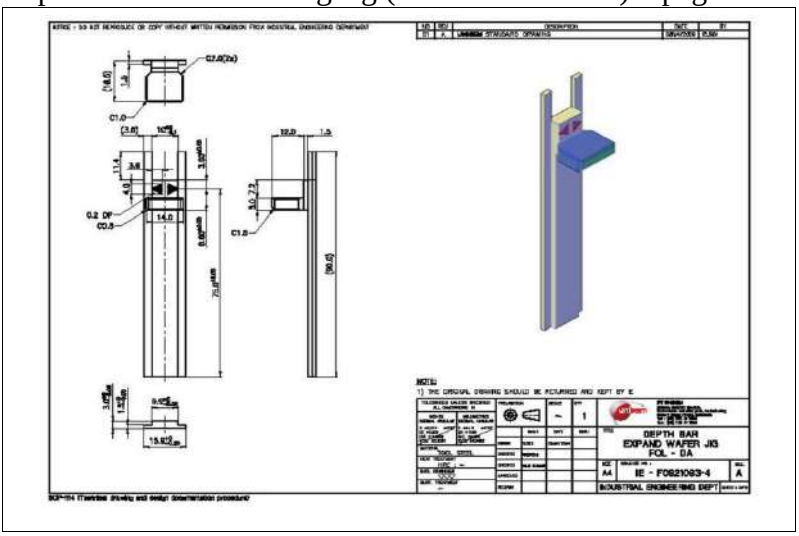
Expand Wafer Measuring Jig (IE- F0921093-02) – page2



Expand Wafer Measuring Jig (IE- F0921093-03) – page 3



Expand Wafer Measuring Jig (IE- F0921093-04) – page 4



Expand Wafer Measuring Jig (IE- F0921093-05) – page 5