PHONE POWER RESHIP REDUCTION FOR PHONE 3 MODEL

Dave D. Laoyan

Process Engineering
Asurion – Techlog Center Philippines, Carmelray Industrial Park II, Special Economic Zone, Calamba, Laguna
dave.laoyan@asurion.com

ABSTRACT

One of the main Asurion Techlog Center Philippines (TCP) KPIs is to hit the set Reship target mandated to us by the US to ensure that our customers feel a higher level of satisfaction with the way we remanufacture our phones. This report consists of a step-by-step procedure on how to find an opportunity for an improvement to decrease the phone power defect in Reship for the Phone 3. Phone power issues are the top reship defect impacting performance, which led the team's call for action to reduce it for Phone 3 from 0.52% to 0.07%.

1. 0 INTRODUCTION

1.1 Company Profile

Asurion is a global tech care company that provides protection, repair and support services for a range of tech devices and applicances.

Fig. 1. Techlog Center Philippines

In March 2009, Asurion expanded to the Philippines with Techlog Center Philippines (TCP), located in Carmelray Industrial Park II, Calamba City, Laguna.

TCP is a 100%-owned subsidiary of Asurion and is the fastest-growing mobile phone remanufacturing facility in the Philippines. The facility houses parts recovery and repair, cellphone repair, and inspection lines for remanufactured mobile handsets of various models. It acquired its ISO 9001:2008 Certification from LRQA on December 5, 2011.

1.2 The Team

We are a team composed of engineers and team leaders from Operation, Quality, and Engineering. We are formed to reduce the phone power reship issue as aligned with our 2023 top priorities of Asurion objectives and initiatives. Using the DMAIC approach, we identify opportunities to contribute to our main KPI through kaizen and continuous improvement as our advocacy. The team was formed in January 2023, named the group "The TEAM," and continued our DMAIC journey on this project. The team had a regular meeting three times a week, with an average attendance rate of 95%.

Name	Function	Key Role	Responsibility
Dave Laoyan	Process Technician	Leader	Leads the overall activities of the project
Michelle Pamilar	Operation Team Leader	Member	Validates root causes and evaluation
Adelar Lachica	Sr. Process Technician	Member	Supports product-level analysis and validation
Cath Pelobello	Operation Team Leader	Member	Supports implementation and validation
Lorna Sadicon	Quality Engineer 2	Member	Initiate meetings and report activities to the US

Table 1. Team Composition

1.3 Definition of Terms

Terms	Definition	Terms	Definition
KPI	Key Performance Indicator	AND	A powerful, high-tech smartphone that runs on the Android OS developed by Google and is used by a variety of phone manufacturers.
FPY	First Pass Yield	Manu 3	Manufacturer under Android Phone
BY	Board Yield	Phone 3	Focus model under Manu 3 manufacturer
MLB	Main Logic Board	TCN	Temporary Change Notice
R02	Repair Order 2	R01	Repair Order 1

Table 2. Definition of Terms

1.4 Project Timeline

This project is guided by an activity timeline to ensure completion within the set time frame. The project started in January 2023 and ended in June 2023 and continuous monitoring up to the present. A total of six (6) months of activities. The team's meeting period is 1-2 hours, the frequency is twice a week, and the meeting schedule is 7 a.m. to 8 a.m. (see Table 3).

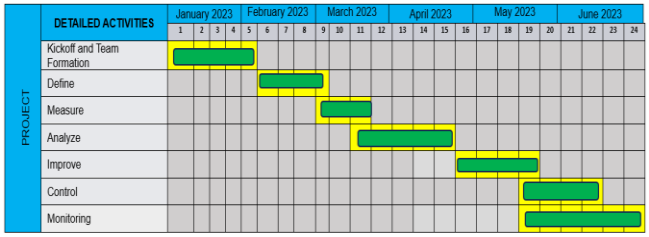


Table 3. Project Timeline

2. 0 REVIEW OF RELATED WORK

"Not Applicable."

3.0 METHODOLOGY

3.1 Define Phase

3.1.1 Problem Identification and Selection

Alignment to the company's goal

The team used the Tree Diagram technique to align our project with 2023 TCP Objectives, and our project was aligned in AND reship focus on the Phone Power issue. (see Fig. 2).

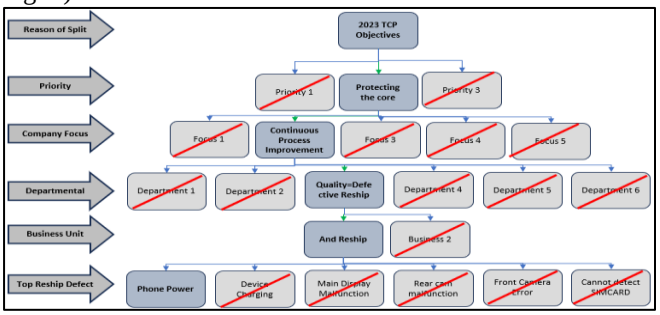
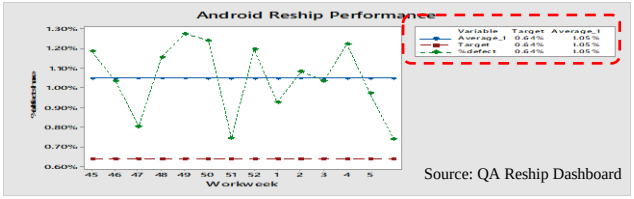


Fig. 2. Tree Diagram

3.1.2 Stratification

3.1.2.1 AND Reship Performance

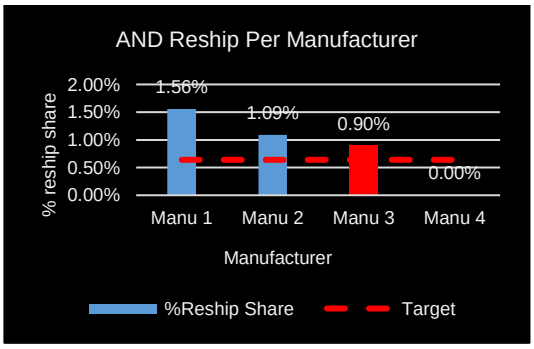
1st stratification, the reship trend from workweek 45, 2022 to workweek 5, 2023 is averaging 1.05% higher than the target, which was intended to be 0.64%. (see Graph 1)



Graph 1. AND Reship Performance

3.1.2.2 Reship Performance Per Manufacturer

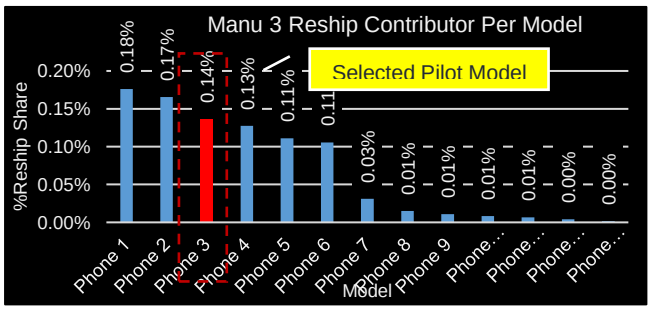
For the second stratification, identifying the reship contributor per manufacturers of AND. These are Manu 1, Manu 2, Manu 3, and Manu 4. The team selected Manu 3 since Manu 1 and Manu 2 are focused by another team and as confirmed to Demand Planning, Manu 3 has the highest forecast volume for the next coming months.



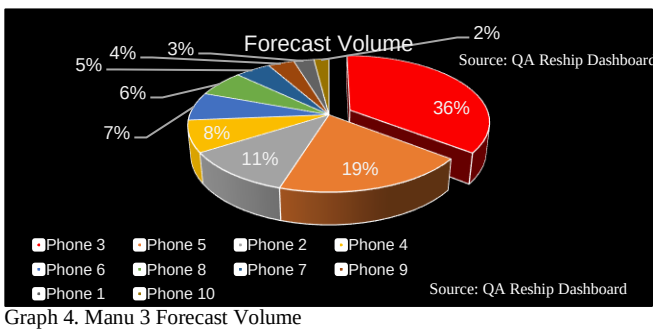
Graph 2. Reship Performance per Manufacturer

3.1.2.3 Reship Performance and Forecast Volume under Manu 3

The 3rd stratification under Manu 3 is finding out the top reship contributor per model (see Graph 3) and looking forward to their next volume in the coming months (see Graph 4). The team selected the Phone 3 with a 0.14% reship and with the highest forecast volume. Phone 1 is focused by another team while Phone 2 has no volume for the next coming months.



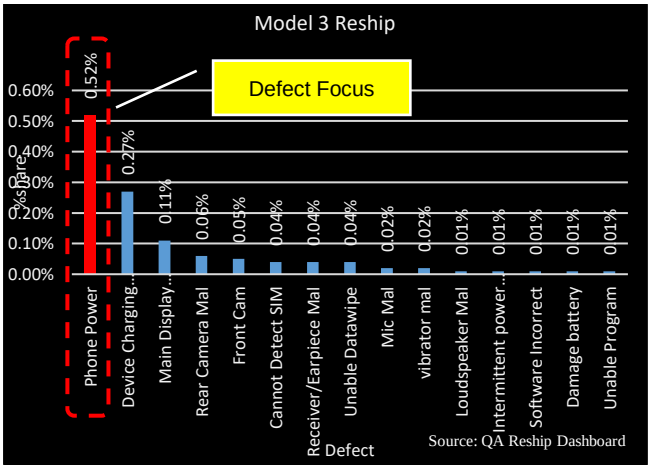
Graph 3. Manu 3 Models Reship



Graph 4. Manu 3 Forecast Volume

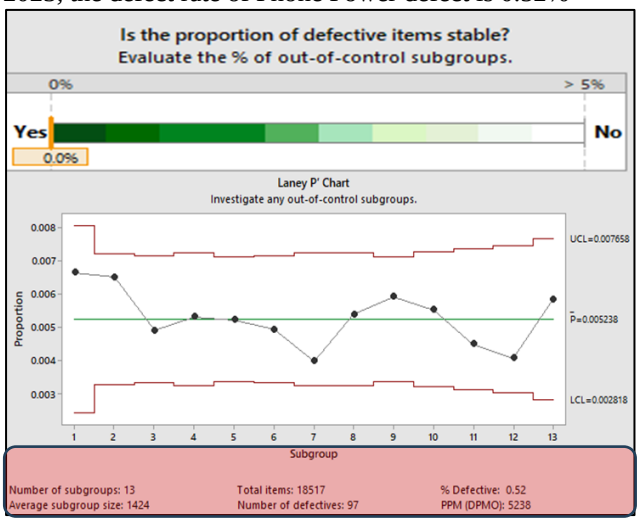
3.1.2.4 Phone 3 Defect Contributor

For the 4th Stratification define the defects affecting the Reship in model 3 (see Graph 5). The team focus is the Phone Power issue with the highest contribution among the defects.

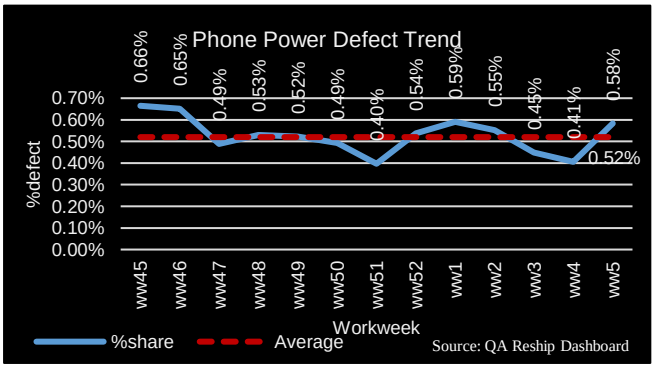


Graph 5. Phone 3 Defect Pareto

Based on Reship historical data from ww45, 2022 to ww05, 2023, the defect rate of Phone Power defect is 0.52%



Graph 6. Phone 3, Phone Power P-Chart



Graph 7. Phone 3, Defect Trend

3.1.3 Operational Definition

What is a Phone Power Defect?
Phone without any response on the display during the power-on test. The device doesn't vibrate when you press the ON button. Checking the phone, No Power, No Charging indicator using a charger. (See Figure 3).

Fig. 3. Sample of With Power and Without Power

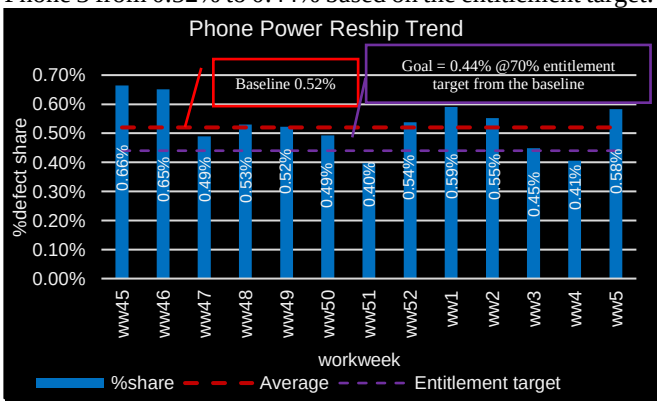
What is Defective Reship?
- Is a unit received by the customer with a failure that needs to be replaced within 28 days of claiming the unit.
- Defective Reship Formula = Number of defective units received by customer / Ship Quantity

3.1.4 Problem Statement

Phone Power Defect is the top contributor and one of the causes of not hitting the Reship target for Phone 3 from workweek 45, 2022 to workweek 5, 2023 with an average of 0.52% defect share. This is a loss of opportunity for the remanufacturing business in terms of three months of revenue due to returned units from the US.

3.1.5 Initial Goal Settings

The team's goal is to reduce the Phone Power Reship issue in Phone 3 from 0.52% to 0.44% based on the entitlement target.



Graph 8. Phone Power Target Settings

Target = Baseline (Cumulative)-(Baseline(cumulative)-Best Achieved) *70%.
Target = 0.52%-(0.52%-0.40%) *70%
Target = 0.44%

3.1.6 Cost Opportunity

The team seeks help from the IE and Finance teams for the possible cost savings of this project based on the initial Goal. Getting the cost-saving opportunity is equivalent to 1 Brand new Toyota HiAce annually if the entitlement target is achieved.

3.1.7 Stake Holder Analysis

The team conducted a stakeholder analysis to ensure alignment and expectation and to consider all the needs of each group that will be affected and has an interest in this project. (see Table 4).

Stakeholder Analysis					
Stakeholder / Stakeholder Group	**Impact Level**	**Level of Support**	**Reason for Resistance or Support**	**Action(s) to Address This Stakeholder Group**	**Contact**
Assembly	Will be Affected	Supporter	Improved FPY Yield and Delivery	Weekly Update	Cathrina Pelobello
Disassembly	Will be Affected	Supporter	Board Yield and Delivery	Weekly Update	Jeff Angeles
QA Eng'g	Will be Affected	Supporter	Improved FPY Yield and Reship	Weekly Update	Lorna Sadicon
Equipment Eng'g	Will be Affected	Supporter	Machine Ability	Weekly Update	Herald Iglesias
Process Eng'g	Will be Affected	Supporter	Improved FPY Yield and Delivery	Weekly Update	Rollin Sellado

Table 4. Stakeholder Analysis

3.2 Measure Phase

3.2.1 Process Mapping / Macro Process Flow

Fig. 4. Macro Process Flow

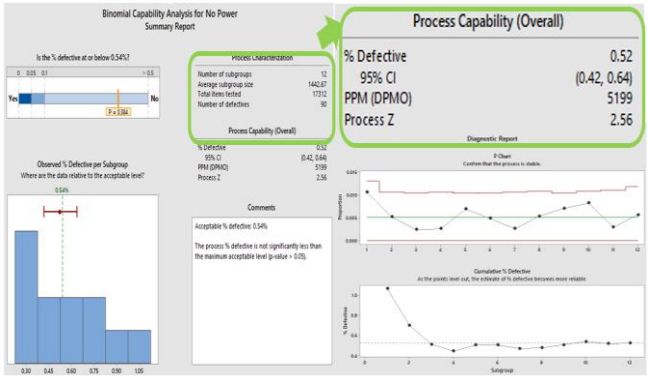
3.2.2 Process Mapping / Micro Process Flow

To fully understand what station possibly contributes to the Phone Power Issue or Possible Escapee detection, the team conducted process mapping on all stations. Referring to the Handset process flow, we have a total of 14 major processes. Highlighted in red are the potential contributor or escapee inspection causing the Phone Power issue. (See figure 5).

Fig. 5. Micro Process Flow

3.2.2 Phone Power Reship Capability Analysis

Using Minitab Binomial Capability Analysis shows that the Phone Power % Defective is 0.52% and the probability of defect ranges from 0.42% to 0.64% DPMO Calculated Z score is 2.56. and using the P' Chart to confirm that the process is stable. (See Graph 9).



Graph 9: Phone Power Process Capability Performance

3.3 Analyze Phase

3.3.1 Problem Analysis / Fishbone Diagram

The team sent samples to the failure analysis team to deep dive into the root cause of phone power, which would help the team during brainstorming. After brainstorming using the Fishbone diagram, the team identified 12 potential root causes. These items will be verified through simulation, actual process checking, and product analysis. See Figure 6.

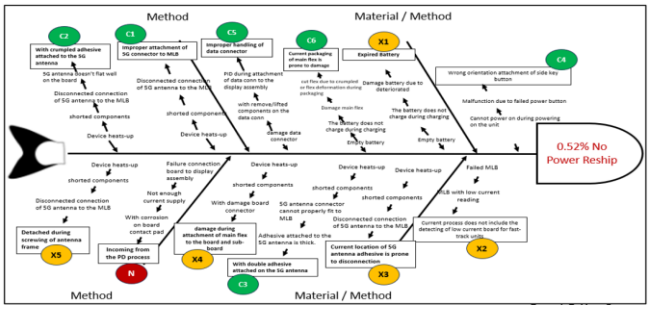


Fig. 6. Fishbone Diagram

3.3.2 Corrective Action for Q-Item

After categorizing the fishbone, we listed down all Q-items as part of quick wins and the team provided corresponding actions based on validation results. See Table 6.

Wrong orientation attachment of side key button	Method	Review the current reference document	There is no picture reference for the proper attachment of the side key button	Added picture or illustration to emphasize the proper attachment of the side key button and conduct orientation	Dave Laoyan	Week 13 April 1, 2023	Done
Improper handling of data connector during the parts	Method	Verify the actual scenario of handling	The existing document does not specify critical points during the handling of parts	Include to JOB Aid of assembly and VCT process the critical to quality during handling of data connector	Review Logatoc	Week 13 April 1, 2023	Done
The current packaging of the main flex is prone to damage	Method	Check the current position of the main flex to the zip lock	The current zip lock used as packaging is too small for the main flex	Use of bigger zip lock bag for other main flex packaging.	Bhang Guevarra	Week 13 April 1, 2023	Done

Table 6: Quick wins

3.3.3 Summary of Potential Causes, Data Collection, and Validation Plan for X-items

The team creates a validation table plan when the potential causes will be validated. See Table 7.

No.	Factor	Potential Cause	Validation Plan	In-Charge	Target Date
1	Material	Expired battery	Observation and checking of batteries if stock from the warehouse is obsolete	Jumar Millesca	Ww 14 April 4, 2023
2	Method	Current processes have no process for detecting low current boards for fast-track units.	Observation, Checking of documents, and interview	Lorna Sadicon	WW 14 April 5, 2023
3	Method	The current location of the 5G antenna adhesive is prone to disconnection	Observation and checking of documents	Dave Laoyan	WW 14 April 6, 2023
4	Method	damage during attachment of the main flex to the board and sub-board	Observation and simulation of through different sequence	Cath Pelobello	WW 15 April 9, 2023
5	Method	Detached during screwing of the antenna frame	Observation and simulation of thru different screwing sequence	Dave Laoyan	WW 15 April 10, 2023
6	Material	Incoming from the PD process	Observation and run samples	Ben Barbara	WW 15 April 11, 2023

Table 7: Summary of potential causes and validation Plan

3.3.4 Validation of Potential Causes

X-item #	Potential Root Cause	4m Category	Validation Result	Decision	Controllability
1	Expired battery	Material	**Method of Validation:** Check batteries located at Parts Warehouse and check if with obsolete batteries. **Result:** 0% defect share No Expired batteries based on the samples. The expired battery is being scrapped. Model / Inspected QTY / Pass / Failed / %failed Phone 3 / 300 / 300 / 0 / 0% Phone 1 / 300 / 300 / 0 / 0% Phone 5 / 300 / 300 / 0 / 0% Phone 6 / 300 / 300 / 0 / 0% **Conclusion:** 100% of the batteries issued to handsets for use are not expired.	Not True Cause	Within the team's Control
2	The current process does not include the detecting of low current boards for fast-track units.	Method	**Method of Validation:** Validate the fast-track units. **Result:** 0.50% defect share Based on the processes, the current reading process is only applied to units with failures during the repair process. Upon validation of the 1200-board fast track, 0.50% were detected with a low-current board. 1-Sample % Defective Test for Fast Track Summary Report Statistics Total number tested 1200 Number of defectives 6 % Defective 0.50 95% CI (0.18, 1.09) Target 1.94 Does the % defective differ from 1.94%? 0 0.05 0.1 > 0.5 Yes No P < 0.001 The % defective of Fast Track is significantly different from the target (p < 0.05). **Conclusion:** Based on the data probability of failure without current checking ranges around 0.18% to 1.09%.	True Cause	Within the Team's Control
3	The current location of the 5G antenna adhesive is prone to disconnection.	Method	**Method of Validation:** Simulate the current location with other different locations and check through visual inspection if it will induce unseated connectors (Chi-Square %defective test) **Result:** 16% defect share the location of the 5G antenna is lifted when the other end is pressed. Chi-Square % Defective Test for Test Items by X Diagnostic Report Statistics X / Number Tested / Defectives / % Defective / Individual 95% CI Current loca 50 8 16.00 (7.17, 29.11) Center 50 0 0.00 (0.00, 7.52) left side 50 5 10.00 (3.33, 21.81) Do the % defectives differ? 0 0.05 0.1 > 0.5 Yes No P = 0.016 Differences among the % defectives are significant (p < 0.05). **Conclusion:** For the current location, the probability of failure ranges from 7.17% to 29.11%; in the center location, the probability of failure ranges from 0.00% to 5.82%, while the location on the left side ranges from 3.33% to 21.81%. The center location is the best among the three locations.	True Cause	Within the Team's Control
4	damage during attachment of the main flex to the board and sub-board	Method	**Method of Validation:** Compare the resulting attachment of the Main flex from MLB to the data connector and the data connector to MLB. (2 Sample % defective test). **Result:** 12% defect share Sequence attachment of the main flex from MLB to data con can force the board connector causing damage during the insertion process. 2-Sample % Defective Test for MLB to Data vs Data Con to Summary Report Individual Samples Statistics / MLB to data / Data Con to Total number tested 50 50 Number of defectives 6 0 % Defective 12.00 0.00 95% CI (4.53, 24.31) (0.00, 5.82) Do the % defectives differ? 0 0.05 > 0.5 Yes No P = 0.027 The % defective of MLB to data is significantly different from the % defective of Data Con to (p < 0.05). **Conclusion:** The sequence attachment of the main flex has significant differences; Data Con to MLB is better than MLB to Data Con. MLB to Data con sequence probability of defect % ranges from 4.53% to 24.31% while Data con to MLB is ranging 0.00% to 05.82%.	True Cause	Within the Team's Control
5	Detached during screwing of antenna frame.	Method	**Method of Validation:** Compare the result of the current screwing vs other screwing sequences during attachment of the antenna frame and check if with unseated 5G antenna. (2 Sample % defective test). **Result:** 10% defect share The connection is removed because the connector rises in the first part of the antenna frame that is screwed. 2-Sample % Defective Test for Current Seq vs New Seq Summary Report Individual Samples Statistics / Current Seq / New Seq Total number tested 50 50 Number of defectives 5 0 % Defective 10.00 0.00 95% CI (3.33, 21.81) (0.00, 5.82) Do the % defectives differ? 0 0.05 > 0.5 Yes No P = 0.056 The % defective of Current Seq is not significantly different from the % defective of New Seq (p > 0.05). **Conclusion:** The current screwing sequence has a probability of defect ranging from 3.33% to 21.81%, compared to the other sequence, whose probability of defect ranges from 0.00% to 5.82%. It is based on 50 samples.	True Cause	Within the Team's Control
			Upon receiving the phone to PD process is already manifestation as No Power board. 1-Sample % Defective Test for MLB No Power Summary Report Statistics Total number tested 300 Number of defectives 23 % Defective 7.67 95% CI (4.92, 11.28) Target 1.94 Does the % defective differ from 1.94%? 0 0.05 0.1 > 0.5 Yes No P < 0.001 The % defective of MLB No Power is significantly different from the target (p < 0.05). **Conclusion:** The percentage defective differs from 1.94% at the 0.05 level, indicating 95% confidence that the percentage defective ranges from 4.92% to 11.28%.		

Table 8: Validation of Potential Causes

3.3.5 Summary of True Causes on X-items

Potential Root Cause	% Defect share	Cumulative%	Controllabilty
Expired battery	0%	0%	
The current process does not include the detecting of low current boards for fast-track units.	0.50%	1%	Within the team's control
The current location of the 5G antenna adhesive is prone to disconnection.	16%	35%	Within the team's control
damage during attachment of the main flex to the board and sub-board	12%	26%	Within the team's control
Detached during screwing of antenna frame.	10%	22%	Within the team's control
Incoming from the PD process.	7.67%	17%	Not Within the Teams Control
Total		100%	

Table 9: Summary of True Causes

3.3.6 Final Goal Statement

The team's final goal is to reduce the Phone Power defect in Phone 3 from 0.52% to 0.089% based on the result of validation and controllability.

Final Goal Setting Formula:

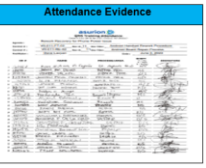
Target = (Baseline defect - (Baseline defect * Controllable%)

= (0.52% - (0.52%*84%)

= 0.08%

3.3.7 N-Items Noise or Uncontrollable Action

Since N-Items are beyond the team's control, we decided to coordinate the findings based on the root cause analysis to the Repair operation that recovered units with the Phone Power issue for review as those are incoming defective units received by TCP.

Possible Cause	Counter Measure		Source of Variation	Attendance Evidence
Incoming from the PD process	Feedback to the Repair Team for Repair Capability		Material	
Activity	**In-Charge**	**Date**		
Conduct meetings with the operation	Team Reship	June 3, 2023		
Acknowledgement from the repair team when will be the repair conducted	Operation	June 3, 2023		

3.4 Improve Phase

3.4.1 Selection of Best Solution / Pay-off Matrix

The team brainstorms and selects the best alternative solution. Though we generated several improvement actions, not all of them can be implemented due to some reasons. We use the Pay-off Matrix to judge what actions we need to implement and what actions need not be implemented.

The Pay-Off Matrix			
Criteria	**Pay-Off Matrix Score**		
	5	**3**	**1**
Yield (Y)	3-5% Impact on Yield	1-2% Impact on Yield	0% Impact on Yield
Delivery (D)	High Impact on Delivery	Medium Impact on Delivery	Low Impact on Delivery
Cost (C)	Zero Cost in Investment	Max P5000 investment	P5000 & above on investment
Safety (S)	No Impact on safety	With Minor Safety Concerns	With Major Safety Concerns
Effort (E)	Easy to Implement	Medium Effort / Need Assistance	With High Effort

Table 10: Pay-off Matrix

Team's Decision based on total Score: ***18 – 25 = GO; 0 – 17 = NO GO***
Formula: ***Total Score = Y + D + C + S + E***
Based on the result of Scoring on Pay off Matrix, 4/7 Alternative solutions are subject for our trial evaluation.

No	True Causes	Countermeasure	Y	D	C	S	E	Total Score	Team's Decision	Remarks
1	Current processes have no process for detecting low current boards for fast-track units.	Implement current checking process	3	3	3	5	5	19	Go	
		Insert current checking in the R02 process.	1	1	5	5	5	17	No Go	Will lower the FPY if detection is in R02
2	The current location of the 5G antenna adhesive is prone to disconnection	Replace adhesive material measurement and design	3	3	1	5	5	17	No Go	Need to buy and evaluate new materials
		Transfer the location of the Adhesive 5G antenna	5	5	5	5	5	25	Go	
3	damage during attachment of the main flex to the board and sub-board	Change sequence Attachment of main flex from Data Connector to MLB connector	5	5	5	5	5	25	Go	
		Transfer attachment of main flex at Display process	3	1	3	5	5	17	No Go	**Possible misalignment of attachment**
4	Detached during screwing of the antenna frame	Interchange the screwing sequence during the attachment of the screw on the antenna frame	5	5	5	5	5	25	Go	
		Request frame holder to R&D to be used during screwing	5	3	3	3	3	17	No Go	**Need to buy materials for jig creation**

able 11: Selection of Best Solution

3.4.2 Solution validation for X-items

The team evaluated the best-selected action using the PDCA approach.

True Cause No. 1	Best Solution	Source of Variation	EP Level
Current processes have no process for detecting low current boards for fast-track units.	Implement current checking process	Method	4- Detection at source

Plan

Evaluation plan for current checking	Date	Incharge
1. Creation of TCN as document reference during the process	WW16	Lorna Sadicon
2. Prepare 500 samples of known fast-track units.	WW16	Hilbert Roja
3. Conduct Orientation to all affected processes	WW16	Hilbert Roja
4. Conduct current checking	WW16	Hilbert Roja
5. Analyze the result and Perform Hypothesis Testing (2 Sample Tests)	WW16	Dave Laoyan

DO

Before	After
No Current Checking for Fast track boards	1. Conduct current reading which will define the board if fast tract or for repair. 2. Insert the USB Cable into the data connector and perform the current testing. **Illustration:** 

Act

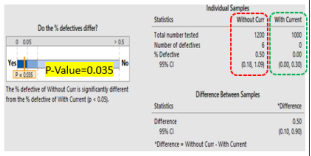
Activities:
1. Introduce the current checking process.
2. Closely monitor the result of The Power issue due to low current

In-charge: Dave Laoyan

Date: ww19

Check

Test Result: from 0.50% to 0%.



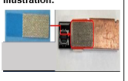
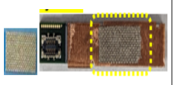
Conclusion:
Significant Different:
Based on the sample provided, the probability of failure without the current test ranges from *0.18% to 1.09%*, while with the current test, the probability of failure ranges from *0.00% to 0.30%*. With current testing is better than without current testing.

True Cause No. 2	Best Solution	Source of Variation	EP Level
The current location of the 5G antenna adhesive is prone to disconnection	Transfer the location of the Adhesive 5G antenna	Method	4- Detection at source

Plan

Evaluation to select the best location	Date	Incharge
1. Include in the changes to TCN as a document reference during the process	WW16	Dave Laoyan
2. Conduct Orientation to all affected processes	WW16	Dave Laoyan
3. Prepare 300 samples for attachment of Adhesive	WW17	Cath Pelobello
4. Conduct an attachment on the new proposed location	WW17	Cath Pelobello
5. Analyze the result and Perform Hypothesis Testing (2 Sample Tests)	WW17	Dave Laoyan

DO

Before	After
5G Antenna Conductive Attachment Before 5G antenna conductive attachment is near the Connector. **Illustration:** 	**5G Antenna Conductive Attachment** After 5G conductive attachment is at the center. **Illustration:** 

Act

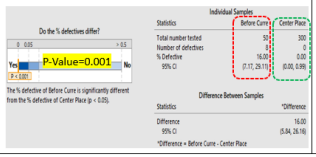
Activities:
1. Introduce the new location of conductive tape.
2. Closely Monitor the result of No Power due to wrong placement of adhesive.

Date: WW19

PIC: Benedict Barbara

Check

Test Result: from 16% to 0%.



Conclusion:
Significant Different:
Before the probability of failure ranges from 17.17% to 29.11% and after improvement the probability of failure ranges from 0.00% to 0.99%. The center location of the adhesive is better than the 5G adhesive attachment before.

True Cause No. 3	Best Solution	Source of Variation	EP Level
Damage during attachment of main flex to the board and sub-board	Change sequence Attachment of main flex from Data Connector to MLB connector	Method	4- Detection at source

Plan

Evaluation to select the best sequence	Date	Incharge
1. Include the changes to TCN as a document reference during the process	WW16	Dave Laoyan
2. Conduct Orientation to all affected processes	WW16	Jumar Millesca
3. Prepare 300 samples for attachment of the main flex.	WW17	Marycris Ocbania
4. Conduct attachment Data Con to MLB	WW17	Marycris Ocbania
4. Analyze the result and Perform Hypothesis Testing (2 Sample Tests)	WW17	Jumar Millesca

DO

Before	After
Attachment of Main Flex start from MLB to data connector. Illustration: 	The Main Flex Attachment starts from the data connector to MLB. **Illustration:** 

Act

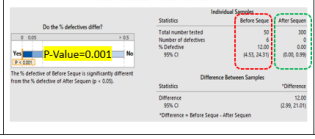
Activities:
1. Introduce the new sequence attachment.
2. Closely monitor No Power issue due to damaged connector

Date: WW19

PIC: Cath Pelobello

Check

Test Result: from 12% to 0%.



Conclusion:
Significant Different:
Before the probability of failure ranged from 4.53% to 24.31% and after improvement the probability of failure ranges from 0.00% to 0.99%. Conclude that sequence after is better than before.

True Cause No. 4	Best Solution	Source of Variation	EP Level
Detached during screwing of the antenna frame	Interchange the screwing sequence during the attachment of the screw on the antenna frame	Method	4- Detection at source

Plan

Evaluation plan to select the best screwing sequence	Date	Incharge
1. Include the changes to TCN as a document reference during the process	WW16	Dave Laoyan
2. Conduct Orientation to all affected processes	WW16	Cath Pelobello
3. Prepare 300 Samples for attachment of the Antenna Frame.	WW18	Cath Pelobello
4. Conduct screwing using the proposed sequence.	WW18	Cath Pelobello
5. Analyze the result and Perform Hypothesis Testing (2 Sample Tests)	WW18	Michelle Pamilar

DO

Before

The current screwing sequence was that the component connector to the MLB was being detached.

Illustration:

After

The new screwing sequence is to prioritize the portion of connectors to avoid unseated.

Illustration:

Act

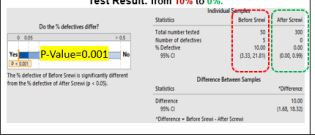
Activities:
1. Introduce the new screwing sequence
2. Closely monitor No Power issue due to damaged connector

Date: WW19

PIC: Dave Laoyan

Check

Test Result: from 10% to 0%.



Conclusion:

Significant Different:

Before the probability of failure ranged from *3.33% to 21.81%* and after improvement the probability of failure ranges from 0.00% to 0.99%. Conclude that the new sequence is better than before.

3.4.3. Potential Problem Analysis

The team conducts a Risk Assessment Analysis to assess problems that we will encounter during the implementation of action and provide countermeasures if problems occur. See

Best Solution	Potential Problem	Counter Preventive Measure/ Contingency Plan	Responsible	Target Date	Status
Insert current checking in the PD Process.	Lower the UPH due to added Elemental in PD (Current Testing)	1. Request TMS validation to IE to assess if need additional headcount or Recalculation of UPH based on the result of TMS	Dave Laoyan	WW17	Done
	No Reference for the Good and failed current readings during testing	1. Create a current reading table guide and include it in Job Aid. 2. Conduct Training and orientation.	Jumar Millesca	WW18	Done
	No Available machine for the current testing process	1. Request machine to Test Engineering. 2. Re-use the machine that was safekeep at the test engineering area. 3. Purchase a machine for current testing if the availability of the machine is insufficient.	Lorna Sadicon	WW18	Done
	Low Board Yield	1. Update the Board Yield	Christian Macalindong	WW18	Done
	Operators skip step-by-step proper attachment	1. Include compliance check in daily spot audit for 30 days to check consistency	Cath Pelobello	WW18	Done
	Can Induce RF failure due to the transfer location of Adhesive	Monitoring of affected ESN number.	Team	WW17	Done
	Improper attachment of adhesive due to unawareness of the sequence implemented	1. Emphasize the step-by-step procedure in the documentation and include CTQ during attachment 2. Include compliance check in daily spot audit for 30 days to check consistency	Jumar Millesca	WW17	Done
Change sequence Attachment of main flex from Data Connector to MLB connector	Lower UPH due to new sequence attachment	1. Request TMS validation to IE to assess if need for additional headcount or adjust UPH based on the result of TMS	Dave Laoyan	WW17	Done
Interchange the screwing sequence during the attachment of the screw on the antenna frame	Operators skip step-by-step proper attachment	1. Include documentation under CTQ and compliance check in daily spot audit for 30 days to check consistency	Ben Barbara	WW17	Done

Table 12: Potential Problem Analysis

3.5 Control Phase

3.5.1 Solution Implementation Plan

Since every mitigation has been completed, the team has created an implementation table plan outlining when the action will be implemented.

Legend: Plan Actual

True cause	Best solution	Status	April 2023				May 2023				June 2023			
			Work week											
			13	14	15	16	17	18	19	20	21	22	23	24
TR#1	Insert current checking in the PD Process	Done												
TR#2	Transfer the location of the Adhesive 5G antenna	Done												
TR#3	Change sequence Attachment of main flex from Data Connector to MLB connector	Done												
TR#4	Interchange the screwing sequence during the attachment of the screw on the antenna frame	Done												

3.5.2 Documentation

All corrective actions were included in the procedures and were properly documented. See Table 14 for the affected documents

Document Title	Control #	Type	PIC	Date	Status
Android Handset Assembly Work Instruction	WI-011-AS-02	Work Instruction	Dave Laoyan	June 10, 2023	Done
Android Handset Disassembly Work Instruction	WI-011-PD-01	Work Instruction	Dave Laoyan	June 10, 2023	Done
Phone 3 Assembly Instruction	JA-011-AS-128	Job Aid	Jumar Millesca	June 10, 2023	Done
Android Handset FMEA	FMEA-011-02	FMEA	Jumar Millesca	June 10, 2023	Done
PMP for Android Handset	PMP-011-01	PMP	Jumar Millesca	June 10, 2023	Done

Table 13: Documentation

4.0 RESULTS AND DISCUSSION

4.1 Cost Savings

The tangible benefits in terms of cost savings have a total equivalent to 1 Brand new Super Grandia Elite 2024. This was also validated by the Finance Department.

4.2 Intangible Benefits

Through a combination of process improvement, and implementing efficiency measures, the team delivers tangible savings that will ultimately contribute to the financial and sustainability of the organization. This, in turn, can result in higher customer satisfaction, increased customer loyalty, and a stronger competitive position. Our team developed commitment and ownership in every task that we take in our daily activities. We were excited and enjoyed each phase of our project as we discovered the DMAIC tools. We are proud that we made a significant contribution to our company. Related Work. The implications of the results including the possible practical applications must be discussed.

4.3 Safety Assessment

Achieve zero occurrences related to this initiative.

4.4 Team Evaluation

- Gained knowledge of the DMAIC concept and apply in improvement.
- Developed teamwork and integrity.
- Improved quality awareness and developed continuous improvement.
- Enhanced planning and time management

- Learned more about the essence of ownership and commitment.

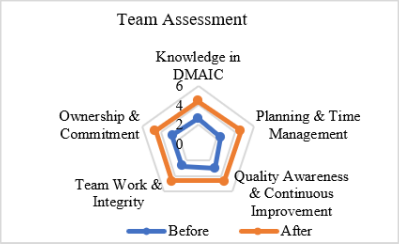


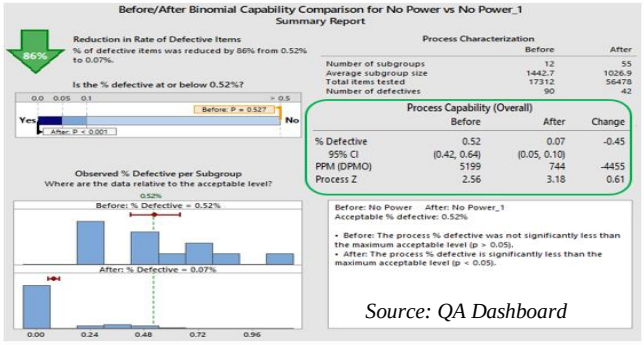
Figure 7: Radar Chart

5.0 CONCLUSION

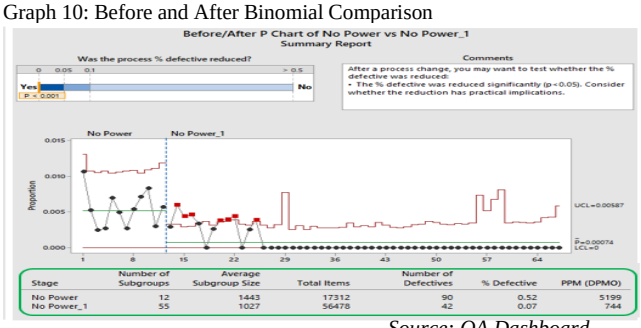
5.1 Phone Power Reship Trend

Using Binomial Capability Comparison (See graph 10) and P-Chart (See graph 11) defect was reduced by 86% from 0.52% to 0.07%. Process Z increased from 2.56 to 3.18. DPMO reduced from 5199 to 744. The overall impact of these initiatives on Overall Android performance helped to reduce by 0.09%.

The formula for Overall Impact to AND Reship Performance:
Overall impact to AND Reship= (Defect before – Defect after) * Phone 3 Volume to Overall Android.
= ((0.52%-0.07%) * 20%)
= 0.09%



Graph 10: Before and After Binomial Comparison



Graph 11: Before and After P-Chart

6.0 RECOMMENDATIONS

6.1 Standardization

6.1.1 Fan-out

The team fans out the action to other models. See Table 13.

Action	Model	PIC	Target Date	Status
Current Testing	All Models /Manufacturer's under AND	Lorna Sadicon	July 8, 2023	Done
Transfer the location of the Adhesive 5G antenna	Phone 1 and Phone 6	Dave Laoyan	July 8, 2023	Done
Interchange the screwing sequence during the attachment of the screw on the antenna frame	Phone 1 and Phone 6	Dave Laoyan	July 8, 2023	Done

Table 14: Fan out Table Illustration

6.1. 2 Next Project / Future

Model	Action	Responsible	Target Date	Status
Phone 1	Phone Power Reship Reduction	Reymart Cacao	September 2023	Done
Phone 1	Display Malfunction	Lorna Sadicon	December 2023	On Going

Table 15: Next Project

7.0 ACKNOWLEDGMENT

The team would like to acknowledge the following persons for their contribution to the realization of the project:
Sharon Castillo (CI Manager)
Brigettee Dones (CI Engineer 2)
Grin Reyes (Operations Manager)
Edwin Felix (Engineering Director)
Dennis Meciano (Sr. Engineering Manager)
Alvin Sorima (CI Facilitator)
Andrew Medina (QA Manager)
Jumar Millesca (Sr. Process Technician)
Benedict Barbarra (Failure Analysis)
Princess Loveria (Finance Manager)
Junior Delos Santos (Failure Analysis)