



LIVE SMARTER

**WATERS Weekly FPY (Hard Failures) review
(WW16 – 2020)**

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Scope of review and Alert Level

Description

1) Scope of review

- Last week data, to look out for 'surge' and 'new failures' for Hard Failures (or Faulty Component).
- 13 weeks rolling data to be reviewed, including past actions.
- 20 Dec: To review the Event Log of all failures of previous week.
- 20 Dec: To focus on last week failure during weekly review (For info)
- 14 Mar: To include In-Process FPY for review, starting WW12'18.

2) Alert Level

- If exceeds average failure plus one Standard Deviation.
- New failures – 3 pieces and above in the same week or continuous for 3 weeks.

Review of last FPY minutes (page 1 of 2)

#	Date	Item	Responsible	Status
1		<u>GPV (279001810) failure</u>		
	19-Feb-20	- To continue verification.	Flex/WPPL	On-going
	25-Feb-20	- Conf call set at Tue 25 Feb 2020 (9.30pm Singapore time)	for info	for info
	26-Feb-20	- For the 11u already RTV, to verify and report out the "failure code reported to Parker" against Flex's manual record.	Flex CFT	Closed
	26-Feb-20	- For the 8u still at Flex, Flex to continue on further investigation.	Flex CFT	Closed
	03-Mar-20	- 3u verified failed. 3u verified - pass. 2u in progress	For Info	For Info
	04-Mar-20	- to continue re-verify the 8u failed GPV at Flex after submit Evaluation Form	Joel	On-going
	04-Mar-20	- to follow up disposition of the 8u 11u GPV at Parker.	Wei Yin	Closed
	10-Mar-20	- 6u at Parker: Parker ready to return Flex. 5u at Milford: pend Milford to return Parker.	For info	For info
	11-Mar-20	- to try find out % of GPV reported "Teflon creep issue" for past 6 months RTV	Wei Yin	Closed
	24-Mar-20	- 6mth data, only one additional failure. Will back track 12 month (Mar19 to Feb20)	Wei Yin	Closed
	31-Mar-20	- WAT270524 - 7/5106 (0.14% Teflon creep); 279001810 - 2/3107 (0.06%)	For Info	For Info
	11-Mar-20	- to ask Parker for photo of the 2u / 11u that Parker mentioned "damaged Teflon block"	Wei Yin	Closed
	24-Mar-20	- Parker responded no photo was available to share with team	For Info	For Info
	07-Apr-20	- to monitor the testing result of the 6u returned from Parker.	Flex CFT	Closed
	21-Apr-20	- 6u result - all passed	For Info	For Info
	25-Mar-20	- 5u from Milford to return to Flex as well	For Info	For Info
	21-Apr-20	- 5u received by Flex. In-progress arranging ciontrol build next week	Flex CFT	Open
	07-Apr -20	- On 01 Apr, Tony, Guan Yee and Joel Joint visual and test for 3u. Tony sent update to Milford.	Tony/GY/Joel	Closed
	07-Apr-20	- RMA# received for 3u, RTV on WW15'20. Fedex AWB# 7701 9330 0493	Flex CFT	Closed

Review of last FPY minutes (page 2 of 2)

#	Date	Item	Responsible	Status
2	19-Feb-20 25-Feb-20 21-Apr-20	<u>PCBA 210000520 - CEI implemented offline screening</u> - 1st delivery which CEI implemented offline screening, to monitor if any fallout. - monitoring is in progress (no failure related to "FPGA config" or "Unable to detect instrument") - No failure after 3 month monitoring (used qty: 2099). To close this issue	Flex CFT for info For Info	Open for info For Info
3	26-Feb-20 03-Mar-20 21-Apr-20	<u>PCBA 210000416 - WW08'20: 1u failed "Needle Malfunction during rear panel test"</u> - Joint verified with Flex Senai completed. To expedite RTV for Senai investigation. - delay (transaction freeze due to PI this week. 31-Mar: coupled by Senai lockdown) - Update by Flex Senai CFT Verification: Visual -> burnt U13. ICT and FCT-> Fail After replaced U13 -> ICT still failed due to internal trace burnt. Disposition: Scrap PCBA as unable to further repair. For Closure: 01 / 598u failed (0.17%) and it is not related to U7 or U13.	Wei Yin / CFT for info For Info	Closed for info For Info
4	26-Feb-20 24-Mar-20 25-Mar-20 01-Apr-20 01-Apr-20 07-Apr-20 21-Apr-20	<u>il2V check valve (289003207) - 5u failed on Jan'20 and 3u failed on Feb'20</u> - To reverification some of the samples by Flex and WPPL Engineering - Evaluation Form raised on 10 Mar by Aldwin. Pend review / approval - Afternote: since off line verify confirm failure, no further evaluation is needed. To void this evaluation. (On 31-Mar: Aldwin send closure email to Desmond and Guan Yee) - WPPL and Flex CFT agreed to close this issue. - To keep Jen in the email loop when shared the Fedex tracking number of the returned I2V. - RMA# received for 3u, RTV by WW15'20 - RTV on 08/Apr (Fedex AWB# 7701 9334 1107). To close and to continue tracking in the 'open' issie.	Joel/Guan Yee For Info For Info For Info For Info Flex Wei Yin	For Info For Info For Info For Info For Info Closed Closed

Review of last FPY minutes (page 2 of 2)

#	Date	Item	Responsible	Status
5	26-Feb-20 01-Apr-20 08-Apr-20	<u>Needle (405001338) - 3u already shipped to Milford on 25 Feb 2020</u> - There could be some delay in FA report - to change the tracking of prelim FA from WW14'20 to WW16'20 - to check with Scott (Waters Milford) for committed date on FA report submission	For info For info Jen	For info For info Open
6	04-Mar-20 10-Mar-20 11-Mar-20 11-Mar-20 21-Apr-20	<u>Alliance GPV (WAT270524) - on WW09'20 1u failed for Inlet C no solvent Flow during Solvent Inlet Plumbing Verification</u> - to verify failure prior RTV Parker. - Verified on KGU Result failed. Observed Inlet C no flow during N2 purge by TE. - to arrange the return of failed GPV. - to put Randy on copy for all GPV returns to Parker - RMA# provided by Parker, RTV is completed.	Joel For Info Wei Yin / CFT For Info Wei Yin / CFT	Closed For Info For Info For Info Closed
7	08-Apr-20	<u>CMTI Assy, Limit Sensor (279002643)</u> - To share FA report	Flex	Closed
8	08-Apr-20 21-Apr-20	<u>PCBA 210000411 - WW09'20 "Hang at Alliance Logo". PCBA SN: 220120055M</u> - to study board circuitry- to provide further update on investigation of failure (i why U82 failure not detected at Senai) - Update by Flex Senai CFT: After replaced U82 -> ICT, FCT and Instrument all passed. Comment: U82 supply 3.3 Volts to U66 is not present resulted distorted logo display. Follow up action on-going: U82 will be sent for FA. (Target:4-May-20) Closure: To close this issue. 01 / 598u failed (0.17%) and it is not related to U66.	Wei Yin/CFT For Info	Closed For Info

Weekly First Pass Yield Summary - all models (hard failure)

Alert Level crossed
Instrument and In-Process

		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
Alliance	First Pass Yield	97%	89%	97%	99%	99%	97%	98%	99%	96%	99%	100%	98%	94%
	Total Units Tested	105	27	143	105	92	94	95	69	73	72	25	84	68
	Total Units Passed	102	24	139	104	91	91	93	68	70	71	25	82	64
	Hard Failures	3	3	4	1	1	3	2	1	3	1		2	4
	Alert limit triggered													
		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
BSM/QSM	First Pass Yield	85%	86%	100%	65%	100%	92%	96%	100%	96%	97%	82%	100%	97%
	Total Units Tested	54	22	45	23	30	50	50	50	26	39	11	40	35
	Total Units Passed	46	19	45	15	30	46	48	50	25	38	9	40	34
	Hard Failures	8	3		8		4	2		1	1	2		1
	Alert limit triggered													
		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
PDA	First Pass Yield	98%	100%	98%	99%	100%	98%	99%	99%	100%	94%	100%	97%	96%
	Total Units Tested	93	46	88	82	99	98	103	71	92	33	93	36	24
	Total Units Passed	91	46	86	81	99	96	102	70	92	31	93	35	23
	Total Units Failures (hard)	2		2	1		2	1	1		2		1	1
	Alert trigger limit													
		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
TUV	First Pass Yield	99%	100%	97%	99%	99%	98%	99%	100%	100%	100%	100%	100%	94%
	Total Units Tested	123	60	109	93	100	119	89	71	10	28	84	40	36
	Total Units Passed	122	60	106	92	99	117	88	71	10	28	84	40	34
	Total Units Failed (Hard)	1		3	1	1	2	1						2
	Alert trigger limit													
		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
Pump	First Pass Yield	100%	100%	100%	100%	100%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	100%	100%	86%	100%
	Total Units Tested	15	9	12	18	3	0	0	0	0	5	15	7	10
	Total Units Passed	15	9	12	18	3	0	0	0	0	5	15	6	10
	Total Units Failures (Hard)												1	
	Alert trigger limit													

Parts triggered Alert level on WW16: Alliance - PN 210000425 triggered for FT and no parts triggered for in-process

BSM/QSM - No parts triggered for both FT and in-process

Detectors - No parts triggered for both FT and in-process

Pumps - No parts triggered for both FT and in-process

Weekly First Pass Yield (hard failure)

FA Status (OPEN issues)



Closed



In Progress

Model	Part Number	Supplier	Q2'18	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
TUV	279002643 (Assy, Limit Sensor)	CMTi					WW22'19				WW29'19	WW29'19	WW31'19 WW34'19	WW47'19 WW48'19 WW51'19 WW17'20	WW22 - 3 Instrument failing "Missing bad sensor". WW29 - wire strands broken at black insulation area and it's a Double-wire crimping process. WW31 - supplier 4M reviewed. The Terminal is not designed for double wire crimping. No other PN affected. WW34 – supplier proposal to change two wires crimping to solder splice. Package sent to WPPL for review. WW47'19 – FA 5 x samples received. WW49'19 – sent 5x samples to Milford WW51'19 – new drawing prelim released by Milford. WW17'20 – New part received and to be used in WW17 after old part consumed.
BSM/ QSM & Detectors	210000520 (PCBA, CPU)	CEI		Aug'18									WW47'19 WW48'19 WW49'19 WW03'20	WW15'20	WW42'19 ' CEI to source for 3 rd party to analyze for U11 on firmware loading issue. U25 (Altera) - unable to perform FA with 3 rd party error message. WW42'19 – CEI to fabricate tester to screen component U11 (Completed). WW47'19 - CEI has sent out additional 5 pcs of U11 to distributor Quiksol on 24 Oct. Target 1 month to receive report. Reports shared on 27 Nov 19. Report found no abnormality. WW48'19 – Prototype tester to offline screen U11 completed. CEI proposed to test one-month production before proposal to Waters to add as permanent testing. Pending waters to review proposal. WW49 – proposal send Milford, pending Milford review. WW03'20- Waters approved the proposal. CEI will start to implement offline screening on WWK 03 and has shared the 1 st serial number: 280120001C, WW15'20 - No failure after 3 months monitoring (used qty: 2099). To close this issue

Weekly First Pass Yield (hard failure)

FA Status (OPEN issues)

Closed

In Progress

Model	Part Number	Supplier	Q2'18	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	21000416 (Fluidics PCBA)	Flex Senai							WW42'19	WW43'19	WW44'19	WW46'19	WW49'19 WW51'19 For FA: WW51'19 WW01'20	WW11'20	WW41'19 - Needle malfunction*1, Carousel Z axis malfunction*1. WW42'19 - Needle malfunction*2. WW43'19 – Joint verification with Flex Senai WW46'19 – Due to Faulty U13*1 and Faulty U7*1 WW49'19 – proposed Containment Action: -> U13 to measure pin 7 and pin 8 to check any internal component short. -> U7 to use oscilloscope to check the output voltage connecting to J8 pin 3. WW51'19 - to implement additional check for U13 and U7. 1 st SN 301219376M For FA: WW51'19 – to send Component U13 and U7 for FA. WW01'20 – Component U13 FA report received. WW04'20 – Component U7 FA report received. For monitoring: WW11'20 – to monitor for 3 months. WW11'20 (at Senai) - Qty additional check: 873pcs and 0 failure WW11'20 (at Kallang) – 1 /598u failed for “Needle Malfunction during Rear Panel Test”. PCBA SN: 110120108M. (On 10-Mar-20, Senai will collect this bd back for their evaluation. No further update due to Senai lockdown). WW17: Update by Flex Senai CFT: Verification: Visual -> burnt U13. ICT and FCT-> Fail After replaced U13 -> ICT still failed due to internal trace burnt. Disposition: Scrap PCBA as unable to further repair. Closure: To close this issue. 01 / 598u failed (0.17%) and it is not related to U7 or U13.

Weekly First Pass Yield (hard failure)

FA Status (OPEN issues)



Closed



In Progress

Model	Part Number	Supplier	Q2'18	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	210000411 (CPU PCBA)	Flex Senai							WW42'19	WW43'19	WW44'19	WW45'19	WW46'19 WW05'20 WW09'20 For FA: WW50'19 WW51'19 WW03'20	WW11'20	WW41'19 – Hang at Alliance Logo*1, WW42'19 – Hang at Alliance Logo*1. WW45'19 – Due to U66 component Faulty WW46'19 - 2 nd time offline verification at U66 offline programming station. <u>First cut in S/N 111119159M</u> WW05'20 – currently, frequency measurement done manually at FCT by operator. Per discussed with WPPL Engineering, modification on ICT tester is not feasible. WPPL proposed to build a standalone fixture. WW09'20 – Flex Senai feedback: not feasible for ‘stand alone’ testing fixture proposal. For FA: WW50'19 – receive component FA for U66. WW51'19 – review FA report from supplier: Supplier reported the IC can “function properly and retain data after testing”. WW03'20 – Senai completed to simulate offline programming, to study if any possibility to corrupt the IC-U66. Result – not able to duplicate. For Monitoring: WW11'20 – monitor for 3 month WW11'20 –. At Senai: Qty 2 nd verification 0 / 1545pcs failure WW11'20 – At Kallang, 1u/598u failed for “Hang at Alliance Logo”. PCBA SN: 220120055M. On 10-Mar-20, Senai will collect this bd back for their evaluation. WW15'20 – Update by Flex Senai CFT: ICT-Failed (U82-Component Failure) FCT-Failed (Communication Error) Alliance Instrument-Failed (Hang and Distorted Display WW17: Update by Flex Senai CFT: After replaced U82 -> ICT, FCT and Instrument all passed. Disposition: Scrap PCBA as unable to further repair. Comment: U82 supply 3.3 Volts to U66 is not present resulted distorted display. Follow up: U82 will be sent for FA. (Target:4-May-20) Closure: To close this issue. 01 / 598u failed (0.17%) and it is not related to U66.

Weekly First Pass Yield (hard failure)

FA Status (OPEN issues)

Closed

In Progress

Model	Part Number	Supplier	Q1'20	Q2'20	Q3'20	Q4'20	Q1'21	Q2'21	Q3'21	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
QSM+	279001810 (ASSY, GPV, DUAL CHANNEL, QSM)	Parker	WW03'20 (4u) WW04'20 (7u) WW07'20 (8u)							WW03'20 WW05'20 (11u) WW10'20 (8u)	WW05'20 (5u) WW06'20 (6u) WW15'20 (3u)	WW07'20 (11u) WW20'20 (3u)	NA	WW14'20 (6u) WW18'20 (5u)	WW03'20 – 4u failed Test Input X prime with MeOH WW04'20 – 7u failed Test Input X prime with MeOH WW03'20, WW05'20 – Verification completed (11u) WW05'20 – 5u shipped and WW06'20 – 6u shipped WW07'20 – supplier prelim FA 8u – NTF, 2u – Teflon block damaged. 1u – Teflon creep.. WW14'20 – 6u Flex received parts from Parker. Result – all passed WW18.20 – 5u – received in Flex. In-progress for control build. WW07'20 – 8u failed Test Input X prime with MeOH WW10'20 – 3u verified failed. 5u verified - pass. 01 Apr, Tony and Guan Yee and Joel joint visual and testing for the 3x failed unit. Result feedback to Milford- done. WW15'20 – 3u - RMA# received and shipped WW20'20 – to track prelim FA from Parker
QSM+	289003207 (ASSY, CARTRIDGE, I2V, PLATE CL)	Waters	WW02'20 (2u) WW03'20 (3u) WW09'20 (3u)							WW05'20 (5u) WW12'20 (3u)	WW09'20 (5u) WW15'20 (3u)	NA WW20'20 (3u)	NA	NA	WW02'20 - Test static leak pump B failed *1, Dynamic leak test *1 WW03'20 - Dynamic leak test "3 WW05'20 – Verification completed (for 5u) WW09'20 – Disposition is to Scrap on-site (for 5u) WW09'20 - Dynamic leak test "1, Test static leak pump A failed*2 WW12'20 – Verification on completed(3u failed WW15'20 – RMA received and shipped. WW20'20 – to track prelim FA from Milford.

Weekly First Pass Yield (hard failure) FA Status (OPEN issues)



Closed



In Progress

Model	Part Number	Supplier	Q1'20	Q2'20	Q3'20	Q4'20	Q1'21	Q2'21	Q3'21		Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	210000425 (ASSY, PCB, PUMP DRIVER, ROHS)	Flex Senai		WW16'20 (3u)							WW17'20	WW17'20				WW17'20 – 1u failed 'Unable to Home', 2u failed 'Bio Chem Valve unable to work during Seal Wash' WW17'20 – RTV is in progress

Weekly First Pass Yield (hard failure) FA Status (OPEN issues)

- Closed
- In Progress

In Process Failures FA Status

Model	Part Number	Supplier	Q1'20	Q2'20	Q3'20	Q4'20	Q1'21	Q2'21	Q3'21	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	405001338 (NEEDLE,INJECTOR)	Waters Tech	WW03'20 (1u) WW04'20 (2u)							WW06'20	WW09'20	WW18'20			WW03'20 – 1u failed Fail decay test at Injector Sub Assy Test WW04'20 – 2u failed Fail decay test at Injector Sub Assy Test WW06'20 - Verification (bubble test) completed WW09'20 – 3 samples shipped. WW18'20 – to track Prelim FA



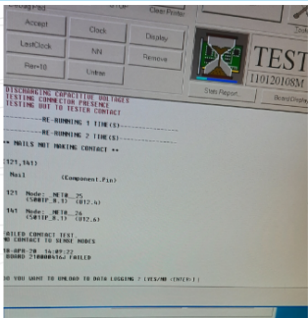
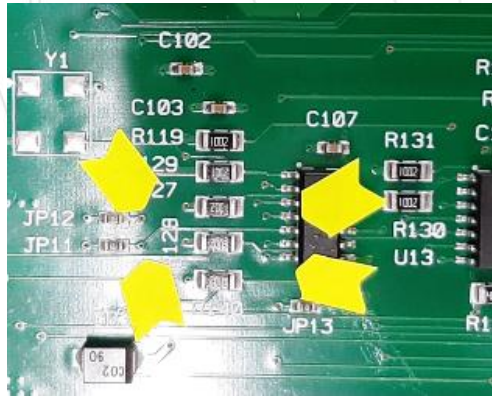
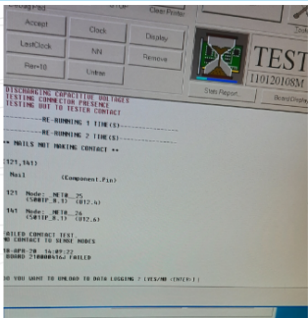
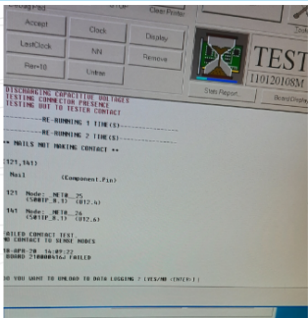
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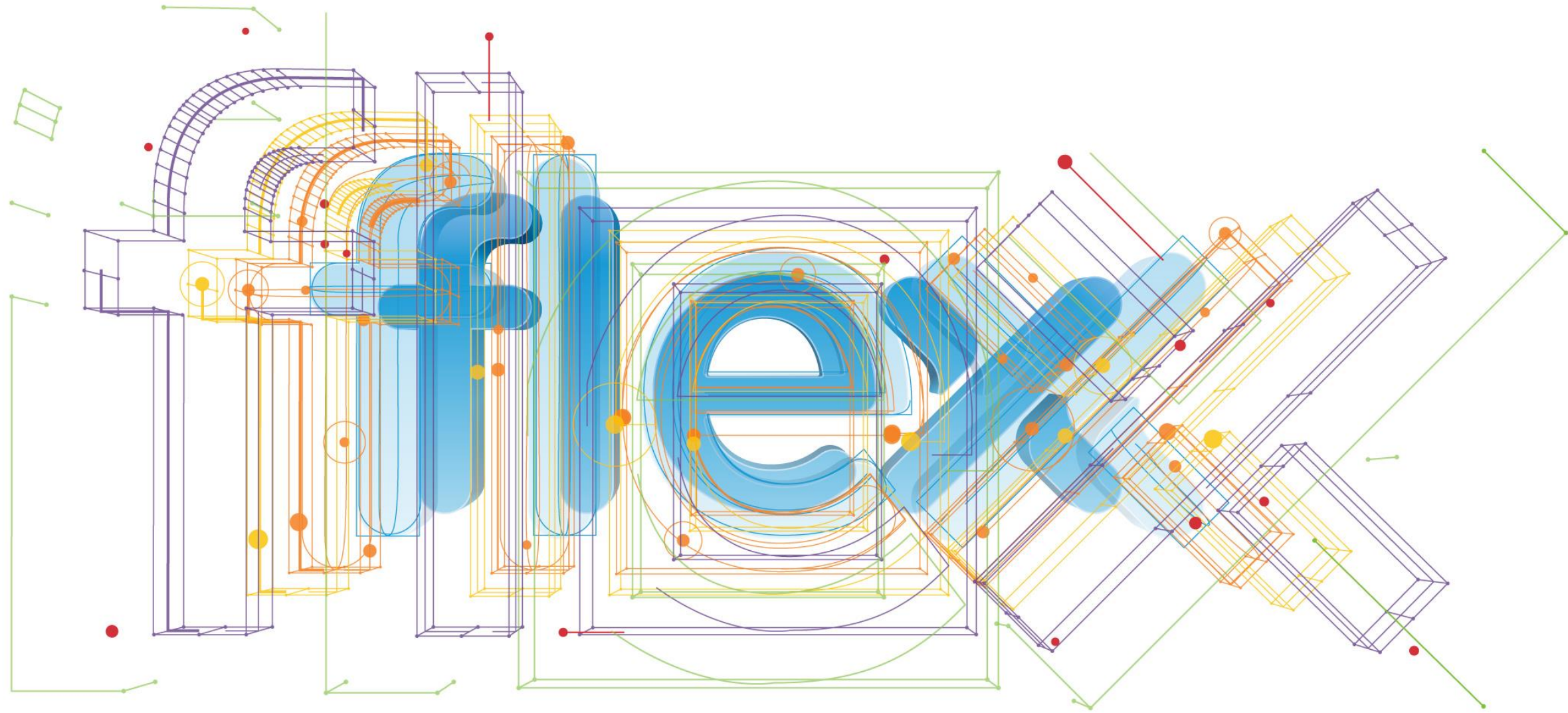
“Needle Malfunction during Rear Panel Test”

Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action																																																																																																																																																																																																																																																		
PN : WATH-210000416-M Problem: Needle Malfunction during Rear Panel Test NCMR-SKW-00015686-110120108M	1. Flex Flow History (Prime) for Serial Number: 110120108M -ICT-Passed, -FFT-Passed Unit: A81-110120108M <table><tr><td>Unit Info</td><td>Consumption</td><td>Test</td><td>Package</td><td>RMA</td><td>Part</td><td>Production Order</td><td>Route Info</td><td>Action Log</td><td>Cookbook</td><td>Lot-Recording</td><td>Efficiency Dashboard</td><td>QTY Planning</td><td>Customized Info</td></tr><tr><td colspan="14">Test-Repair-Data:</td></tr><tr><th>Name</th><th>TestType</th><th>Station</th><th>Employee</th><th>Jig</th><th>IsPass</th><th>Status</th><th>CreationTim</th><th>TesterStartT</th><th>TesterEndTi</th><th>TesterTestTi</th><th>PanelIndex</th><th>SocketIndex</th><th>SWFile</th><th>SWVer</th><th>LooperCoun</th></tr><tr><td>(null)</td><td>AOI/PostIR(T)</td><td>AOI/PostIR(T)</td><td>snimohdk</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/13/2020</td><td>2020-01-13 22</td><td>2020-01-13 22</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>PostIR Washin</td><td>PostIR_Washi</td><td>sninuraz</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/14/2020</td><td>2020-01-14 04</td><td>2020-01-14 04</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>PreWave</td><td>PreWave SW1</td><td>225437</td><td>PRE-WAVE</td><td>✓</td><td>Pass</td><td>1/15/2020</td><td>15/1/2020 11:</td><td>15/1/2020 11:</td><td>1</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>PostWave</td><td>Post Wave PM</td><td>1071957</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/16/2020</td><td>2020-01-16 02</td><td>2020-01-16 02</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>PostWave Wa</td><td>PostWave_Wa</td><td>225437</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/16/2020</td><td>2020-01-16 04</td><td>2020-01-16 04</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>VMI</td><td>VMI WT Cell</td><td>835411</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/18/2020</td><td>2020-01-18 23</td><td>2020-01-18 23</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>ICT-AT</td><td>ICT-AT GenRa</td><td>960990</td><td>GR-02</td><td>✓</td><td>Pass</td><td>1/19/2020</td><td>19/1/2020 2:1</td><td>19/1/2020 2:1</td><td>1</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>2nd_Handload</td><td>2nd_HandLoa</td><td>1075970</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/24/2020</td><td>2020-01-24 12</td><td>2020-01-24 12</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>FFT</td><td>FFT WT Cell</td><td>1071952</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/24/2020</td><td>2020-01-24 13</td><td>2020-01-24 13</td><td>(null)</td><td>0</td><td>0</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>FVMI</td><td>FVMI WT Cell</td><td>835411</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/25/2020</td><td>2020-01-25 02</td><td>2020-01-25 02</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>FQA</td><td>FQA WT</td><td>snirsoda</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/25/2020</td><td>2020-01-25 05</td><td>2020-01-25 05</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td>(null)</td><td>OBA</td><td>OBA WT</td><td>sninmukh</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/29/2020</td><td>2020-01-29 08</td><td>2020-01-29 08</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr></table> 2. Investigation - Observed U13 burnt. - ICT & FFT failed. <table><tr><th>ICT</th><th>ALLIANCE FUNCTIONAL TEST</th><th>ALLIANCE INSTRUMENT</th></tr><tr><td> Result: Failed. Shorted Gnd to Discharged circuitry </td><td> Result: Failed in Fluid Driver Interface. U13 heat up </td><td> NA Result: No test in Alliance tester. Shorted may damage the instrument </td></tr></table>	Unit Info	Consumption	Test	Package	RMA	Part	Production Order	Route Info	Action Log	Cookbook	Lot-Recording	Efficiency Dashboard	QTY Planning	Customized Info	Test-Repair-Data:														Name	TestType	Station	Employee	Jig	IsPass	Status	CreationTim	TesterStartT	TesterEndTi	TesterTestTi	PanelIndex	SocketIndex	SWFile	SWVer	LooperCoun	(null)	AOI/PostIR(T)	AOI/PostIR(T)	snimohdk	(null)	✓	PASS	1/13/2020	2020-01-13 22	2020-01-13 22	(null)	(null)	(null)	(null)	(null)	1	(null)	PostIR Washin	PostIR_Washi	sninuraz	(null)	✓	PASS	1/14/2020	2020-01-14 04	2020-01-14 04	(null)	(null)	(null)	(null)	(null)	1	(null)	PreWave	PreWave SW1	225437	PRE-WAVE	✓	Pass	1/15/2020	15/1/2020 11:	15/1/2020 11:	1	(null)	(null)	(null)	(null)	1	(null)	PostWave	Post Wave PM	1071957	(null)	✓	PASS	1/16/2020	2020-01-16 02	2020-01-16 02	(null)	(null)	(null)	(null)	(null)	1	(null)	PostWave Wa	PostWave_Wa	225437	(null)	✓	PASS	1/16/2020	2020-01-16 04	2020-01-16 04	(null)	(null)	(null)	(null)	(null)	1	(null)	VMI	VMI WT Cell	835411	(null)	✓	PASS	1/18/2020	2020-01-18 23	2020-01-18 23	(null)	(null)	(null)	(null)	(null)	1	(null)	ICT-AT	ICT-AT GenRa	960990	GR-02	✓	Pass	1/19/2020	19/1/2020 2:1	19/1/2020 2:1	1	(null)	(null)	(null)	(null)	1	(null)	2nd_Handload	2nd_HandLoa	1075970	(null)	✓	PASS	1/24/2020	2020-01-24 12	2020-01-24 12	(null)	(null)	(null)	(null)	(null)	1	(null)	FFT	FFT WT Cell	1071952	(null)	✓	PASS	1/24/2020	2020-01-24 13	2020-01-24 13	(null)	0	0	(null)	(null)	1	(null)	FVMI	FVMI WT Cell	835411	(null)	✓	PASS	1/25/2020	2020-01-25 02	2020-01-25 02	(null)	(null)	(null)	(null)	(null)	1	(null)	FQA	FQA WT	snirsoda	(null)	✓	PASS	1/25/2020	2020-01-25 05	2020-01-25 05	(null)	(null)	(null)	(null)	(null)	1	(null)	OBA	OBA WT	sninmukh	(null)	✓	PASS	1/29/2020	2020-01-29 08	2020-01-29 08	(null)	(null)	(null)	(null)	(null)	1	ICT	ALLIANCE FUNCTIONAL TEST	ALLIANCE INSTRUMENT	Result: Failed. Shorted Gnd to Discharged circuitry	Result: Failed in Fluid Driver Interface. U13 heat up	NA Result: No test in Alliance tester. Shorted may damage the instrument	Conclusion: Senai has performed visual inspection on the return board and found there is burnt on the top surface of U13. Based on the re-test result at Senai, the PCBA is failing at ICT & FCT. After replaced new U13, ICT test was failed again. Senai concluded due to burn U13 resulting Internal open trace at U12 This board unable to repair and will proceed to scrap.
Unit Info	Consumption	Test	Package	RMA	Part	Production Order	Route Info	Action Log	Cookbook	Lot-Recording	Efficiency Dashboard	QTY Planning	Customized Info																																																																																																																																																																																																																																							
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Needle Malfunction during Rear Panel Test

WW08'20 – 210000416 PCBA

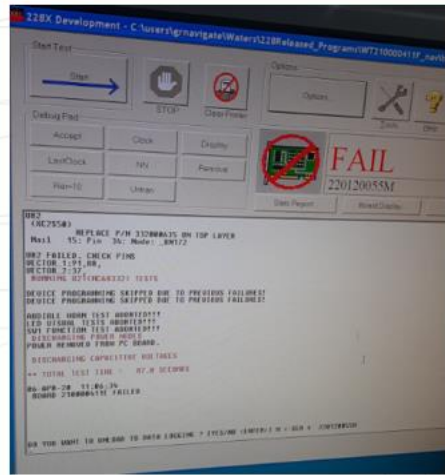
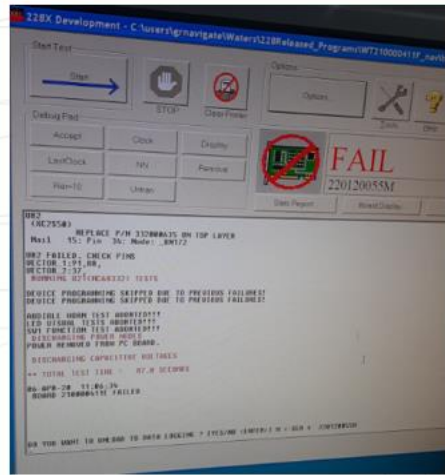
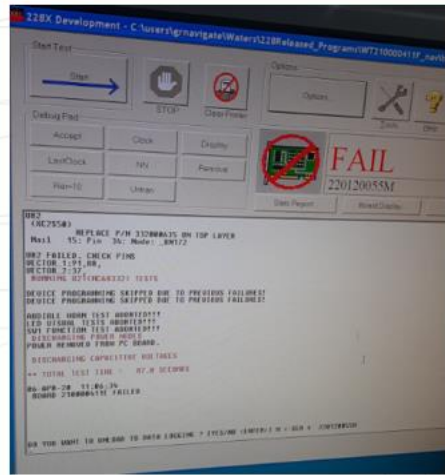
Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action									
PN : WATH-210000416-M Problem: Needle Malfunction during Rear Panel Test NCMR-SKW-00015686-110120108M	2. Investigation (Continue) - Replaced new U13 component - Result was failed. <table><tr><th>ICT</th><th>ALLIANCE FUNCTIONAL TEST</th><th>ALLIANCE INSTRUMENT</th></tr><tr><td></td><td>NA</td><td>NA</td></tr><tr><td>Result: Failed. Open continuity U12 pin 4 to 6</td><td>Result: NA</td><td>Result: NA</td></tr></table> - Resulting Internal open trace at U12 	ICT	ALLIANCE FUNCTIONAL TEST	ALLIANCE INSTRUMENT		NA	NA	Result: Failed. Open continuity U12 pin 4 to 6	Result: NA	Result: NA	See above slide
ICT	ALLIANCE FUNCTIONAL TEST	ALLIANCE INSTRUMENT									
	NA	NA									
Result: Failed. Open continuity U12 pin 4 to 6	Result: NA	Result: NA									



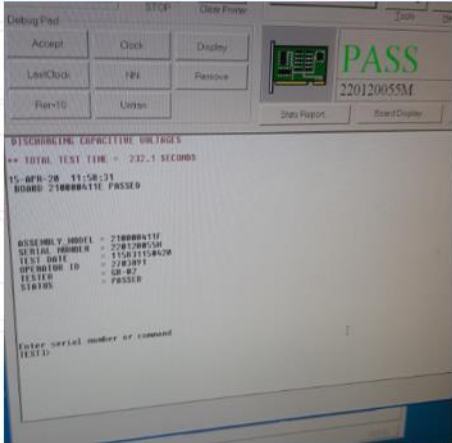
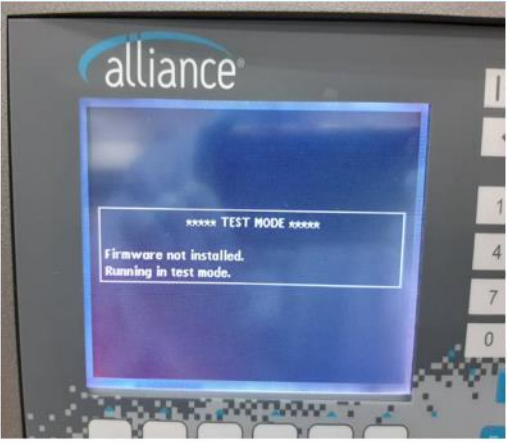
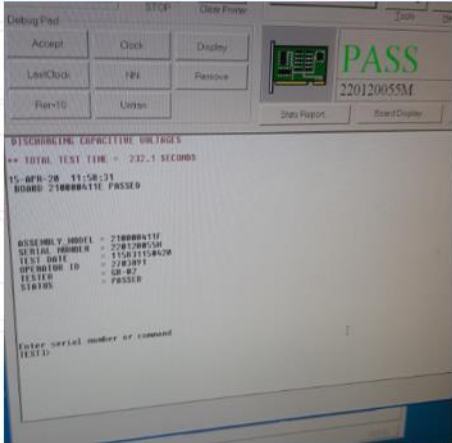
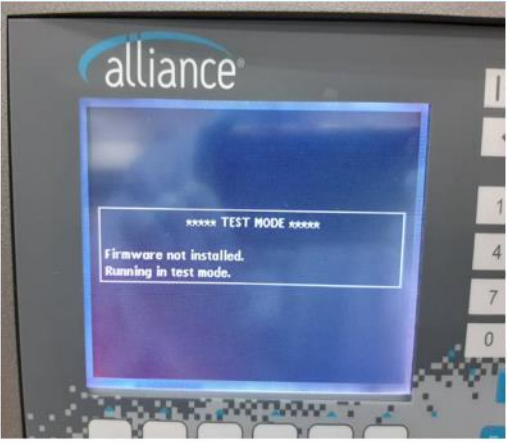
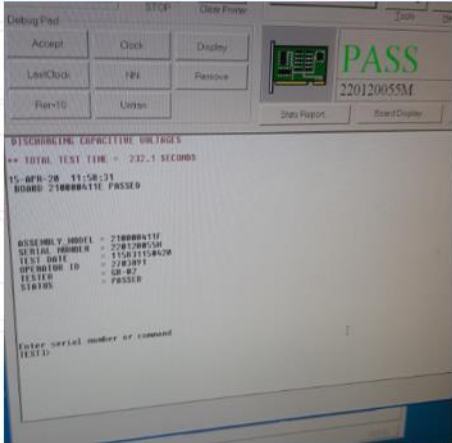
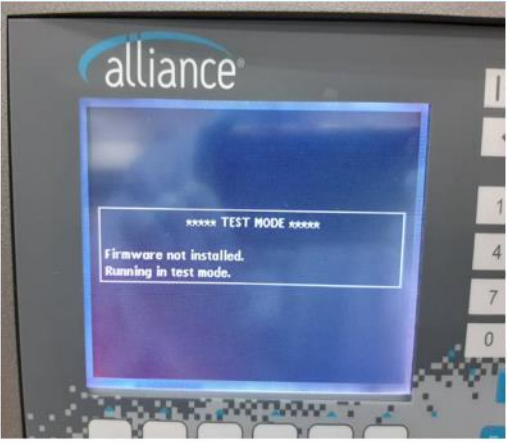
Thank You

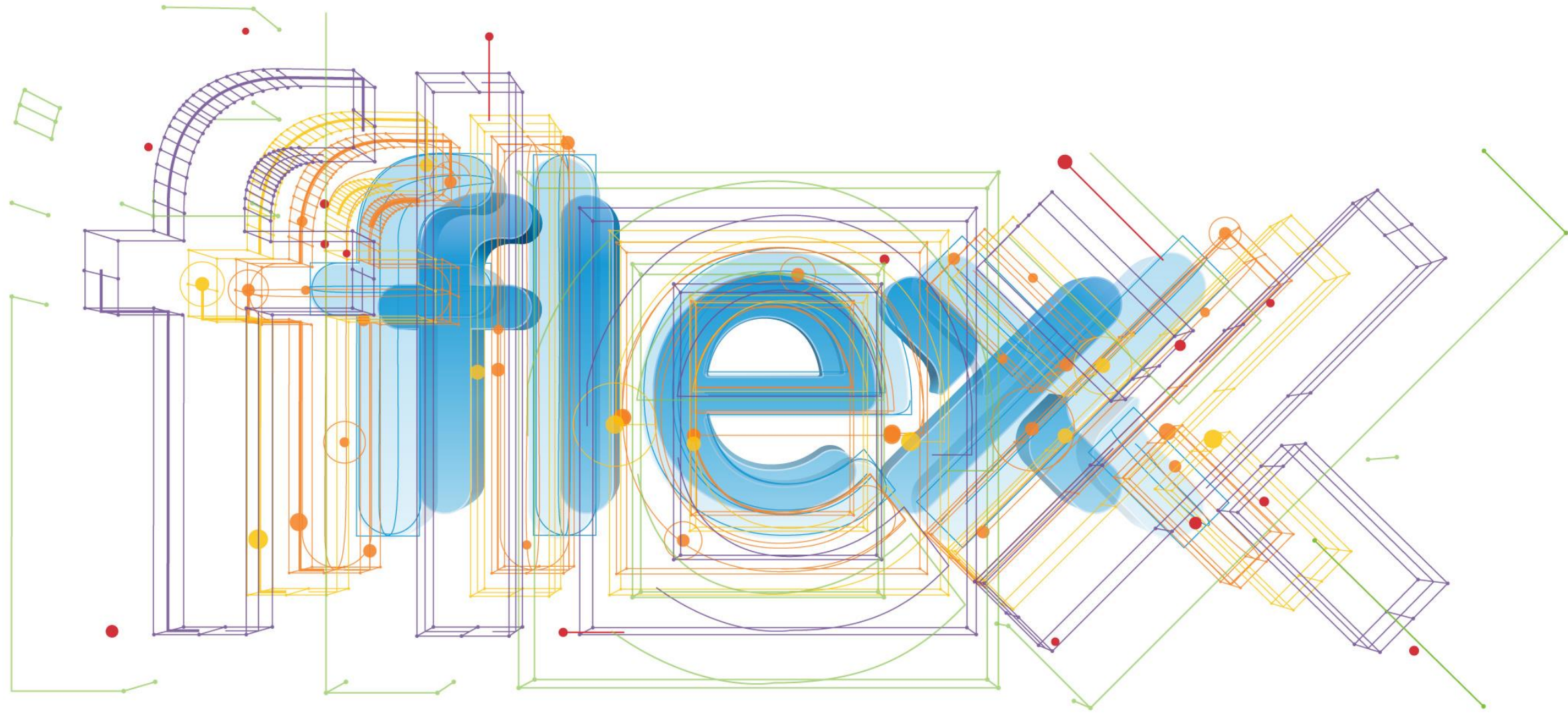


Model:210000411-F
“Hang at Alliance Logo”

Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action																																																																																																																																																																																																																																																																																			
PN : WATH-210000411-F Problem: Hang at Alliance logo NCMR-SKW-00015677-220120055M 	1. Flex Flow History (Prime) for Serial Number: 220120055M -ICT-Passed, -FFT-Passed <table><tr><th colspan="15">Unit: A15-220120055M</th></tr><tr><td colspan="15">Unit Info Consumption Test Package RMA Part Production Order Route Info Action Log Cookbook Lot-Recording Efficiency Dashboard QTY Planning Customized Info</td></tr><tr><td colspan="15">Test-Repair-Data:</td></tr><tr><td></td><td>Name</td><td>TestType</td><td>Station</td><td>Employee</td><td>Jig</td><td>IsPass</td><td>Status</td><td>CreationTim</td><td>TesterStartT</td><td>TesterEndT</td><td>TesterTestTi</td><td>PanelIndex</td><td>SocketIndex</td><td>SWFile</td><td>SWVer</td><td>LooperCoun</td></tr><tr><td>▶</td><td>(null)</td><td>AOI/POSTIR(B</td><td>AOI/PostIR(B)</td><td>sninuran</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/25/2020</td><td>2020-01-25 01</td><td>2020-01-25 01</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>AOI/PostIR(T)</td><td>AOI/PostIR(T)</td><td>sninisma</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/25/2020</td><td>2020-01-25 09</td><td>2020-01-25 09</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>PostIR Washin</td><td>PostIR_Washi</td><td>snibitha</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/25/2020</td><td>2020-01-25 13</td><td>2020-01-25 13</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>PreWave</td><td>PreWave</td><td>PreWave SW1</td><td>225437</td><td>PRE-WAVE</td><td>✓</td><td>Pass</td><td>1/29/2020</td><td>29/1/2020 10:</td><td>29/1/2020 10:</td><td>1</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>PostWave</td><td>Post Wave PM</td><td>1071957</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/29/2020</td><td>2020-01-29 23</td><td>2020-01-29 23</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>PostWave Wa</td><td>PostWave_Wa</td><td>225437</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/30/2020</td><td>2020-01-30 00</td><td>2020-01-30 00</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>2nd_Handload</td><td>2nd_HandLoa</td><td>1075970</td><td>(null)</td><td>✓</td><td>PASS</td><td>1/31/2020</td><td>2020-01-31 17</td><td>2020-01-31 17</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>ICT-AT</td><td>ICT-AT</td><td>ICT-AT GenRa</td><td>2703891</td><td>GR-02</td><td>✓</td><td>Pass</td><td>2/1/2020</td><td>1/2/2020 8:45</td><td>1/2/2020 8:45</td><td>1</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>FFT</td><td>FFT</td><td>FFT WT Cell</td><td>1040197</td><td>(null)</td><td>✓</td><td>PASS</td><td>2/1/2020</td><td>2020-01-30 00</td><td>2020-01-30 00</td><td>(null)</td><td>0</td><td>0</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>FVMI</td><td>FVMI WT Cell</td><td>974104</td><td>(null)</td><td>✓</td><td>PASS</td><td>2/3/2020</td><td>2020-02-03 14</td><td>2020-02-03 14</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>FQA</td><td>FQA WT</td><td>982061</td><td>(null)</td><td>✓</td><td>PASS</td><td>2/3/2020</td><td>2020-02-03 15</td><td>2020-02-03 15</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr><tr><td></td><td>(null)</td><td>OBA</td><td>OBA WT</td><td>snisidi</td><td>(null)</td><td>✓</td><td>PASS</td><td>2/4/2020</td><td>2020-02-04 11</td><td>2020-02-04 11</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>(null)</td><td>1</td></tr></table> 2. Investigation <table><tr><th>ICT</th><th>ALLIANCE FUNCTIONAL TEST</th><th>ALLIANCE INSTRUMENT</th></tr><tr><td></td><td></td><td></td></tr><tr><td>Result: Failed. (U82-Component failure)</td><td>Result: Failed. Communication error</td><td>Result: Failed. 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(U82-Component failure)	Result: Failed. Communication error	Result: Failed. Hang and Distorted Display	Conclusion: Senai has performed visual inspection on the return board and found there is no cosmetic or solderability issue. Based on the re-test result at Senai, the PCBA is failing at ICT for U82 location. Flex Senai concluded as component failure, as the component passed at Flex Senai ICT before ship to Flex Kallang. Defective U82 in which supply 3.3 Volts to U66 is not present resulted distorted display. U82 will be sent for FA. (Target date to ship : 4-May-20)
Unit: A15-220120055M																																																																																																																																																																																																																																																																																					
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flex

Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action									
PN : WATH-210000411-F Problem: Hang at Alliance logo 	2. Investigation (Continue) - Replaced new U82 component - Result was passed. <table><tr><th>ICT</th><th>ALLIANCE FUNCTIONAL TEST</th><th>ALLIANCE INSTRUMENT</th></tr><tr><td></td><td></td><td></td></tr><tr><td>Result: PASSED</td><td>Result: PASSED</td><td>Result: PASSED</td></tr></table>	ICT	ALLIANCE FUNCTIONAL TEST	ALLIANCE INSTRUMENT		 		Result: PASSED	Result: PASSED	Result: PASSED	See above slide
ICT	ALLIANCE FUNCTIONAL TEST	ALLIANCE INSTRUMENT									
	 										
Result: PASSED	Result: PASSED	Result: PASSED									

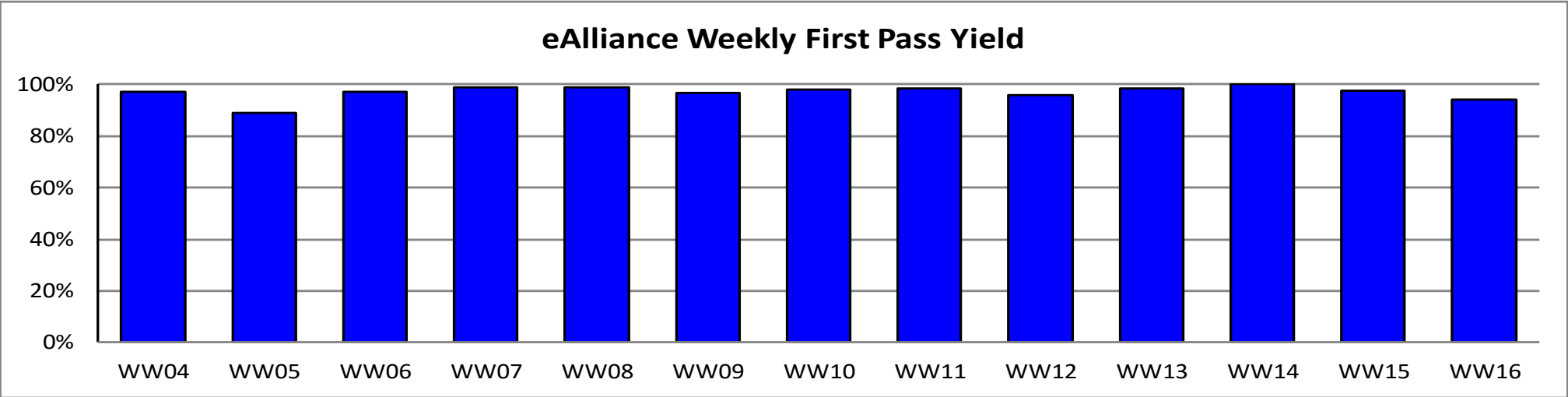


Thank You



Weekly FPY data and charts

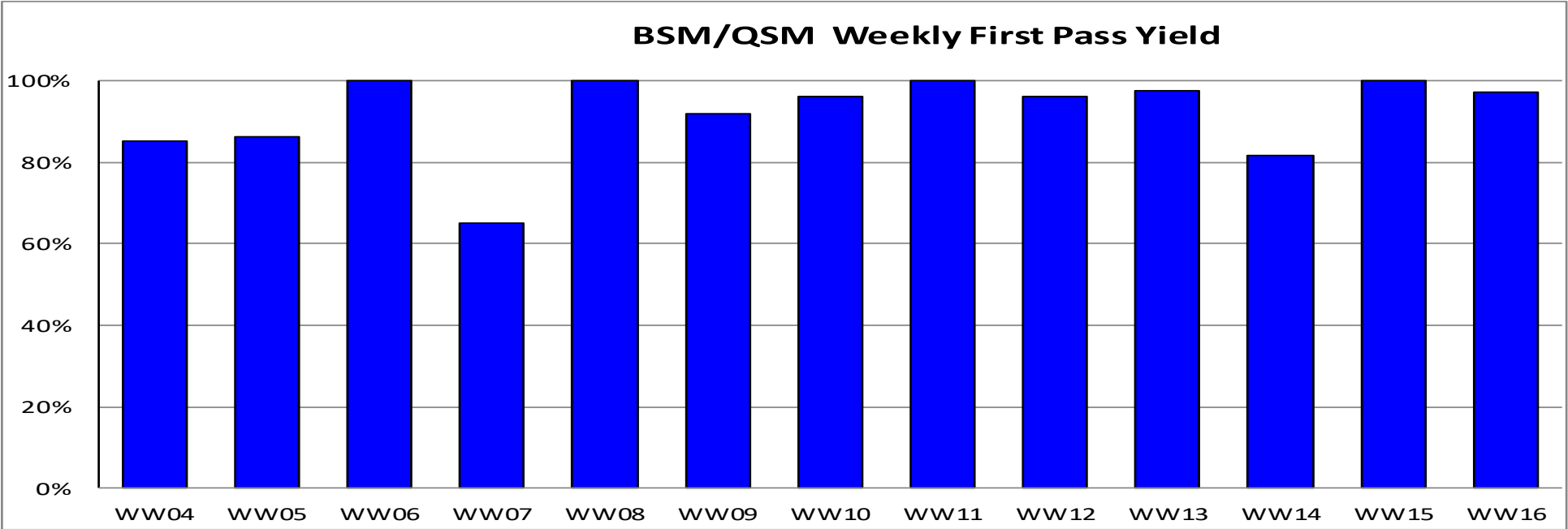
Weekly First Pass Yield - Alliance (hard failure)



	17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
	WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
First Pass Yield	97%	89%	97%	99%	99%	97%	98%	99%	96%	99%	100%	98%	94%
Total Units Tested	105	27	143	105	92	94	95	69	73	72	25	84	68
Total Units Passed	102	24	139	104	91	91	93	68	70	71	25	82	64
Hard Failures	3	3	4	1	1	3	2	1	3	1		2	4
Alert limit triggered													

		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr	AL
	Row Labels	WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16	
1	210000411 (CPU PCBA)	1		1			1		1		1			1	2
2	210000425 (Pump tray PCBA)							1						3	2
3	210000444 (H/C PCBA)		2										1		2
4	289001192 (H/C Engine)			1									1		2
5	WAT270524 (GPV) (Threadless armature)				1		1			1					2
6	210000416 (Fluidics PCBA)	2				1				2					2
7	WAT270621 (Cable)							1							2
8	WAT270172 (Transducer)			1			1								2
9	289012691 (Chamber)			1											2
10	WAT270361 (Fan)		1												2

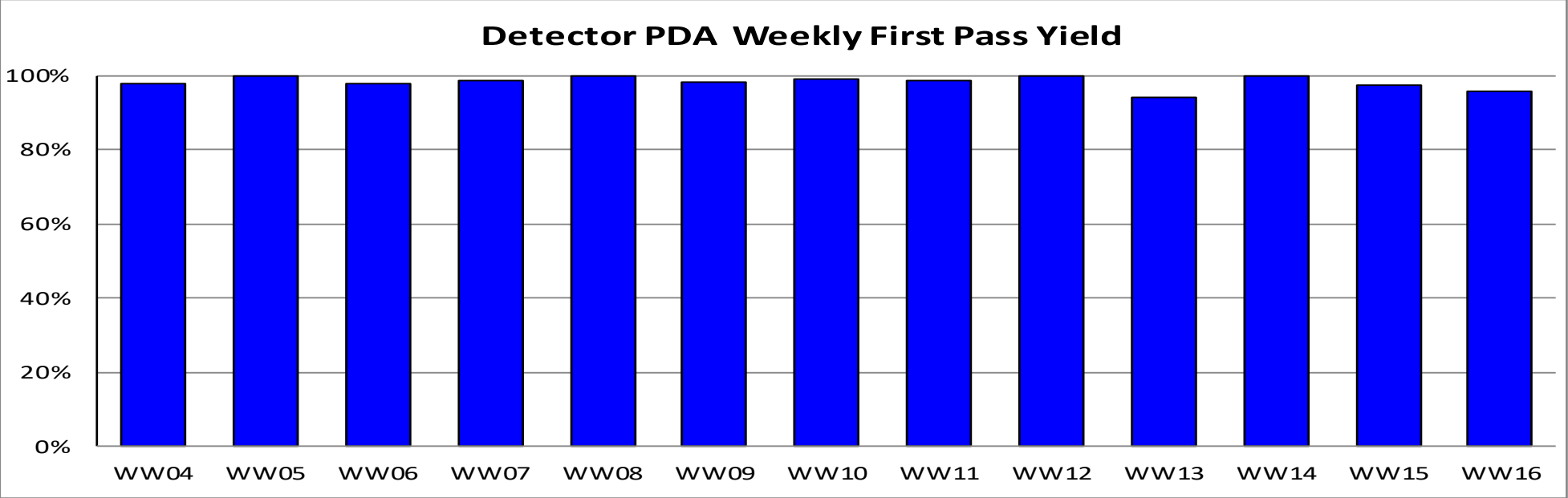
Weekly First Pass Yield – BSM/QSM (hard failure)



M		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
	First Pass Yield	85%	86%	100%	65%	100%	92%	96%	100%	96%	97%	82%	100%	97%
	Total Units Tested	54	22	45	23	30	50	50	50	26	39	11	40	35
	Total Units Passed	46	19	45	15	30	46	48	50	25	38	9	40	34
	Hard Failures	8	3		8		4	2		1	1	2		1
	Alert limit triggered													

		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr	AL
	Row Labels	WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16	
1	210000345 (PCBA Analytical)							1						1	2
2	210000422 (PCBA PUMP)											1			2
3	279001810 (GPV) (Threadless armature)	7			8					1		1			4
4	289003207 (Assy Cartridge)		1		2		3				1				2
5	289001940 (Check Valve)	1	1		2		1	1							2
6	289003741 (ASSY, VALVE, VENT, QSM)		1												2
7	279001817 (ASSY, QSM, I2V)														2
8	279000705 (VALVE, SOLENOID, SOLVENT SELEC)														2
9	425000388 (.0787 ID, FLANGED, UP 30 SEAL,)														2
10	279001490 (ASSEMBLY, REDUCED HEIGHT I2V)														2

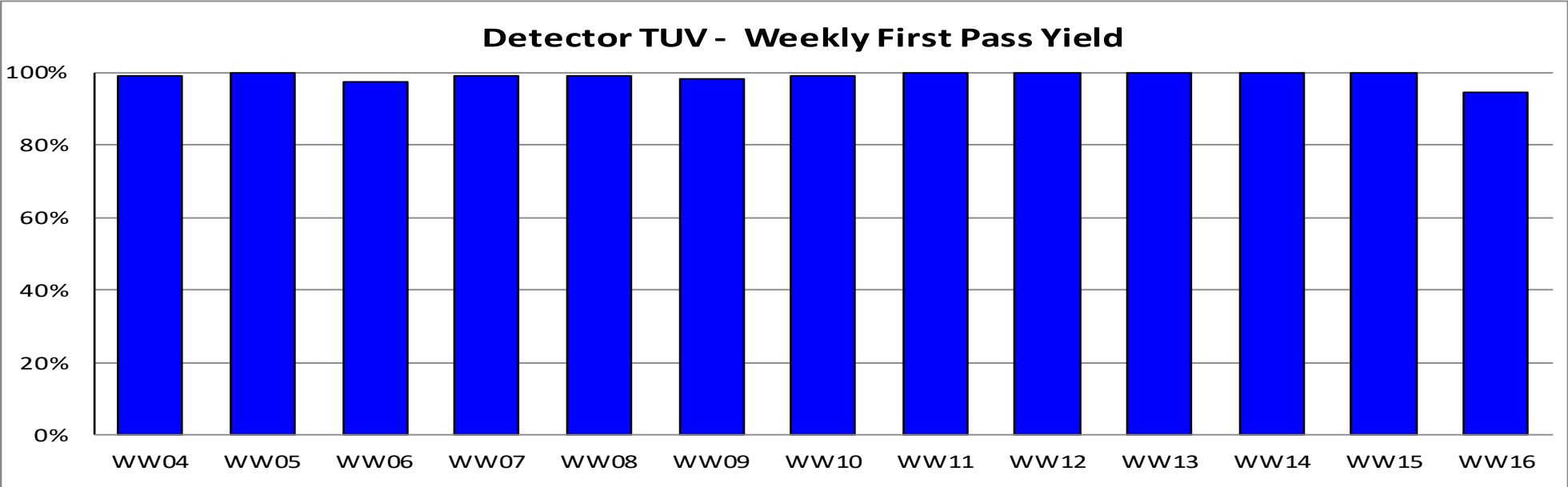
Weekly First Pass Yield – PDA (hard failure)



	17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
	WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
First Pass Yield	98%	100%	98%	99%	100%	98%	99%	99%	100%	94%	100%	97%	96%
Total Units Tested	93	46	88	82	99	98	103	71	92	33	93	36	24
Total Units Passed	91	46	86	81	99	96	102	70	92	31	93	35	23
Total Units Failures (hard)	2		2	1		2	1	1		2		1	1
Alert trigger limit													

		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr	AL
Row Labels		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16	
1	402000539 (PDA, 518 PIXEL, CMOS, SELECTIVE)			1	1		1							1	2
2	210000520 (PCBA CPU)												1		2
3	210000415 (PCBA Pers)						1		1		2				2
4	210001203 (PCB HAMAMATSU)							1							2
5	402000351 (Lamp)			1											2
6	279001105 (lamp power supply)	1													2
7	402000353 (lamp)	1													2
8	210000404 (PCBA Pers)														2
9	210001164 (PCBA Charge Amp)														2
10	WAT057552 (996 ORDER FILTER)														2

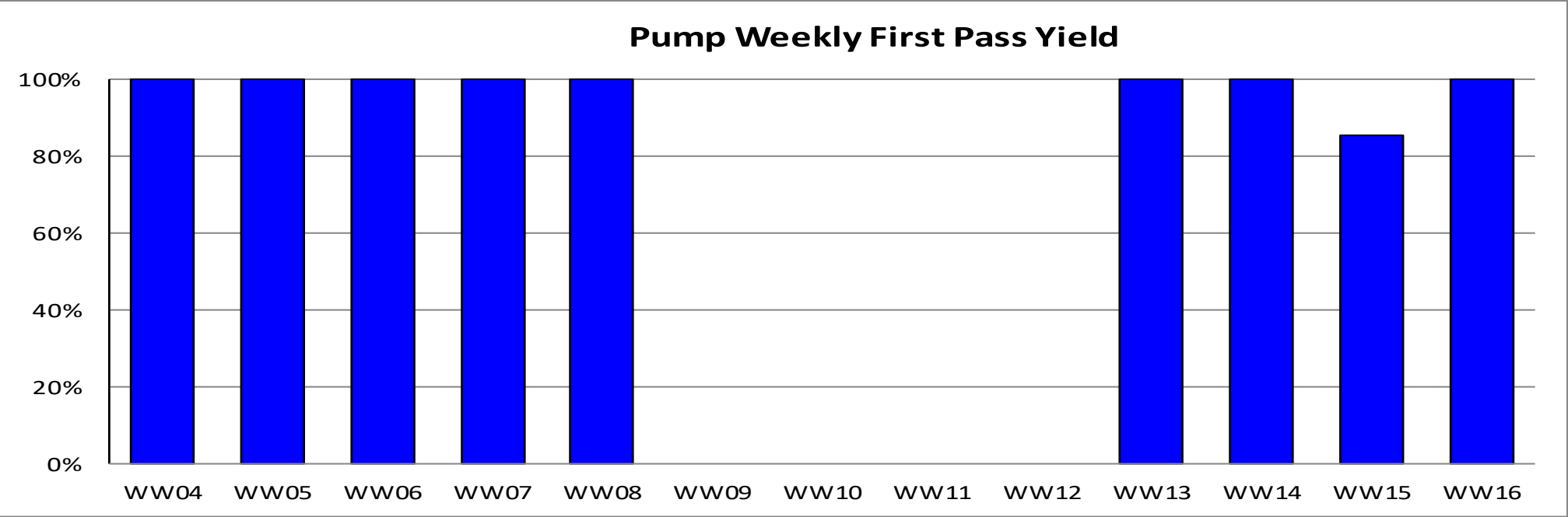
Weekly First Pass Yield – TUV (hard failure)



	17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
	WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
First Pass Yield	99%	100%	97%	99%	99%	98%	99%	100%	100%	100%	100%	100%	94%
Total Units Tested	123	60	109	93	100	119	89	71	10	28	84	40	36
Total Units Passed	122	60	106	92	99	117	88	71	10	28	84	40	34
Total Units Failed (Hard)	1		3	1	1	2	1						2
Alert trigger limit													

Row Labels		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr	AL
		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16	
1	279002660 (PCBA PRE-AMP 2489)			2										1	2
2	279001105 (Lamp Power Supply)						1							1	2
3	279001855 (ASSY,LIMIT,SENSOR,GRATING,DRIV)														2
4	WAT081268 (grating motor)							1							2
5	210000414 (PCBA, PERSO, TUV)						1								2
6	279002842 (DISPLAY, LCD)					1									2
7	210000355 (PCBA, PERSO, 2489 TUV)			1	1										2
8	210000520 (PCBA, CPU)														2
9	WAT240545 (SCR,2-56X03 HEX SOC HD SS)														2
10	279001923 (Filter wheel Assy)	1													2

Weekly First Pass Yield – Pump (hard failure)



	17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr
	WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16
First Pass Yield	100%	100%	100%	100%	100%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	100%	100%	86%	100%
Total Units Tested	15	9	12	18	3	0	0	0	0	5	15	7	10
Total Units Passed	15	9	12	18	3	0	0	0	0	5	15	6	10
Total Units Failures (Hard)												1	
Alert trigger limit													

		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr	AL
Row Labels		WW04	WW05	WW06	WW07	WW08	WW09	WW10	WW11	WW12	WW13	WW14	WW15	WW16	
1	21000057520 (PCB)												1		2
2	210000562 (PCBA pump controller)														2
3	210000548 (PCBA pump rear panel)														2
4	210000520 (PCBA CPU)														2
5	279000138 (power supply)														2
6	WAT207053 (PCBA pump controller)														2

Weekly First Pass Yield (hard failure) – in process

#	Part Number / Description	04'20	05'20	06'20	07'20	08'20	09'20	10'20	11'20	12'20	13'20	14'20	15'20	16'20	AL
		17-Jan	24-Jan	31-Jan	7-Feb	14-Feb	21-Feb	28-Feb	6-Mar	13-Mar	20-Mar	27-Mar	3-Apr	10-Apr	
1	210000425 (ASSY, PCB, PUMP DRIVER, ROHS)	1		1			1		2		1		1		2
2	210000429 (ASSY,PCB,DUAL,OPTICAL,SENSOR)												2		2
3	405001338 (Needle injector)	2		2		1					1				2
4	WATH-279000881-K (X-DUCER ASSY, HEAD MOUNTED)					1									2
5	279001049 (ASSY,STEP MOTOR CAROUSEL DRIVE)					1									2
6	420002695 (KEYPAD, ALLIANCE X)					1									2
7	402000539 (PDA, 518 PIXEL, CMOS, SELECTIV)														2
8	326000104 (DISPLAY LIQUID CRISTAL GRAPHIC)			1											2
9	279002755 (GEAR MOTOR, FILTER FLAG, BRASS)		2												2
10	WAT081330 (LCD WITH CABLE 2487)	1													2
11	279002660 (ASSY, PRE-AMP WITH CABLE 2489)	1													2
12	402000351 (ASSY, HB DEUTERIUM LAMP)	1													2
13	420000107 (KEYPAD,515 MODEL)														2
14	289003308 (ASSEMBLY, BODY FLOW CELL ANALY)														2
15	279001839 (ASSY,MOTOR,FILTER,WHEEL,DRIVE)														2

Weekly First Pass Yield (hard failure) - in process

For Reference (Part number and it's supplier)

#	Part Number / Description	Supplier
1	210000425 (ASSY, PCB, PUMP DRIVER, ROHS)	Flex Senai
2	210000429 (ASSY,PCB,DUAL,OPTICAL,SENSOR)	Flex Senai
3	405001338 (Needle injector)	WATERS
4	WATH-279000881-K (X-DUCER ASSY, HEAD MOUNTED)	DJ INSTRUMENTS
5	279001049 (ASSY,STEP MOTOR CAROUSEL DRIVE)	LIN ENGINEERING, INC
6	420002695 (KEYPAD, ALLIANCE X)	EASTPRINT INCORPORATED
7	402000539 (PDA, 518 PIXEL, CMOS, SELECTIV)	HAMAMATSU
8	326000104 (DISPLAY LIQUID CRISTAL GRAPHIC)	HANTRONIX
9	279002755 (GEAR MOTOR, FILTER FLAG, BRASS)	HAYDON KERK MOTION SOLUTIONS INC
10	WAT081330 (LCD WITH CABLE 2487)	Waters
11	279002660 (ASSY, PRE-AMP WITH CABLE 2489)	Flex Senai
12	402000351 (ASSY, HB DEUTERIUM LAMP)	HAMAMATSU
13	420000107 (KEYPAD,515 MODEL)	XYMOX TECHNOLOGIES INC
14	289003308 (ASSEMBLY, BODY FLOW CELL ANALY)	WATERS TECHNOLOGIES CORP.
15	279001839 (ASSY,MOTOR,FILTER,WHEEL,DRIVE)	HAYDON KERK MOTION SOLUTIONS INC

Investigation slides - Open issues (Final Testing)

Weekly First Pass Yield (hard failure)

WW15'20 PN: 210000425

Problem Statement	Investigation/ Possible Root Cause	Corrective Action/ Improvement																										
Part Number : 210000425 (ASSY, PCB, PUMP DRIVER, ROHS) Refer to below table for affected qty and fail code: <table><tr><th>WW</th><th>Qty failed</th><th>PCB SN</th></tr><tr><td rowspan="3">WW15</td><td rowspan="3">3</td><td>250220113M</td></tr><tr><td>220220283M</td></tr><tr><td>250220156M</td></tr></table> Date of Manufactured: Apr 2020 Reported site: Flex Kallang	WW	Qty failed	PCB SN	WW15	3	250220113M	220220283M	250220156M	<u>Investigation:</u> Technician visual checked all Connections –no visual issue. Technician replaced 210000425 (ASSY, PCB, PUMP DRIVER, ROHS) Retest and passed. Refer to below verification: <table><tr><th>WW</th><th>Instrument SN</th><th>PCB SN</th><th>Production Fail code</th><th>TE Verification</th></tr><tr><td rowspan="3">WW15</td><td>D20SM4901A</td><td>250220113M</td><td>Unable to Home</td><td>Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Plunger homing fault(1)</td></tr><tr><td>D20SM4908A</td><td>220220283M</td><td>Bio Chem Valve unable to work during Seal Wash</td><td>Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Unable to activate Seal Wash Pump Valve (no tick sound).</td></tr><tr><td>D20SM4910A</td><td>250220156M</td><td>Bio Chem Valve unable to work during Seal Wash</td><td>Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Unable to activate Seal Wash Pump Valve (no tick sound).</td></tr></table> Defective part transferred to Non-Conformance Area Supplier: Flex Senai <u>Root Cause</u> To be advised.	WW	Instrument SN	PCB SN	Production Fail code	TE Verification	WW15	D20SM4901A	250220113M	Unable to Home	Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Plunger homing fault(1)	D20SM4908A	220220283M	Bio Chem Valve unable to work during Seal Wash	Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Unable to activate Seal Wash Pump Valve (no tick sound).	D20SM4910A	250220156M	Bio Chem Valve unable to work during Seal Wash	Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Unable to activate Seal Wash Pump Valve (no tick sound).	<u>Corrective Action:</u> Flex Kallang: NA Supplier: TBA. Target to RTV on WW17’20
WW	Qty failed	PCB SN																										
WW15	3	250220113M																										
		220220283M																										
		250220156M																										
WW	Instrument SN	PCB SN	Production Fail code	TE Verification																								
WW15	D20SM4901A	250220113M	Unable to Home	Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Plunger homing fault(1)																								
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	D20SM4910A	250220156M	Bio Chem Valve unable to work during Seal Wash	Verified using KGU S/N : L16SM4371A. Result Failed. Findings: Unable to activate Seal Wash Pump Valve (no tick sound).																								

QSM+ Instrument Failed Final Test for “Input Prime with MeOH”

WW07'20
PN: 279001810

Problem Statement	Investigation/ Possible Root Cause	Corrective Action/ Improvement																																					
Instrument Part Number: 186015080 Issue: Instrument Failed Final Test for “Input Prime with MeOH”. Instrument Passed after GPV replaced. Affected qty: 4u (WW03), 7u (WW04), 8u (WW07) Refer to table on the right-hand side for Instrument SN Date of Manufactured: Jan and Feb 2020 Reported site: Flex Kallang	Investigation: • Technician visual checked all Connections –no issue. • Technician replaced ASSY, GPV, QSM (PN:279001810). And Retest instrument and passed. • Final Test Failure and Offline Verification by Flex TE - Results refer slide. • Joint verification of failures with WPPL on 13-Feb – Results refer slide. • Additional Reverification of GPVs failed in Feb’20 – In progress. 4M analysis <table><tr><th>Category</th><th>Possible Causes</th><th>Verification</th><th>Possible Cause (Y/ N)</th></tr><tr><td>Man</td><td>1) Untrained/ Uncertified operator</td><td>Verified Operator trained and certified.</td><td>N</td></tr><tr><td rowspan="2">Method</td><td>1) Missed to follow the ASP sequence.</td><td>Verified Operator following ASP sequence. Operator following sequence when to tighten the peak fittings</td><td>N</td></tr><tr><td>2) Missed to follow the TSP sequence.</td><td>Verified Operator following TSP sequence.</td><td>N</td></tr><tr><td rowspan="2">Material</td><td>1) GPV faulty</td><td>Verification in progress.</td><td>TBA</td></tr><tr><td>2) Tubing faulty</td><td>No abnormality and no form fit issue</td><td>N</td></tr><tr><td rowspan="2">Machine</td><td>1) Overdue calibration for torque tool.</td><td>- Verified torque tool is within calibration due date - Verified the torque reading is within range of 48.0 in-oz (+/-5 in-oz)</td><td>N</td></tr><tr><td>2) Overdue PM / Calibration for the tester.</td><td>- TE82943 ACQSDS tester PM and condition ok. - Detector Test Equipment PM and lamp hours condition ok. - Weighing Balance Calibrated and condition ok. - Chemicals 700005319 GPV Test solutions 5mL/1L of MeOH weekly replacement</td><td>N</td></tr></table> Containment Action: 1. New skid of GPV being used. <table><tr><th>Skid (Qty)</th><th>Remark</th></tr><tr><td>531221119 (150)</td><td>start using on 21 Jan 2020. All used up, no failure reported</td></tr><tr><td>531222517 (50)</td><td>start using on 04 Feb 2020. 1st instrument SN: B20QSP304A. Stop using on 11 Feb 2020.</td></tr><tr><td>531226666 (100)</td><td>start using on 11 Feb 2020.</td></tr></table> 2. Notified supplier of the high failure. Investigation in progress.	Category	Possible Causes	Verification	Possible Cause (Y/ N)	Man	1) Untrained/ Uncertified operator	Verified Operator trained and certified.	N	Method	1) Missed to follow the ASP sequence.	Verified Operator following ASP sequence. Operator following sequence when to tighten the peak fittings	N	2) Missed to follow the TSP sequence.	Verified Operator following TSP sequence.	N	Material	1) GPV faulty	Verification in progress.	TBA	2) Tubing faulty	No abnormality and no form fit issue	N	Machine	1) Overdue calibration for torque tool.	- Verified torque tool is within calibration due date - Verified the torque reading is within range of 48.0 in-oz (+/-5 in-oz)	N	2) Overdue PM / Calibration for the tester.	- TE82943 ACQSDS tester PM and condition ok. - Detector Test Equipment PM and lamp hours condition ok. - Weighing Balance Calibrated and condition ok. - Chemicals 700005319 GPV Test solutions 5mL/1L of MeOH weekly replacement	N	Skid (Qty)	Remark	531221119 (150)	start using on 21 Jan 2020. All used up, no failure reported	531222517 (50)	start using on 04 Feb 2020. 1st instrument SN: B20QSP304A. Stop using on 11 Feb 2020.	531226666 (100)	start using on 11 Feb 2020.	Action : RTV Status 5u shipped on 29 Jan 2020 (RMA# 08336) 6u shipped on 03 Feb 2020 (RMA# 08379) After Parker FA (for 11u) 6u – Parker returned, and Flex received. Flex completed control run. Result:6u Passed. 5u –Parker returned, and Flex received. Flex to do control run. Result: TBA WW07’20 (8u – production reported failed) 3u verified failed. 5u verified pass. 01 Apr 2020, Tony, Guan Yee and Joel joint visual and testing for the 3x failed unit. Result feedback (with photo) to Milford. 3u – RMA# provided by Parker. 3u - Fedex AWB# 7701 9330 0493 WW20’20 –3u to track prelim FA from Parker.
Category	Possible Causes	Verification	Possible Cause (Y/ N)																																				
Man	1) Untrained/ Uncertified operator	Verified Operator trained and certified.	N																																				
Method	1) Missed to follow the ASP sequence.	Verified Operator following ASP sequence. Operator following sequence when to tighten the peak fittings	N																																				
	2) Missed to follow the TSP sequence.	Verified Operator following TSP sequence.	N																																				
Material	1) GPV faulty	Verification in progress.	TBA																																				
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531226666 (100)	start using on 11 Feb 2020.																																						

GPV investigation

SQE: Tony Shieh

Date: 1st April 2020

Test results & Observations

Channel	SN 76465			Remark
A	P	P	F	
B	P	P	P	Burr



Channel	SN 76485			Remark
C	P	P	F	Thread damage
D	F	P	P	Leakage



Re-seat and retest.

Channel	SN 76465	Remark
A	F	
B	P	Burr

Channel	SN 76485	Remark
C	F	Thread damage
D	P	Leakage

For Channel D, since we are seeing leaking, I've inform the technician to change the tubing. After changing the tube, we still seeing the leakage



Waters

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Weekly First Pass Yield (hard failure)

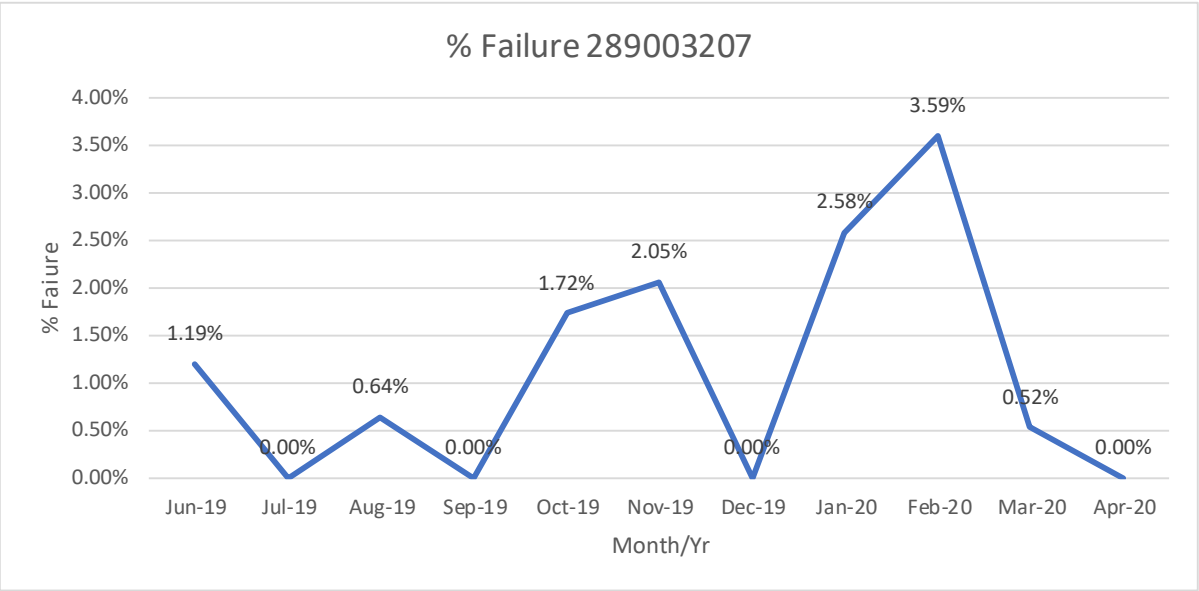
WW09'20
PN: 289003207

Problem Statement	Investigation/ Possible Root Cause	Corrective Action/ Improvement																																
Part Number : 289003207 (ASSY, CARTRIDGE, I2V, PLATE CL) Instrument Part Number: 186015080, 186015001 Refer to below table for affected qty and fail code: <table><tr><th>WW</th><th>Qty failed</th><th>Date code</th><th>Fail code</th></tr><tr><td rowspan="3">WW09</td><td rowspan="3">3</td><td rowspan="3">Jan 15, 2020</td><td>Dynamic Leak test</td></tr><tr><td>Failed Static Leak Pump A test</td></tr><tr><td>Failed Static Leak Pump A test</td></tr></table> Date of Manufactured: Jan, Feb 2020 Reported site: Flex Kallang	WW	Qty failed	Date code	Fail code	WW09	3	Jan 15, 2020	Dynamic Leak test	Failed Static Leak Pump A test	Failed Static Leak Pump A test	Investigation: Technician visual checked all Connections – no visual issue. The technician repeated the ‘leak test’ for 2 times and the actual readings were recorded and verified against the Specification. If the actual readings are confirmed out of spec, the Technician replaced ASSY, CARTRIDGE, I2V, PLATE CL (PN:289003207). If instrument retested and passed, the part (PN:289003207) is transferred to Non-Conformance Area. Refer to below verification: <table><tr><th>WW</th><th>Instrument SN</th><th>Date code</th><th>Fail code</th><th>Actual Value</th><th>TE Verification</th></tr><tr><td rowspan="3">WW09</td><td>B20QSP360A</td><td>Jan 15, 2020</td><td>Dynamic leak test (Spec: 5 to 149.9 nl/min)</td><td>(1) 4.0nL/min</td><td>Verified using KGU S/N: B20QSP378A. Result failed. Dynamic leak test failed.</td></tr><tr><td>B20UPB898A</td><td>Jan 15, 2020</td><td>Failed Static Leak Pump A test (Spec: 1 to 200 psig/min)</td><td>(1) 305.8psig/min</td><td>Verified using KGU S/N: C20QSP449A. Result failed. Dynamic leak test failed.</td></tr><tr><td>B20UPB899A</td><td>Jan 15, 2020</td><td>Failed Static Leak Pump A test (Spec: 1 to 200 psig/min)</td><td>(1) 450.3psig/min</td><td>Verified using KGU S/N: C20QSP449A. Result failed. Dynamic leak test failed.</td></tr></table> Supplier: Waters Root Cause To be advised.	WW	Instrument SN	Date code	Fail code	Actual Value	TE Verification	WW09	B20QSP360A	Jan 15, 2020	Dynamic leak test (Spec: 5 to 149.9 nl/min)	(1) 4.0nL/min	Verified using KGU S/N: B20QSP378A. Result failed. Dynamic leak test failed.	B20UPB898A	Jan 15, 2020	Failed Static Leak Pump A test (Spec: 1 to 200 psig/min)	(1) 305.8psig/min	Verified using KGU S/N: C20QSP449A. Result failed. Dynamic leak test failed.	B20UPB899A	Jan 15, 2020	Failed Static Leak Pump A test (Spec: 1 to 200 psig/min)	(1) 450.3psig/min	Verified using KGU S/N: C20QSP449A. Result failed. Dynamic leak test failed.	Corrective Action: Flex Kallang: NA Supplier: TBA 3u – RMA# provided. RTV on 08/Apr Fedex AWB# 7701 9334 1107 3u - WW20’20 – to track prelim FA from Milford.
WW	Qty failed	Date code	Fail code																															
WW09	3	Jan 15, 2020	Dynamic Leak test																															
			Failed Static Leak Pump A test																															
			Failed Static Leak Pump A test																															
WW	Instrument SN	Date code	Fail code	Actual Value	TE Verification																													
WW09	B20QSP360A	Jan 15, 2020	Dynamic leak test (Spec: 5 to 149.9 nl/min)	(1) 4.0nL/min	Verified using KGU S/N: B20QSP378A. Result failed. Dynamic leak test failed.																													
	B20UPB898A	Jan 15, 2020	Failed Static Leak Pump A test (Spec: 1 to 200 psig/min)	(1) 305.8psig/min	Verified using KGU S/N: C20QSP449A. Result failed. Dynamic leak test failed.																													
	B20UPB899A	Jan 15, 2020	Failed Static Leak Pump A test (Spec: 1 to 200 psig/min)	(1) 450.3psig/min	Verified using KGU S/N: C20QSP449A. Result failed. Dynamic leak test failed.																													

Weekly First Pass Yield (hard failure)

PN: 289003207

Month	Qty used (289003207)	Qty Failure	% Failed	Remarks
Jun-19	168	2	1.19%	(1) Dynamic Leak Test Failed 1) 389.0nL/min 2) 408.0nL/min. Good spec 1 to 200nL/min (2) Dynamic Leak Test Failed 1) 421.0nL/min 2) 439.0nL/min. Good spec 1 to 200nL/min
Jul-19	147	0	0.00%	NA
Aug-19	157	1	0.64%	(1) Failed Dynamic Leak Test, Failed leak rate 266.0nL/min. Good spec 5 to 149.9nL/min
Sep-19	170	0	0.00%	NA
Oct-19	232	4	1.72%	(1) Failed Dynamic Leak Test. Failed Spec 1) 1353.0nL/min 2) 1408.0nL/min. Good spec 5 to 149.9nL/min (2) Failed Static Leak Pump A Test. Failed Spec 1) 0.0psig/min 2) 366.3psig/min. Good spec 1 to 200psig/min (3) Static Leak Pump B failed decay rate 1) 0.0psig/min 2) 0.0psig/min. Good spec 1 to 200psig/min (4) Failed Dynamic Leak Test (Primary). Failed spec 1) 1520.0nL/min 2) 1527.0nL/min. Good spec 5 to 149.9nL/min.
Nov-19	146	3	2.05%	(1) Test Input D to A prime with MeOH failed (2) Dynamic Leak Test failed 1) 311.0nL/min 2) 315.0nL/min. Good spec 5 to 149.9nL/min (3) Failed Dynamic Leak 1) 171.0nL/min 2) 166.0nL/min. Good spec 5 to 149.9nL/min
Dec-19	66	0	0.00%	NA
Jan-20	194	5	2.58%	(1) Test Static Leak Pump B failed 1) 0.0psig/min 2) 9788.3psig/min. Good spec 1 to 200psig/min (2) Dynamic Leak test failed 1) 589.0nL/min 2) 578.0nL/min. Good spec 5 to 149.9nL/min (3) Dynamic Leak test failed 1) 278.0nL/min 2) 297.0nL/min. Good spec 5 to 149.9nL/min (4) Dynamic Leak test failed 1) 1650.0nL/min 2) 1644.0nL/min. Good spec 5 to 149.9nL/min (5) Dynamic Leak test failed 1) 1722.0nL/min 2) 1653.0nL/min. Good spec 5 to 149.9nL/min
Feb-20	167	6	3.59%	(1) Dynamic Leak test (Primary) failed spec 1) -80.0nL/min 2) -75.0nL/min. Good spec: 5 to 149.9nL/min (2) Dynamic Leak test failed 1) 596.0nL/min 2) 586.0nL/min. Good spec: 5 to 149.9nL/min (3) Dynamic Leak test (Prime) Failed spec 1) 259.0nL/min 2) 271.0nL/min. Good spec: 5 to 149.9nL/min (4) Dynamic Leak test failed 1) 4.0nL/min. Good spec: 5 to 149.9nL/min (5) Failed Static Leak Pump A test 1) 305.8psig/min. Good spec: 1 to 200 psig/min (6) Failed Static Leak Pump A test 1) 450.3psig/min. Good spec: 1 to 200 psig/min
Mar-20	191	1	0.52%	(1) Dynamic Leak test failed
Apr-20	101	0	0.00%	NA
TOTAL	1739	22		



Weekly First Pass Yield (hard failure)

WW22'19 - 279002643

Problem Statement

Reported by Flex Kallang

Reported Date: 28, 29 May 2019

Instrument Part Number: 186248900

Instrument SN: E1987E072A,
E1987E109A, E1987E117

Affected Qty: 3u

Problem: Missing bad sensor

Date of Manufactured: May 2019

Reported site: Flex Kallang

The defective sample:



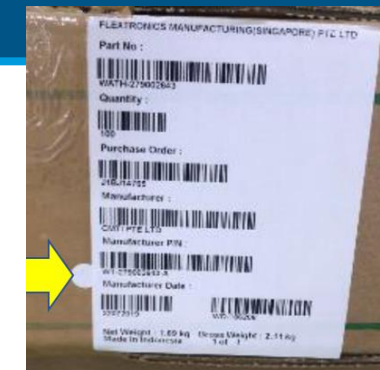
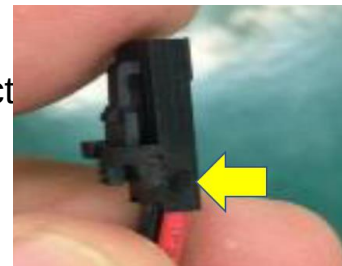
Investigation/ Possible Root Cause

Containment Actions (from CMTi):

500pcs of checked E-test. Result – no reject

Marking on part - a black dot

Marking on carton box – a white sticker.



Root Cause (from CMTi):

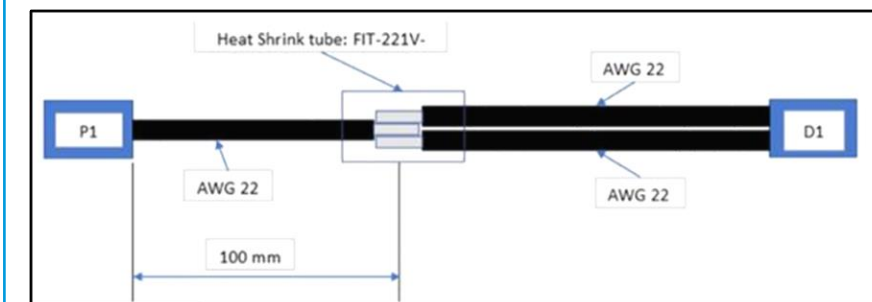
	Possible Causes	Verification	Possible Cause (Y / N)	Proposed Actions
Man	Lacking of crimping operator knowledge & skill	Current crimping operators are qualified operator through proper training	NO	N/A
Method	1.It's might due to incorrect wires position. Insulation wires are in line.	Wires position are correct	NO	N/A
	2. It's might due to over tension at crimp insulation support area due to current terminal use is not recommend for double crimping	2. Strand wire at insulation support area found broken due crimping two wires with such diameters will have high risk in create over tension to the wire	YES	Propose to change double crimping to single crimping with solder splice
Machine	1. It's might due to improper machine setting	1. Crimping result was within specification during setting and production process testing data.	NO	N/A
	2. It's might due to machine machine was out of calibration	2. Regular maintainance for crimping machine has conducted accordingly.	NO	N/A
Material	1. It's might due to wrong use terminal / contact	1. Terminal use / contact use is correct BOM	NO	N/A
Material	2. It's might due to wrong use wires size	1. Wires use is correct according to BOM	NO	N/A

Root cause: Each insulating wire diameter is 1.44mm and two insulating wires put together is 2.88mm. But the Terminal is only recommended for Wire insulator diameter 1.63mm max. Therefore, the product NG was due to crimping 2 wires with this Terminal resulted in over tension to the insulation support area of the wire.”

Corrective Action/ Improvement

Corrective Action (from CMTi):

- For permanent fix, CMTi has put up proposal to change two crimping wires to one crimping wire with solder splice.
- CMTi proposal package sent on WW34'19.
- CMTi provided revised illustration with dimensions per Waters request.
- CMTi to get ready 5 x FA samples by 22 Nov 2019



- Prelim drawing received. Reference- ECR9233373.

WW17'20 – New part received and to be used in WW17 after old part consumed.

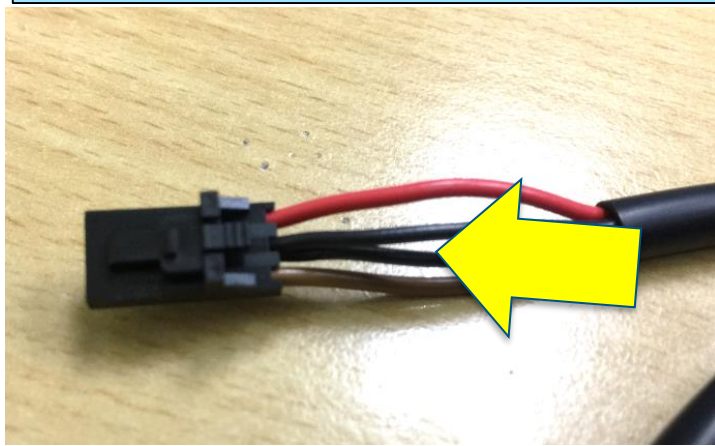
Weekly First Pass Yield (hard failure)

PN: 279002643

CMTI submitted 5 x samples on 22 Nov 2019:
PN: 279002643 (ASSY, LIMIT SENSOR GRATING DRI)

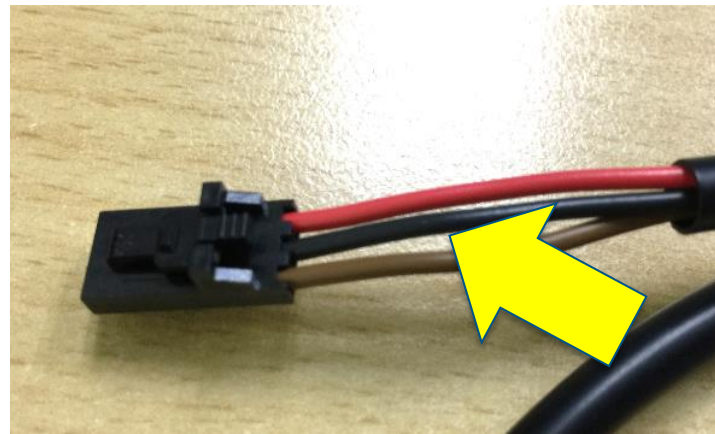
279002643 (ASSY, LIMIT SENSOR GRATING DRI)

Rev A



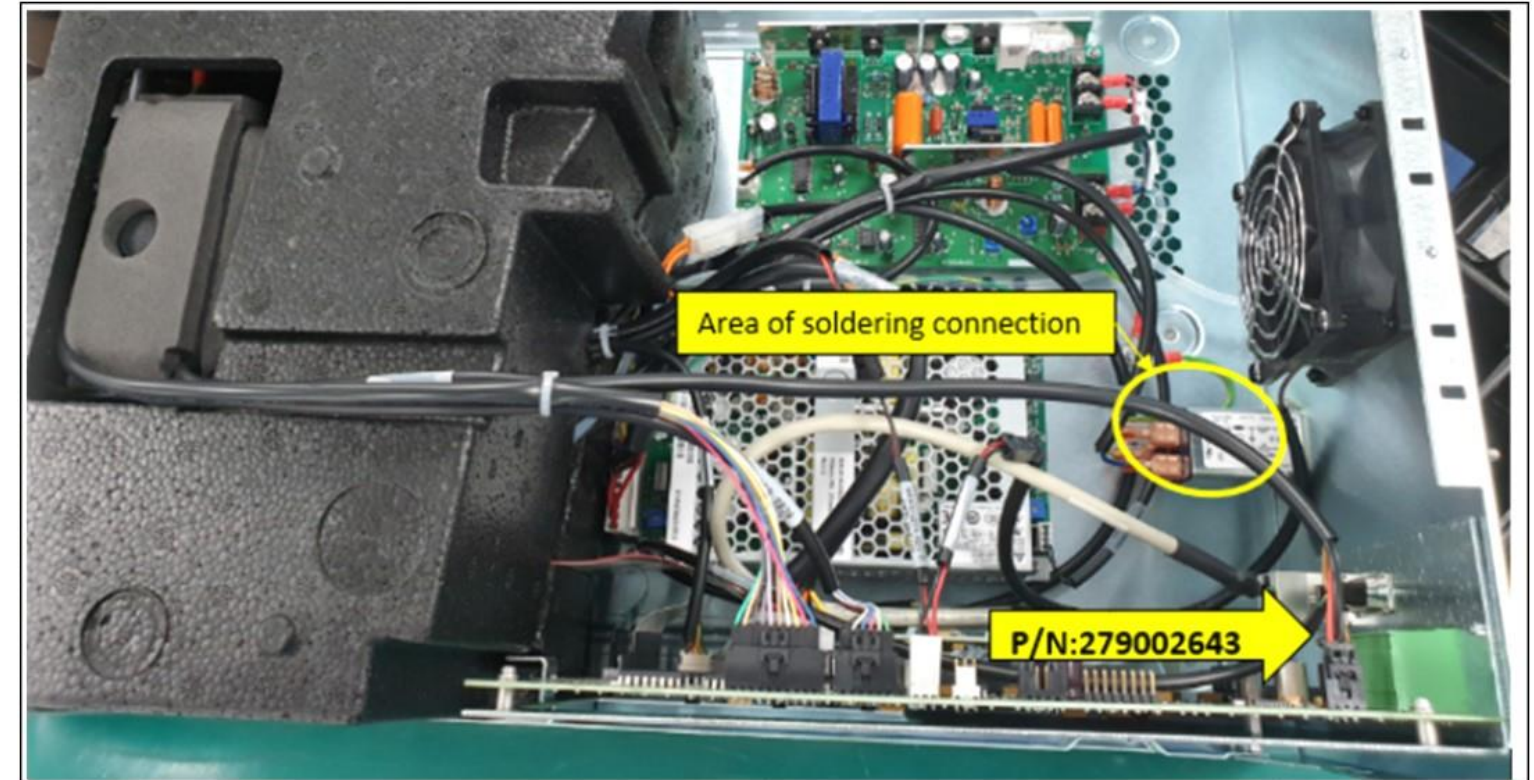
Two wires to the center terminal.

Rev B



One wire to the center terminal after apply "one crimping wire with solder splice"

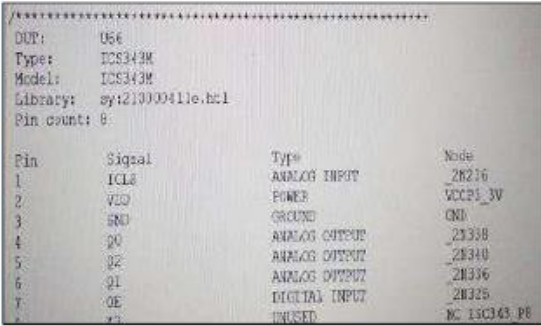
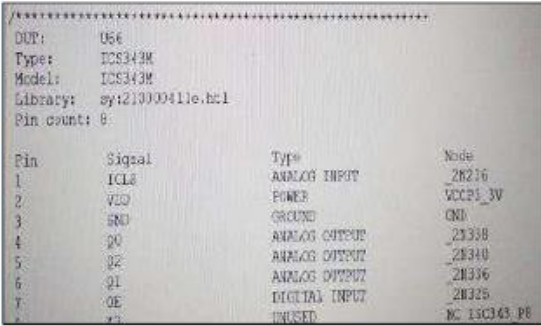
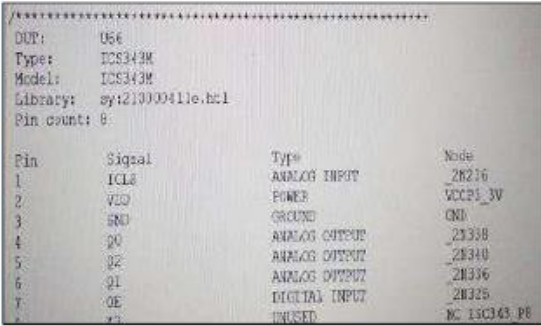
Review the Instrument assembly



Result - No issue for the Form Fit.



Model:210000411-F
“Hang at Alliance Logo”

Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action									
PN : WATH-210000411 Problem: Hang at Alliance logo 	1. Flex Flow History (Prime) for Serial Number: 030919203M -ICT-Passed, -FFT-Passed - Frequency Checking for U66 Manual recording of - result measurement for meet spec limit. 2. RMA board 030919203M review - Remove U53 to swap with a known good board – RMA bd still failed. - Remove U66 to swap with a known good board – RMA bd passed. - Conclusion: U66 component issue as bad U66 component not able to read. 3. Investigation <table><tr><th>IC Programming</th><th>ICT Test</th><th>FT Test</th></tr><tr><td> BP Programmer 1710 </td><td> Genrad 2287L </td><td> Alliance Tester </td></tr><tr><td> Firmware Programming Process: Firmware programming – Off line programming. Verification 1: Programmed log file – Checksum  Job Summary report(Programmed log file), for checksum validation Verification 2: White dotting on IC body after programmed.  Before program  After program Manual dependence process, risk potential on IC without program escapee to next process. </td><td> In Circuit Test Process: U66 Pins checking : Analog/Digital Test Verification: Pins measurement log file  No firmware (checksum) checking, can't inspect firmware condition </td><td> Functional Test Process: U66 booting test Verification1: Alliance logo display  Verification 2: U66 Frequency measurement => Manual measurement and data collection  Manual measurement  Manual data record Manual dependence process, manual Logo display inspection and measurement data collection. </td></tr></table>	IC Programming	ICT Test	FT Test	BP Programmer 1710 	Genrad 2287L 	Alliance Tester 	Firmware Programming Process: Firmware programming – Off line programming. Verification 1: Programmed log file – Checksum  Job Summary report(Programmed log file), for checksum validation Verification 2: White dotting on IC body after programmed.  Before program  After program Manual dependence process, risk potential on IC without program escapee to next process.	In Circuit Test Process: U66 Pins checking : Analog/Digital Test Verification: Pins measurement log file  No firmware (checksum) checking, can't inspect firmware condition	Functional Test Process: U66 booting test Verification1: Alliance logo display  Verification 2: U66 Frequency measurement => Manual measurement and data collection  Manual measurement  Manual data record Manual dependence process, manual Logo display inspection and measurement data collection.	<u>Corrective Action:</u> 1. To implement 2nd time offline verification at U66 offline programming station. (Implemented: 14 Nov 19 - <u>First S/N 111119159M</u>) 2a. To send U66 to manufacturer for failure analysis. Status update:  - Supplier result - samples were not defective. (Completed: 16 Dec 19) 2b. Senai to simulate on current offline BP programmer, any possibility to corrupt the IC (U66) with raw components and 4pcs NTF. - Senai result: unable to duplicate the failure. 3. Per discuss with WPPL Engineering, the U66 clock frequency measurement at ICT proposal is not feasible. WW09'20 – Flex Senai feedback: not feasible for 'stand alone' testing fixture proposal.
IC Programming	ICT Test	FT Test									
BP Programmer 1710 	Genrad 2287L 	Alliance Tester 									
Firmware Programming Process: Firmware programming – Off line programming. Verification 1: Programmed log file – Checksum  Job Summary report(Programmed log file), for checksum validation Verification 2: White dotting on IC body after programmed.  Before program  After program Manual dependence process, risk potential on IC without program escapee to next process.	In Circuit Test Process: U66 Pins checking : Analog/Digital Test Verification: Pins measurement log file  No firmware (checksum) checking, can't inspect firmware condition	Functional Test Process: U66 booting test Verification1: Alliance logo display  Verification 2: U66 Frequency measurement => Manual measurement and data collection  Manual measurement  Manual data record Manual dependence process, manual Logo display inspection and measurement data collection.									

Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action
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PN : WATH-210000429-A

Problem:
Hang at Alliance logo



3. Investigation (Continue)

U66 Improvement Plan

Items	IC Programming	ICT Test	FT Test
	To have second time checksum verification for offline programming. ⇒ Current practice with one time checksum Verification (after programmed) Select "Program" tab to perform programming ⇒ Implement second time checksum verification using "Verify" function. Select "Verify" tab to re-validate the checksum #1. The second verification process will be conduct by different person. #2. Each programmed log report (First and second time verification) to follow MO number for record. Implement target: ⇒ 14 Nov 2019, next MO ZWT005456, 32pcs	To implement U66 clock frequency measurement to verify program condition. # Pin 4 – CLK 1 : Frequency 24MHz # Pin 5 – CLK 2 : Frequency 20MHz # Pin 6 – CLK 3 : Frequency 20MHz These Clock Frequency Pins to determine program condition. If frequency not in range, mean program corrupted or without program. # This process previously implemented at FT station with manual measurement and data collection. # Move to ICT station with auto measurement and data collection (Data store into test log). Implement target: ⇒ 16 Dec 2019 to complete fixture fabrication ⇒ SBR lot to submit for qualification before release new implement for mass production	Propose to improve GTS test coverage to have Alliance logo display check. Request sent on the date 19 Aug via OESR Alliance Tester with Alliance logo display panel GTS tester without Alliance logo display panel # Model 411 qualified to test at GTS but due to limitation on Alliance logo check, temporary still using Alliance tester for testing. Implement target: => Pending OESR update

Off Line programming Verification:

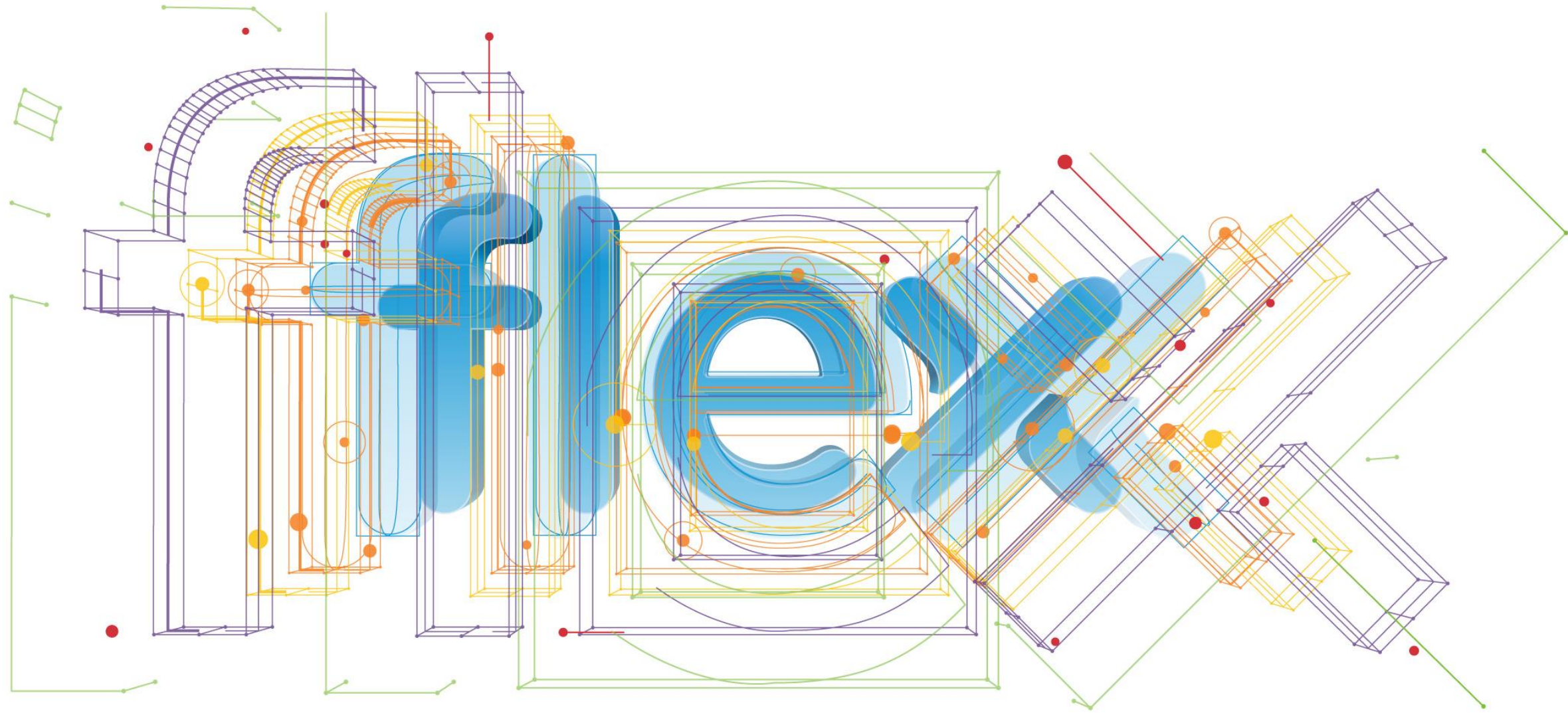
U66 DATE	MO#	1ST VERIFICATION TESTED	PASS	FAIL	U66 DATE	MO#	2ND VERIFICATION TESTED	PASS	FAIL
12-Nov-19	ZWT005456	32	32	0	14-Nov-19	ZWT005456	32	32	0
21-Nov-19	ZWT005487	29	29	0	25-Nov-19	ZWT005487	29	29	0
2-Dec-19	ZWT005507	91	91	0	2-Dec-19	ZWT005507	91	91	0
2-Dec-19	ZWT005509	32	32	0	2-Dec-19	ZWT005509	32	32	0
12-Dec-19	ZWT005571	162	162	0	12-Dec-19	ZWT005571	162	162	0
17-Dec-19	ZWT005569	143	143	0	18-Dec-19	ZWT005569	143	143	0
30-Dec-19	ZWT005598	33	33	0	30-Dec-19	ZWT005598	33	33	0
9-Jan-20	ZWT005610	208	208	0	9-Jan-20	ZWT005610	208	208	0
16-Jan-20	ZWT005642	90	90	0	9-Jan-20	ZWT005642	90	90	0
16-Jan-20	ZWT005662	28	28	0	17-Jan-20	ZWT005662	28	28	0
23-Jan-20	ZWT005773	133	133	0	23-Jan-20	ZWT005773	133	133	0
29-Jan-20	ZWT005746	100	100	0	29-Jan-20	ZWT005746	100	100	0
	ZWT005703	32	32	0		ZWT005703	32	32	0

Containment action:

- Senai to carry out FCT testing twice for each board & record down. (Implemented on 6th Nov 19).

As of WW11'20,
2nd time verified at Programming = 1545u.
Reject found = 0.

See above slide



Thank You

WW42'19 – 210000416 PCBA
Needle Malfunction Failure



Model:210000416-K
"Needle Malfunction"

Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action																																																																						
Reported Date: WW22 (2019) PN : WATH-210000416-K Needle Malfunction NCMR-SKW-00013220-270819554M NCMR-SKW-00013223-270819615M	1. <u>Flex Flow History:</u> NCMR-SKW-00013223-270819615M-ICT & FCT (Passed) NCMR-SKW-00013220-270819554M-ICT & FCT (Passed) 2. <u>Return unit – go thru Alliance Instrument Level Verification:</u> NCMR-SKW-00013223-270819615M-Failed (Needle Malfunction) NCMR-SKW-00013220-270819554M-Failed (Needle Malfunction) 3. <u>Return unit re-tested ICT & FCT:</u> NCMR-SKW-00013223-270819615M-ICT & FCT (Passed) NCMR-SKW-00013220-270819554M-ICT (Failed-U7) 4. <u>Investigation</u> <u>Unit 1: 270819615M</u> <table><tr><th>Items</th><th>Description</th><th>Actions</th><th>ICT</th><th>FT</th><th>Alliance Instrument</th><th>Remarks</th></tr><tr><td>Pre FA</td><td>First level verification</td><td>Re test to duplicate the failures</td><td>Passed</td><td>Passed</td><td>Failed Needle malfunction</td><td>Failure duplicated and suspect U13 defective</td></tr><tr><td>1st FA</td><td>Component replacement</td><td>To replace new U13</td><td>Passed</td><td>Passed</td><td>Passed</td><td>Test passed after replaced U13</td></tr><tr><td>2nd FA</td><td>Defective component justification</td><td>Remount suspect defective U13</td><td>Passed</td><td>Passed</td><td>Failed Needle malfunction</td><td>Re-verified, U13 defective. IC to send for FA</td></tr><tr><td>3rd FA</td><td>Replaced known good IC</td><td>Replaced known good IC for cycle retest (5 times)</td><td>5 X Passed</td><td>5 X Passed</td><td>5 X Passed</td><td>5 times re test on each station with passed result</td></tr></table> <u>Unit 2: 270819554M</u> <table><tr><th>Items</th><th>Description</th><th>Actions</th><th>ICT</th><th>FT</th><th>Alliance Instrument</th><th>Remarks</th></tr><tr><td>Pre FA</td><td>First level verification</td><td>Re test to duplicate the failures</td><td>Failed #Pin no output for U7 - 24</td><td>Failed Fluid Driver malfunction</td><td>Failed Needle malfunction</td><td>Failure duplicated and suspect U7 defective</td></tr><tr><td>1st FA</td><td>Component replacement</td><td>To replace new U7</td><td>Passed</td><td>Passed</td><td>Passed</td><td>Test passed after replaced U7</td></tr><tr><td>2nd FA</td><td>Defective component justification</td><td>Remount suspect defective U7</td><td>Failed #Pin no output for U7 - 24</td><td>Failed Fluid Driver malfunction</td><td>Failed Needle malfunction</td><td>Re-verified, U7 defective. IC to send for FA</td></tr><tr><td>3rd FA</td><td>Replaced known good IC</td><td>Replaced known good IC for cycle retest (5 times)</td><td>5 X Passed</td><td>5 X Passed</td><td>5 X Passed</td><td>5 times re test on each station with passed result</td></tr></table>	Items	Description	Actions	ICT	FT	Alliance Instrument	Remarks	Pre FA	First level verification	Re test to duplicate the failures	Passed	Passed	Failed Needle malfunction	Failure duplicated and suspect U13 defective	1 st FA	Component replacement	To replace new U13	Passed	Passed	Passed	Test passed after replaced U13	2 nd FA	Defective component justification	Remount suspect defective U13	Passed	Passed	Failed Needle malfunction	Re-verified, U13 defective. IC to send for FA	3 rd FA	Replaced known good IC	Replaced known good IC for cycle retest (5 times)	5 X Passed	5 X Passed	5 X Passed	5 times re test on each station with passed result	Items	Description	Actions	ICT	FT	Alliance Instrument	Remarks	Pre FA	First level verification	Re test to duplicate the failures	Failed #Pin no output for U7 - 24	Failed Fluid Driver malfunction	Failed Needle malfunction	Failure duplicated and suspect U7 defective	1 st FA	Component replacement	To replace new U7	Passed	Passed	Passed	Test passed after replaced U7	2 nd FA	Defective component justification	Remount suspect defective U7	Failed #Pin no output for U7 - 24	Failed Fluid Driver malfunction	Failed Needle malfunction	Re-verified, U7 defective. IC to send for FA	3 rd FA	Replaced known good IC	Replaced known good IC for cycle retest (5 times)	5 X Passed	5 X Passed	5 X Passed	5 times re test on each station with passed result	<u>Corrective Action</u> To send the defective U13 component for FA. Update: FA report received. Supplier result: FA concluded electro-thermal damage due to electrical overstress. Senai Action: -Machine grounding checked & component mounting reflow profile reviewed and temperature during removal is within specification. -Continue to measure Pin 7 and Pin 8 to check for any internal component short To send the defective U7 component for FA. Update: FA report received. Supplier result: NTF (destructive test) Senai Action: -NA as no more sample to send supplier. -Continue to use oscilloscope to check the output voltage connecting to J8 pin 3
Items	Description	Actions	ICT	FT	Alliance Instrument	Remarks																																																																		
Pre FA	First level verification	Re test to duplicate the failures	Passed	Passed	Failed Needle malfunction	Failure duplicated and suspect U13 defective																																																																		
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210000416-K - “Needle Malfunction”

WW42'19 – 210000416 PCBA
Needle Malfunction Failure

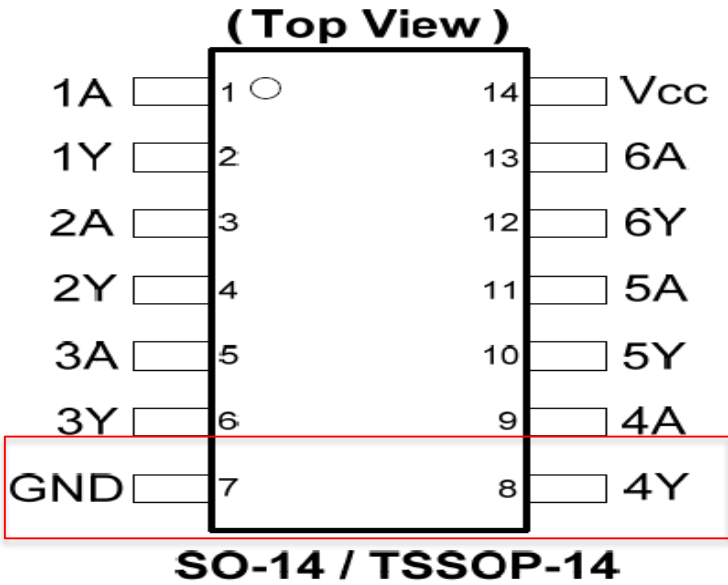
Problem Statement	Investigation/Possible Root Cause	Corrective Action/Improvement action
Reported Date: WW22 (2019) PN : WATH-210000416-K Needle Malfunction NCMR-SKW-00013220-270819554M NCMR-SKW-00013223-270819615M	Other info: - Part Number: WATH-WT-332000539, MPN: MC74HC14ADR2G (On Semi) BOM Quantity: 3per (U12,U13 & U16) - Part Number: WATH-WT-332000772, MPN:A3982SLBTR-T BOM Quantity:7per (U1,U2,U3,U4,U5,U6 & U7) <u>Component level analysis by Seia CFT members</u> - for U13 & U7 component failure-see next slides <u>Containment Action:</u> Proposal: Senai to generate WO to measure the current WIP and RMA a) U13 – measure Pin 7 and Pin 8 to check for any internal component short b) U7 – Use oscilloscope to check the output voltage connecting to J8 pin 3 (to start 18 Dec Nov 2019) Update: 1st PCBA SN: 301219376M Qty tested: 873pcs (as of WW11'20), 0 failure.	Please refer above slide

Component level study

U13 Information

MPN: 74HC14 (Hex inverter)

Application: General Purpose Logic function



Pin Descriptions

Pin Number	Pin Name	Function
1	1A	Data Input
2	1Y	Data Output
3	2A	Data Input
4	2Y	Data Output
5	3A	Data Input
6	3Y	Data Output
7	GND	Ground
8	4Y	Data Output
9	4A	Data Input
10	5Y	Data Output
11	5A	Data Input
12	6Y	Data Output
13	6A	Data Input
14	Vcc	Supply Voltage

Based on FA, found U13 pin 7 and 8 short to GND. IC internal circuit short

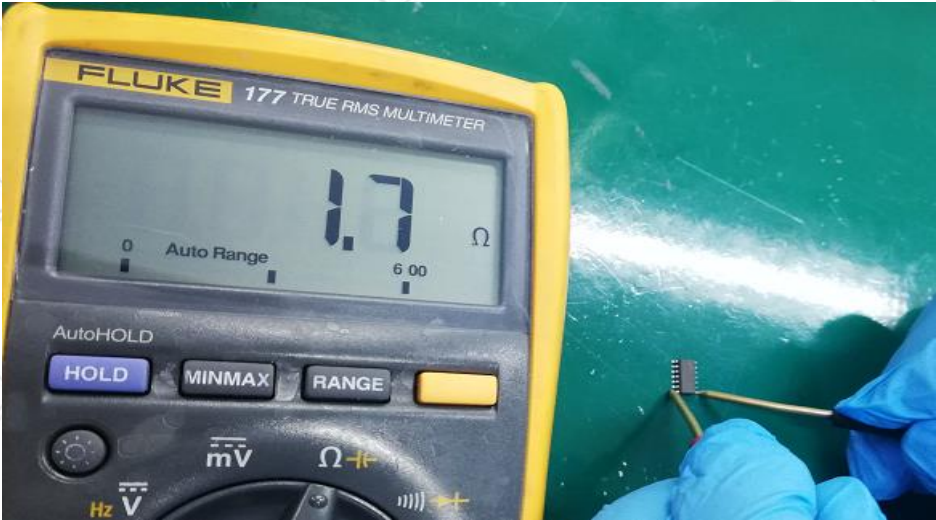
- Pin 7 => GND
- Pin 8 => 4Y (Data output)

Thus, request send back to vendor for further checking

“Good” IC



“NG” IC



- “Good” IC, resistance with 366K ohm
- “NG” IC. Resistance with 1.7 ohm. Short to GND

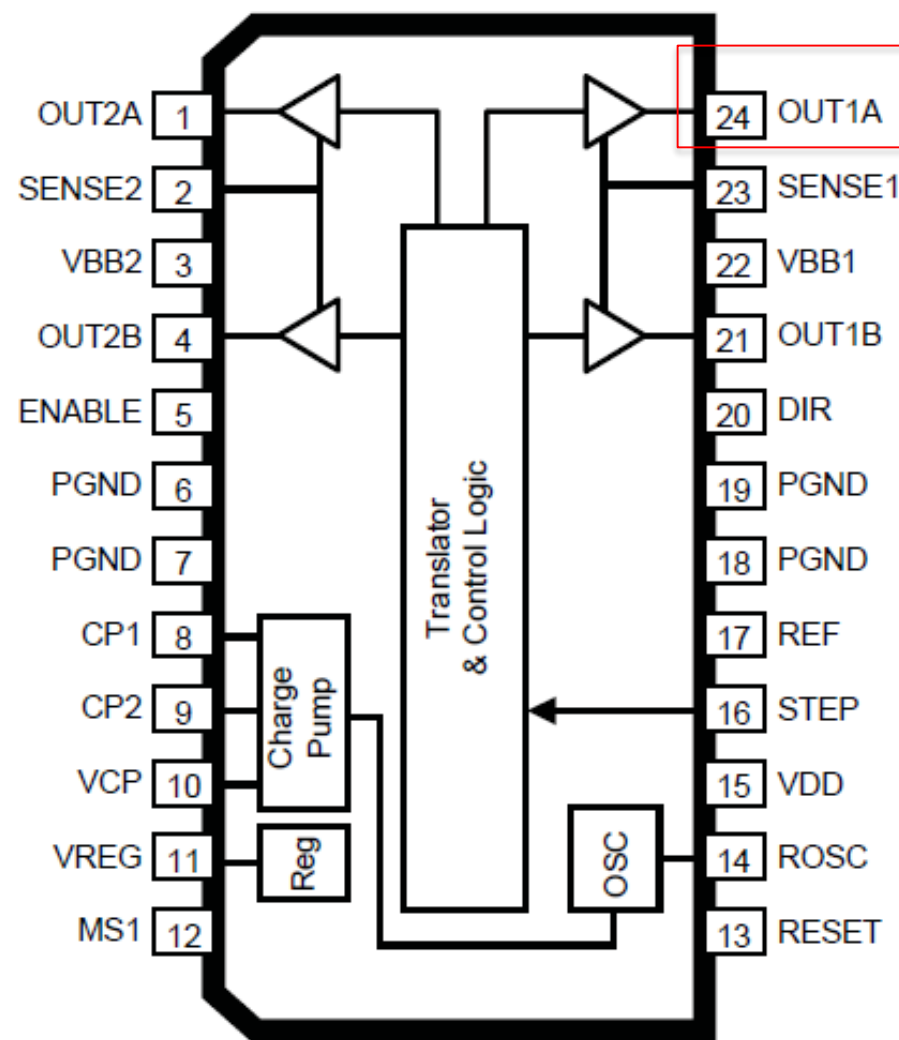
Component level study

U7 Information

MPN: A3982 (DMOS stepper motor driver)

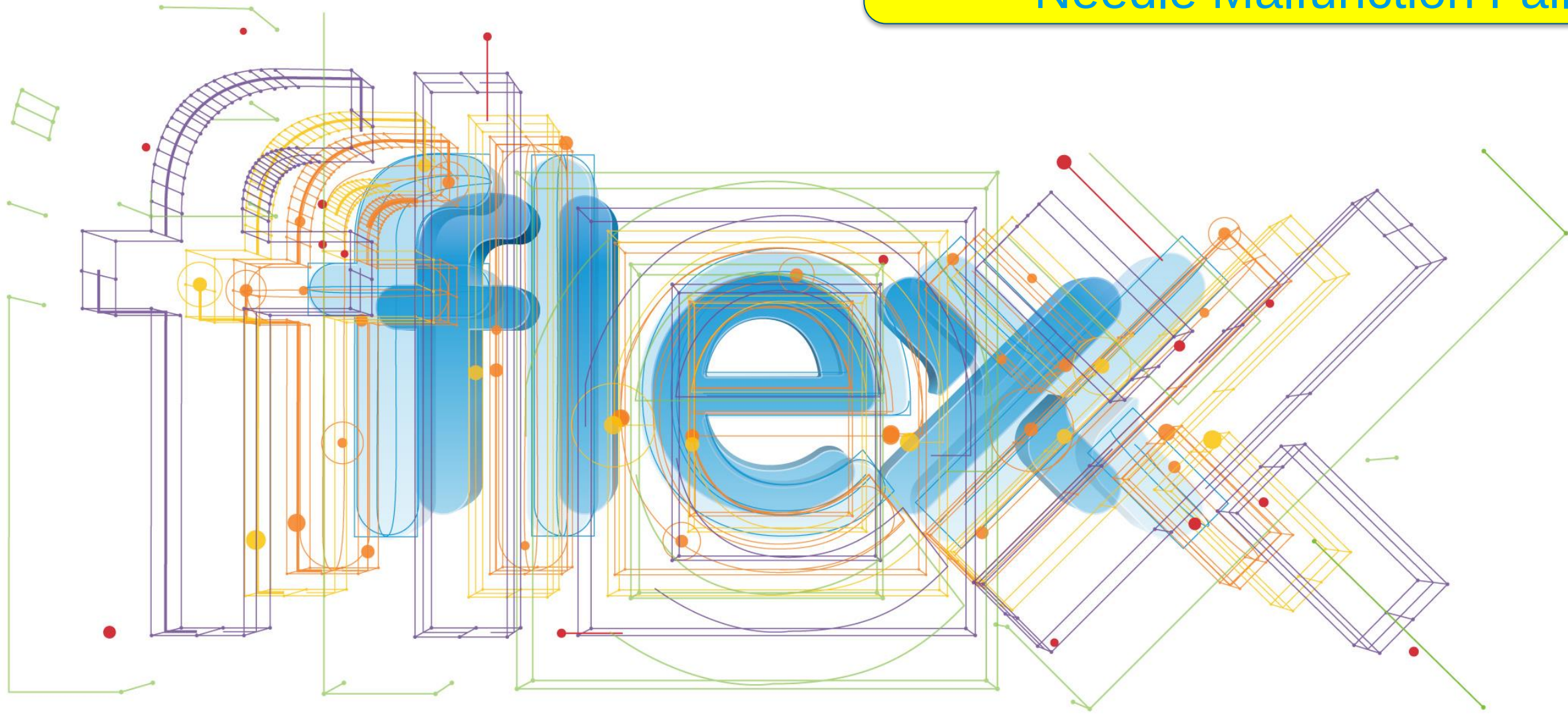
Application: Stepper motor driver controller

Pin-out Diagram



Based on ICT result, IC pin 24 – OUT1A (DMOS Full Bridge) with no output signal.

- DMOS Full Bridge signal is to control motor step up or down with efficiency at high switching speeds.
- Suspect no signal output from this pin and cause needle malfunction.



Thank You

Weekly First Pass Yield (hard failure)

PCBA - 210000520

Waters - Flex - CEI -Weekly Tripartite Meeting Minutes (WPPL-CEI-Flex)

- 1st meeting on 27 Mar 2019.
- 2nd meeting scheduled on 11 Apr 2019. Main activity is to verify 9x NTF boards (>2x loops), where CEI will hand carry the boards to Kallang.
- 1st Joint verification with CEI done on 11 Apr 2019, results: 3 pass, 6 fail.
- 2nd Joint verification with CEI on 24 Apr 2019, CEI brought 2 boards for verification, results fail.
- CEI verified the 6 fail boards using a CPSO instrument, all boards were having failure corresponding to those seen at Flex during joint verification.
- CEI changed components U11, U12 and retest, result failed.
- 19 Jun 2019, joint meeting with conclusion to change U25 and update with the retest result, target by 26 Jun 19.
- 01 Jul 2019, 2 boards passed CPSO instrument, these 2 boards to be verified at Flex KP 03 Jul 2019.
- 03 Jul 2019 joint verification at Flex KP, actual boards quantity handcarry: 3 pcs, result pass.
- 09 Jul 2019, update from CEI, changed U11 and touch up J4, verified pass at CPSO instrument.
- CEI shipped back all unit to KP, pending for verification, target to complete by 31 Jul 19.
- For components FA:
 - 3 pcs of U25 (Manufacturer: Altera), shipped out on 18 Jul 19, target FA completion 02 Sep 19
 - 3 pcs of U11 (Manufacturer: Microchip), shipped out on 18 Jul 19, target FA completion 02 Sep 19
- Microchip, Intel unable to conduct FA due to low% of failure, CEI to source for 3rd party to analyse for U11 on firmware loading issue.
- Altera unable to perform FA with 3rd party error message

Waters - Flex - CEI -Weekly Tripartite Meeting Minutes (WPPL-CEI-Flex) – cont'd

- 3rd party analysis for component U11 conducted by INSCOPE LABS (X-ray Inspection, IV testing, Decapsulation). Results with no abnormalities could be detected.
- CEI to plan send additional 5 defective units (U11) to distributor to conduct the same, for data compilation.
- CEI also plan to fabricate tester to screen component U11. Target inspect lot for 1 month production lot. Requested CEI to update internal documentation on this offline test. To be review by 24 Oct 19 (Next meeting)

27 Nov 2019

- CEI sent out additional 5 pcs of U11 to distributor Quiksol on 24 Oct. Report shared on 27 Nov 19. Reports found no abnormality.
- Prototype tester to offline screen U11 completed. CEI proposed to test 1 month production before proposal to Waters to add as permanent testing

16 Jan 2020

- Waters approved the proposal. CEI will start to implement offline screening on WWK 03 and will share the 1st serial number.

04 Feb 2020

- 1st serial number is 280120001C. Update: on ww15'20, No failure after 3 month monitoring (used qty: 2099). To close this issue

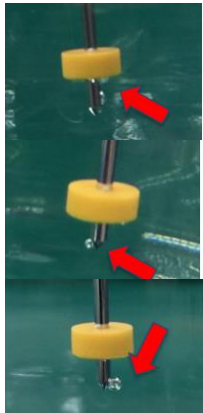


Investigation slides - Open issues (In-process Testing)

Weekly First Pass Yield (hard failure)

In process

PN: 405001338

Problem Statement	Investigation/ Possible Root Cause	Corrective Action/ Improvement																					
Part Number : WAT-405001338-B Description: NEEDLE,INJECTOR Problem: Fail decay test (spec of < 270PSI) Affected Qty: refer to below table <table><tr><th>WW</th><th>Qty failed</th><th>Failure</th></tr><tr><td>WW03'20</td><td>1</td><td>Fail decay test (spec of < 270PSI).</td></tr><tr><td>WW04'20</td><td>2</td><td>Fail decay test (spec of < 270PSI).</td></tr></table> Date of Manufactured: Jan 2020 Reported site: Flex Kallang Needle 405001338 Supplier: Waters Tech	WW	Qty failed	Failure	WW03'20	1	Fail decay test (spec of < 270PSI).	WW04'20	2	Fail decay test (spec of < 270PSI).	Off Line Verification: Method of verification: Reject needle subjected to about 20psi using N2 Performed by: David (TE) <table><tr><th>WW</th><th>Date code</th><th>TE Verification Result</th></tr><tr><td>WW03'20</td><td>19 Sep 2019</td><td>N2 verification: Bubbles observed</td></tr><tr><td>WW04'20</td><td>16 Oct 2019</td><td>N2 verification: Bubbles observed</td></tr><tr><td>WW04'20</td><td>16 Oct 2019</td><td>N2 verification: Bubbles observed</td></tr></table>  Refer to next slide for verification photos After Off Line Verification: Defective part transferred to Non Conformance Area Root Cause: TBA	WW	Date code	TE Verification Result	WW03'20	19 Sep 2019	N2 verification: Bubbles observed	WW04'20	16 Oct 2019	N2 verification: Bubbles observed	WW04'20	16 Oct 2019	N2 verification: Bubbles observed	Corrective Action: Flex Kallang: NA Supplier: TBA Note: WW09'20 – 3 samples for RTV – shipped WW20'20 – to track Prelim FA
WW	Qty failed	Failure																					
WW03'20	1	Fail decay test (spec of < 270PSI).																					
WW04'20	2	Fail decay test (spec of < 270PSI).																					
WW	Date code	TE Verification Result																					
WW03'20	19 Sep 2019	N2 verification: Bubbles observed																					
WW04'20	16 Oct 2019	N2 verification: Bubbles observed																					
WW04'20	16 Oct 2019	N2 verification: Bubbles observed																					

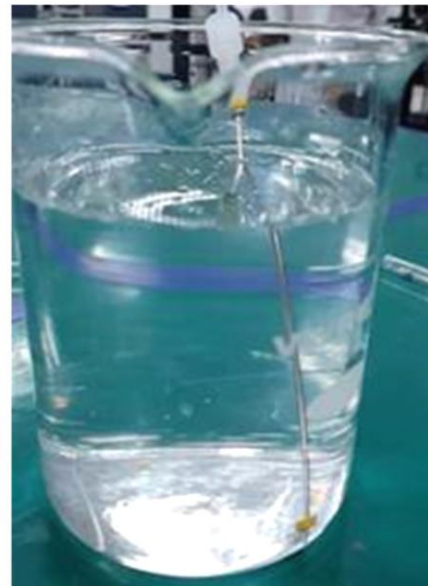
(PN 405001338) – Method of verification: Reject needle subjected to about 20psi using N2

Bubble test Set-up and criteria for verification:

REJECT : Presence of Bubbles
(below sample does not have seal)



PASS : No Bubbles after 30 seconds.

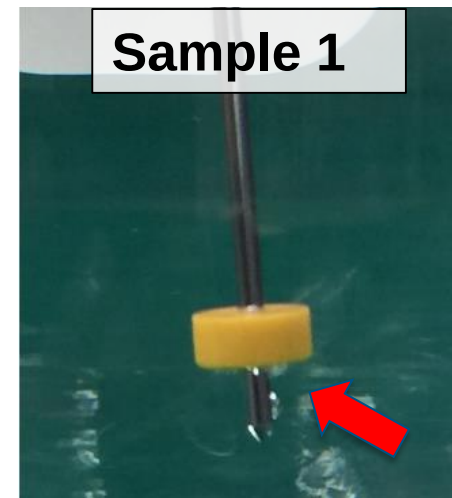


WW03'20

Needle reject qty: 1u

Result: Bubbles observed from needle tip

Sample 1

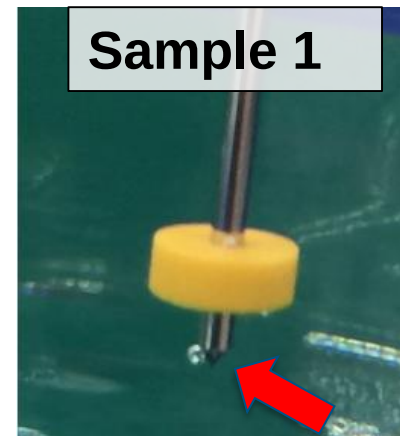


WW04'20

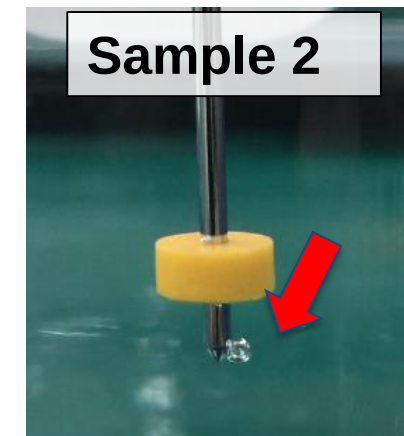
Needle reject qty: 2u

Result: Bubbles observed from needle tip

Sample 1



Sample 2

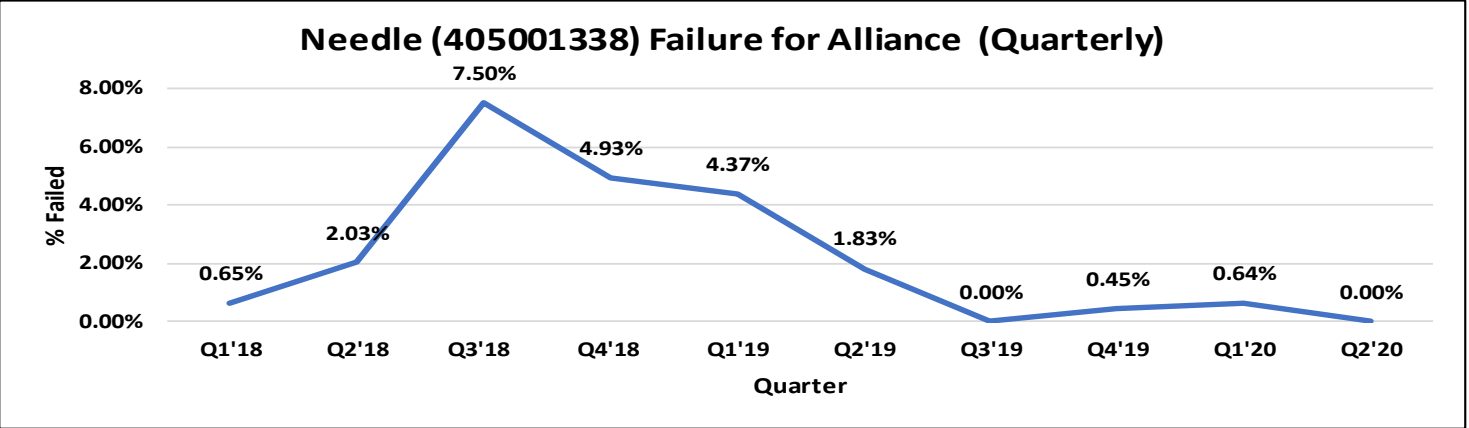


Weekly First Pass Yield (hard failure)

In process

PN: 405001338

Month	186269505 and 186269506 Qty Build	Qty Failure	% Failed	Quarter	Qty Build	Qty Failure	% Failed
Jan-18	462	2	0.43%	Q1'18	1223	8	0.65%
Feb-18	361	2	0.55%				
Mar-18	400	4	1.00%				
Apr-18	352	3	0.85%	Q2'18	1234	25	2.03%
May-18	394	10	2.54%				
Jun-18	488	12	2.46%				
Jul-18	558	47	8.42%	Q3'18	1466	110	7.50%
Aug-18	424	46	10.85%				
Sep-18	484	17	3.51%				
Oct-18	530	10	1.89%	Q4'18	1582	78	4.93%
Nov-18	519	12	2.31%				
Dec-18	533	56	10.51%				
Jan-19	486	35	7.20%	Q1'19	1418	62	4.37%
Feb-19	271	6	2.21%				
Mar-19	661	21	3.18%				
Apr-19	418	22	5.26%	Q2'19	1637	30	1.83%
Apr-19 (WW15-16) Improved Needle	200	0	0.00%				
Apr-19	76	0	0.00%				
May-19	494	6	1.21%				
Jun-19	449	2	0.45%				
Jul-19	602	0	0.00%	Q3'19	1199	0	0.00%
Aug-19	405	0	0.00%				
Sep-19	192	0	0.00%				
Oct-19	381	0	0.00%	Q4'19	894	4	0.45%
Nov-19	225	4	1.78%				
Dec-19	288	0	0.00%				
Jan-20	352	3	0.85%	Q1'20	1095	7	0.64%
Feb-20	434	3	0.69%				
Mar-20	309	1	0.32%				
Apr-20	177	0	0.00%	Q2'20	177	0	0.00%
Total Qty	16373	388		Total	16373	388	



Note: On 09 Apr 2019, started to use improved Needle (100% tested with 200psi helium at Milford).
1st SN : D19SM4528A. Last SN : D19SM4629A

On 26 Apr 2019, started to use 2nd lot of improved Needle
1st SN : D19SM7371A

FA Status – closed issues

Weekly First Pass Yield (hard failure) FA Status (CLOSED issues)

 Closed
 In Progress

Model	Part Number	Supplier	Q1'18	Q2'18	Q3'18	Q4'18	Q1'19	Q2'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
PDA	402000156 (LENS, FLOW CELL)	Opco Lab					Feb'19				WW27'19	WW29'19	WW34'19	Feb'19 – 9 x Fail on Noise Test, spec <7.uAU 17 Aug – 1967pcs WIP. Sampling checked. Result – OK 17 Aug - PA : OPCO to select a sample from each incoming batch to verify material is correct
Alliance	WAT270148 (ENCODER,HEDL – 560	Avago Tech						WW22'19		WW29'19 16 Jul 19	WW33'19	WW33'19	WW34'19 to WW38'19	WW22 – 4 x Unable to home actuator WW33 – supplier FA result: Damaged CW and Twisted Allen Key. WW34 – Flex briefed the Production WW34 to WW38 – no failure.

Model	Part Number	Supplier	Q1'18	Q2'18	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	210000411 (CPU, PCBA)	Flex Senai						WW22'19			WW23'19 28 Jun 19	WW28'19	WW39'19	WW39'19	WW22'19 – 3 x hang at Alliance logo Prelim FA complete, failure localized to U53, components being sent for supplier FA. WW39'19 – FA for U53 – confirm corruption WW39'19 - to use the Alliance FCT tester.
Alliance	210000411 (CPU, PCBA	Flex Senai						WW30'19 WW31'19		WW31'19	WW33'19 20 Aug 19	WW32'19	WW39'19	WW43'19	WW30'19 – 2 x unable to download, 1 X unable to communicate with tester during RV injection test WW31'19 – 1 x unable to download WW32'19 – Further verification – 3 x J30 shorted to ground. WW39'19 – 4M analysis completed. Action(1) Update MAI to wipe out the flux residue on test points. Action(2) Use Alliance tester (Tester ID : TE#82510) to check the circuitry of the PCBA. (Closed) WW43'19 - Action(3) Fabricate new soldering jig to improve the method of soldering from slanted to horizontal on the table (soldering station). (Closed)

Weekly First Pass Yield (hard failure)

FA Status (CLOSED issues)

Closed

In Progress

Model	Part Number	Supplier	Q1'18	Q2'18	Q3'18	Q4'18	Q1'19	Q2'19	Verification	RTV	Preliminary FA	Supplier FA	Monitor / Closure	Status	
Alliance	405001338 (Needle)		Waters			May'18	Jul'18						WW27'19	Milford 100% testing implemented. Flex to monitor till end Jun 2019. Improved lot : 7u failed out of 2575u tested	
Alliance	210000444 (H/C PCBA)	Flex Senai						WW18'19		WW20'19 10 May 19		WW27'19	WW28'19	WW27 – WPPL approved to replace Fuse at Senai site. WW27 – 3 x bd received in KP after Fuse replaced. WW28 – 3 x bd all passed Kallang Final Test.	
Alliance	210000411 (CPU, PCBA)	Flex Senai						WW19'19		WW21'19 21 May 19	WW26'19	WW27'19	WW29'19	WW19 – 4x PCBA failed and off-line verification found damaged and rework components at bottom side. WW29 – monitor for 3 weeks. No failure reported at Kallang	
Alliance	H/C Engine (289001192)	Laird					Dec'18			WW04'19 31 Jan 19	WW24'19	WW28'19	WW33'19	Dec'18 – 4 x H/C HW Fail WW28'19 – LAIRD implemented additional LCR / multimeter to check J4 resistance. LAIRD 3 rd Party PCA provided. WW33'19 - LAIRD's effectiveness check > 600u checked – no reject. Closed	
Alliance	WAT270524 (GPV)	Parker	Apr'18	Jun'18		Oct'18		WW21		-	-		WW36'19	Prelim FA provided... WW36 - Monitoring “improved lot” till end Aug 2019 - 9/3304 (2724 PPM)	
BSM/ QSM	279001810 (GPV)	Parker	Feb'18		Sep'18					-	-		WW36'19	Prelim FA provided. WW36 - Monitoring “improved lot” till end Aug 2019. -2/1640 (1220 PPM)	
Model	Part Number	Supplier	Q2'18	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	210000416 (Fluidics PCBA)	Flex Senai					WW26'19			WW27'19	2 pcs – WW27'19	WW28'19	WW39'19	WW45'19	WW26 – 4x burnt IC during Rear Panel Testing. WW28 - Prelim FA complete, based on fault tree, all possible causes verified.. WW39'19 –IC U1&U2: failure analysis result – EOS. IC U14 - not able to proceed for FA as LTB part is supported by Waters. WW45'19 – Verified the MSD control in Senai as requested by Waters – Complete.

Weekly First Pass Yield (hard failure)

FA Status (CLOSED issues)

Closed

In Progress

Model	Part Number	Supplier	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	279002755 (GEAR MOTOR FILTER)	Haydon Kerk				WW20'19				WW25'19 25 Jun 19	WW37'19	WW47'19	WW47'19	WW20 – 3x failed Erbium cal and 1 x motor unable to turn WW37'19 – Prelim FA D/c: 1921. Gearbox was stuck making the motor not able to drive shaft rotation. Replaced defective gear box and problem was solved. D/c: 1906 and 1841. Was found that the torque value in shaft at 100 PPS was lower than the specification. Replaced defective gear box and problem was solved. WW47'19 – no trigger since WW20.

Model	Part Number	Supplier	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Detector (TUV)	WAT081308-J (GRATING, 1800 G/MM, W/ HOLDER)	OPTOMETRICS					WW38'19		WW38'19	WW42'19	WW41'19	WW44'19 WW47'19	WW49'19	WW38'19 – 28u found low Energy. WW41'19 – due to new Mech mount vendor 2 applied oil, caused 'oil contamination'. WW44'19 –Optometrics finalized report for the oil migration evaluation that no migration after 7 days. WW47 - ECR # 9233742 is initiated for the new drawing & design approval by Waters. WW49'19 – 26 Nov, FA samples submission to (Nicholas) Waters WW49'19 – 28 Nov, supplier acknowledged that Flex has requested for 10 samples once FA approved WW49'19 – to close and monitor this issue

Weekly First Pass Yield (hard failure) FA Status (CLOSED issues)

- Closed
- In Progress

Model	Part Number	Supplier	Q3'18	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Verification	RTV	Preliminary FA	FA / PCA	Monitor / Closure	Status
Alliance	405001338 (Needle injector)	Waters						WW47'19 WW48'19	WW47'19 WW48'19	NA	WW50'19	NA	WW51'19	WW47 & WW48 – total 4x Failed decay test spec of < 270PSI. WW50 – Milford reviewed their test data and see no indication of a trend and will not take any additional action and don't require the parts to be returned to Milford. Parts to scrap on-site. WW51'19 – propose to close this issue

THANK YOU