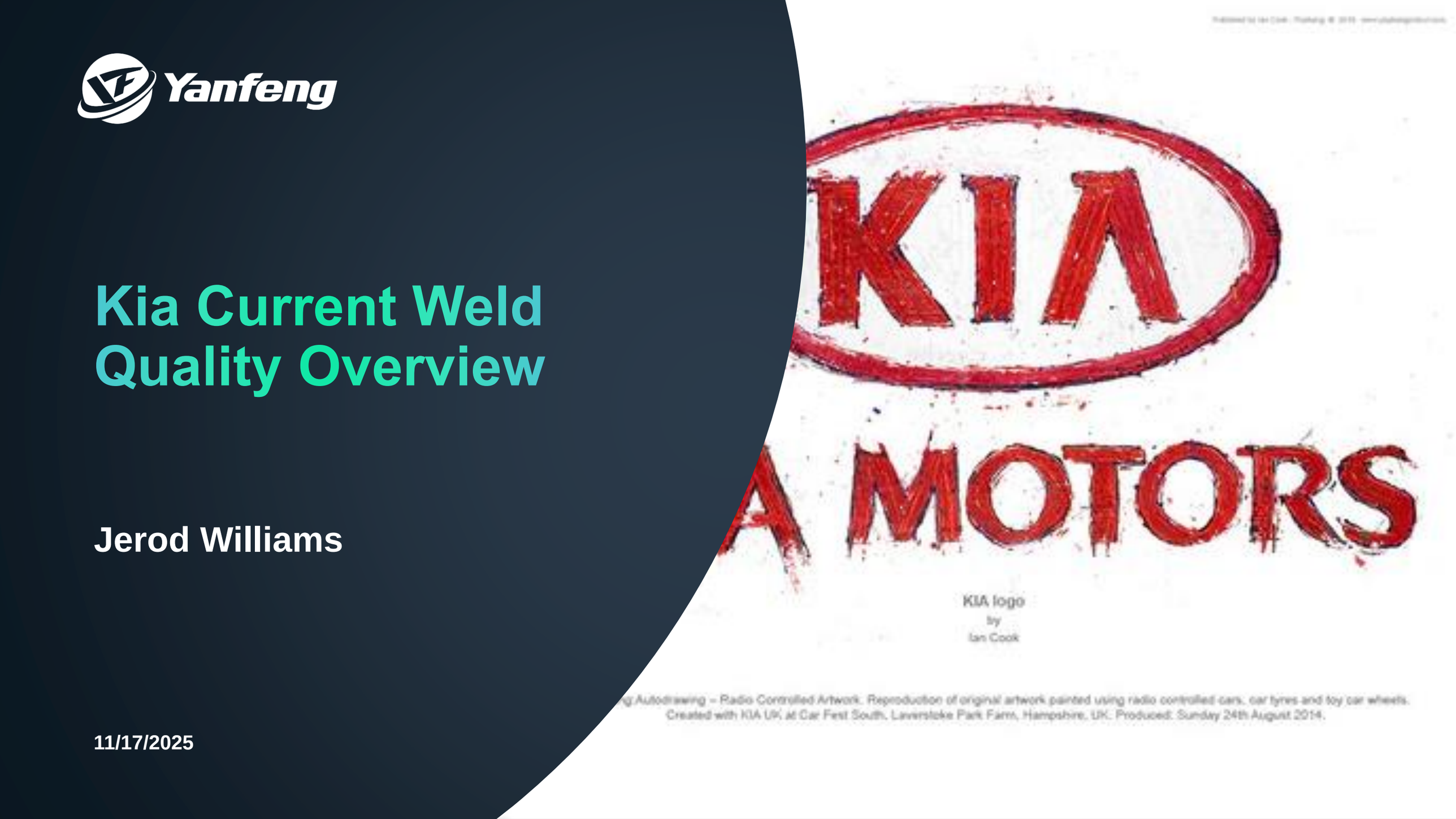
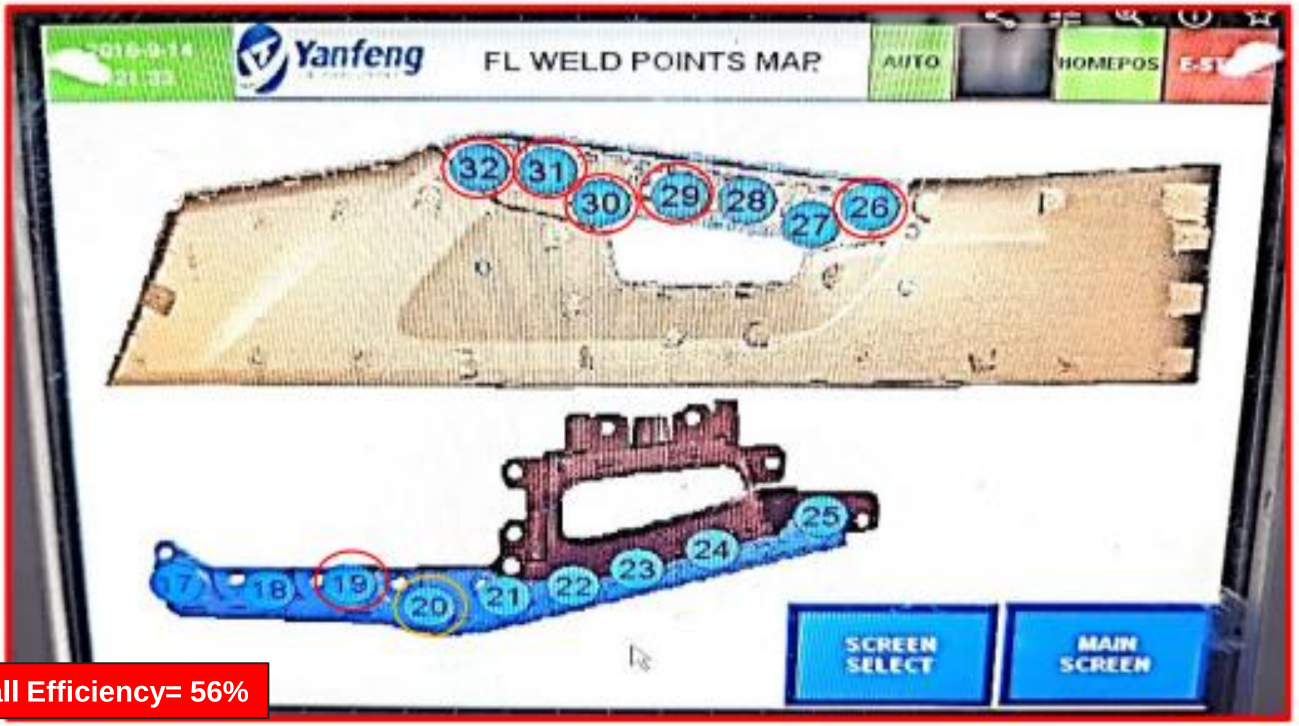
Kia Current Weld Quality Overview

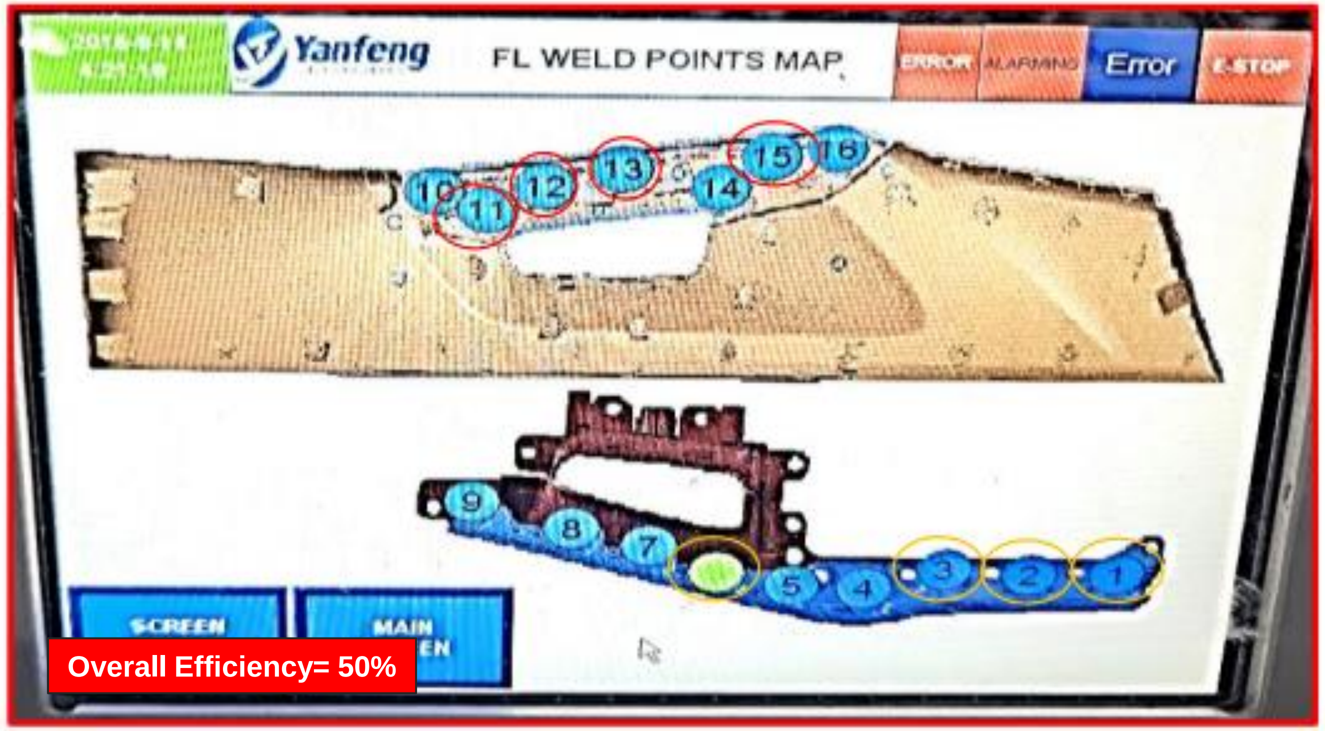
Jerod Williams

11/17/2025



HACS Front LH/RH Heat Stake Component Validation (Before)





Left Hand Front

Phase Install Escalation Plan												
Time	Weld Head	Cooling Hose	Spring	Sleeve	Cooling Hose Size	Temp Settings	Stake #	Weld Head	Cooling Hose	Spring	Sleeve	Comments
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	290	17	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	290	18	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	280	19	Yes	No	No	No	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	275	20	Yes	Yes	Yes	Yes	(Missing Cooling Hose Crimp)
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	280	21	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	300	22	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	290	23	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	305	24	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	285	25	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	270	26	Yes	No	No	No	Offset Heat Stake
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	270	27	Yes	Yes	Yes	Yes	Offset Heat Stake
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	270	28	Yes	Yes	Yes	Yes	
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	270	29	Yes	No	Yes	Yes	(Accumulating Plastic)
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	295	30	Yes	No	Yes	Yes	Offset Heat Stake
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	270	31	Yes	No	No	No	Offset Heat Stake
COB	CW30	CW31	CW31	CW31	8mm (OTR)/6mm (INR)	270	32	Yes	No	No	No	
							Totals	0	6	4	4	

Right Hand Front

								Phase Install Escalation Plan				
Stake #	Weld Head	Cooling Hose	Spring	Sleeve	Comments	Temp Settings	Cooling Hose Size	Weld Head	Cooling Hose	Spring	Sleeve	Time
1	Yes	Yes	Yes	Yes	(Missing Cooling Hose Crimp)	275	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
2	Yes	Yes	Yes	Yes	(Missing Sleeve Screw)	290	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
3	Yes	Yes	Yes	Yes	(Missing Cooling Hose Crimp)	300	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
4	Yes	Yes	Yes	Yes		275	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
5	Yes	Yes	Yes	Yes		285	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
6	Yes	Yes	Yes	Yes	(Missing Cooling Hose Crimp)	285	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
7	Yes	Yes	Yes	Yes		285	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
8	Yes	Yes	Yes	Yes		290	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
9	Yes	Yes	Yes	Yes		290	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
10	Yes	Yes	Yes	Yes	Offset Heat Stake	285	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
11	Yes	No	Yes	Yes	Offset Heat Stake	290	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
12	Yes	No	Yes	Yes		280	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
13	No	Yes	Yes	Yes	Broken Weld Head	285	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
14	Yes	Yes	Yes	Yes		285	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
15	Yes	No	No	No	Offset Heat Stake	290	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
16	Yes	Yes	Yes	Yes		290	8mm (OTR)/6mm (INR)	CW31	CW32	CW32	CW32	COB
Totals	1	3	1	1								

HACS Rear LH/RH Heat Stake Component Validation (Before)

Left Hand Rear

=Old Weld Head

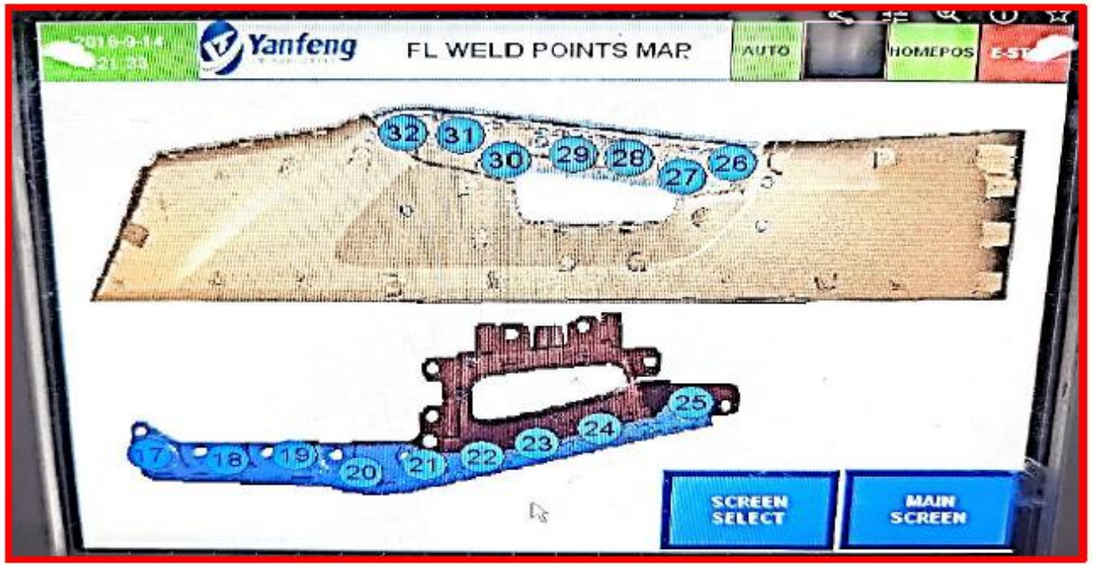
=Missing Components

Right Hand Rear

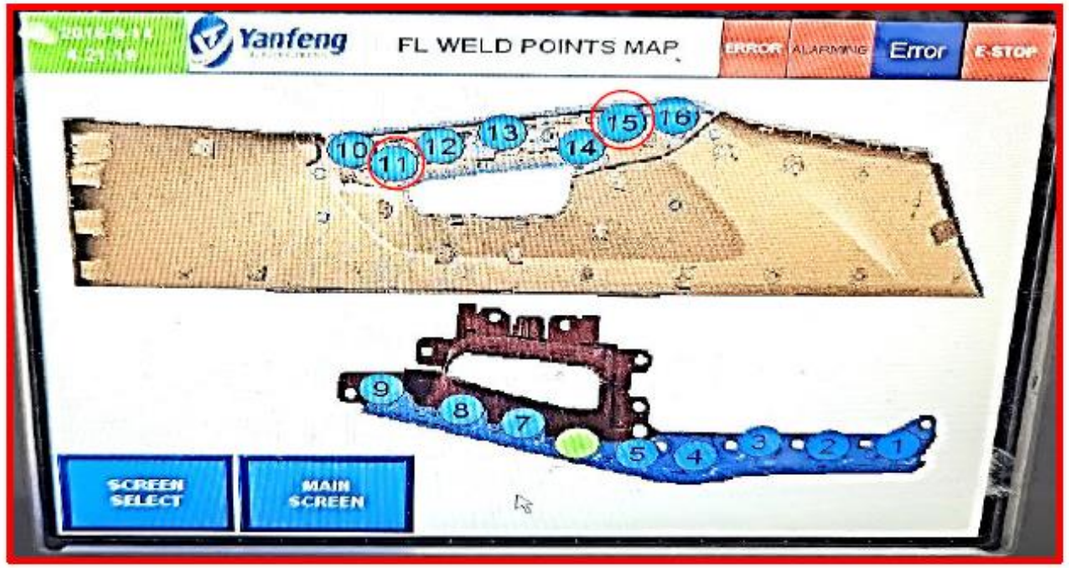
Cooling Hose Size	Temp Settings	Stake #	New Weld Head	Cooling Hose	Spring	Sleeve	Lock Washer	Comments
8mm (OTR)/6mm (INR)		17	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		18	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		19	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		20	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		21	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		22	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		23	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		24	Complete	Yes	Yes	Yes	No	Check Cool Air Supply (Checked/Changed Hoses)
8mm (OTR)/6mm (INR)		25	Complete	No	No	No	No	Offset
8mm (OTR)/6mm (INR)		26	Complete	Yes	Yes	Yes	No	Offset
8mm (OTR)/6mm (INR)		27	No	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		28	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		29	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		30	No	No	Yes	Yes	No	Offset
8mm (OTR)/6mm (INR)		31	No	Yes	Yes	Yes	No	Offset
8mm (OTR)/6mm (INR)		32	No	Yes	Yes	Yes	No	
		Totals	9	7	1	1	16	
		Overall Component Efficiency %	69%					
		Before Adjustments	44%					

Stake #	New Weld Head	Cooling Hose	Spring	Sleeve	Lock Washer	Comments	Temp Settings	Cooling Hose Size
1	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
2	Complete	Yes	Yes	Yes	No	Clogged (Unclogged)		8mm (OTR)/6mm (INR)
3	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
4	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
5	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
6	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
7	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
8	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
9	No	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
10	No	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
11	Complete	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
12	Complete	Yes	Yes	Yes	No	Clogged (Unclogged)		8mm (OTR)/6mm (INR)
13	No	No	Yes	Yes	No			8mm (OTR)/6mm (INR)
14	Complete	No	No	No	No	Offset		8mm (OTR)/6mm (INR)
15	Complete	No	No	No	No	Offset		8mm (OTR)/6mm (INR)
16	Complete	No	No	No	No			8mm (OTR)/6mm (INR)
Totals	13	9	15	15	16			
Overall Component Efficiency %	62%							
Before Adjustments	19%							

HACS Front LH/RH Heat Stake Component Validation (Current)



Left Hand Front



Right Hand Front

○ =Missing Components

Cooling Hose Size	Temp Settings	Stake #	New Weld Head	Cooling Hose	Spring	Sleeve	Lock Washer	Comments
8mm (OTR)/6mm (INR)		17	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		18	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		19	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		20	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		21	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		22	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		23	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		24	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		25	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		26	Complete	Yes			No	Cooling Hose Bracket (Offset)
8mm (OTR)/6mm (INR)		27	Complete	Yes			No	Cooling Hose Bracket(Offset)
8mm (OTR)/6mm (INR)		28	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		29	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		30	Complete	Yes			No	Cooling Hose Bracket(Offset)
8mm (OTR)/6mm (INR)		31	Complete	Yes			No	Cooling Hose Bracket(Offset)
8mm (OTR)/6mm (INR)		32	Complete	Yes			No	Cooling Hose Bracket
		Totals	16	0	0	0	16	
		Overall Component Efficiency %	100%					
		Before Adjustments	94%					

Stake #	New Weld Head	Cooling Hose	Spring	Sleeve	Lock Washer	Comments	Temp Settings	Cooling Hose Size
1	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
2	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
3	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
4	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
5	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
6	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
7	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
8	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
9	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
10	Complete	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
11	Complete	No	No	No	No	Offset (Damage Cooling Hose)		8mm (OTR)/6mm (INR)
12	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
13	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
14	Complete	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
15	Complete	No	No	No	No	Offset		8mm (OTR)/6mm (INR)
16	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
Totals	0	3	3	3	16			
Overall Component Efficiency %	87%							
Before Adjustments	44%							

HACS Rear LH/RH Heat Stake Component Validation (Current)

Left Hand Rear

=Missing Components

Right Hand Rear

Cooling Hose Size	Temp Settings	Stake #	New Weld Head	Cooling Hose	Spring	Sleeve	Lock Washer	Comments
8mm (OTR)/6mm (INR)		17	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		18	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		19	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		20	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		21	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		22	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		23	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		24	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		25	Complete	Yes	No	No	No	Offset (Added Cooling Hose)
8mm (OTR)/6mm (INR)		26	Complete	Yes	Yes	Yes	No	Offset
8mm (OTR)/6mm (INR)		27	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		28	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		29	Complete	Yes	Yes	Yes	No	
8mm (OTR)/6mm (INR)		30	Complete	Yes	Yes	Yes	No	Offset
8mm (OTR)/6mm (INR)		31	Complete	Yes	Yes	Yes	No	Offset
8mm (OTR)/6mm (INR)		32	Complete	Yes	Yes	Yes	No	
		Totals	0	0	1	1	16	
		Overall Component Efficiency %	94%					

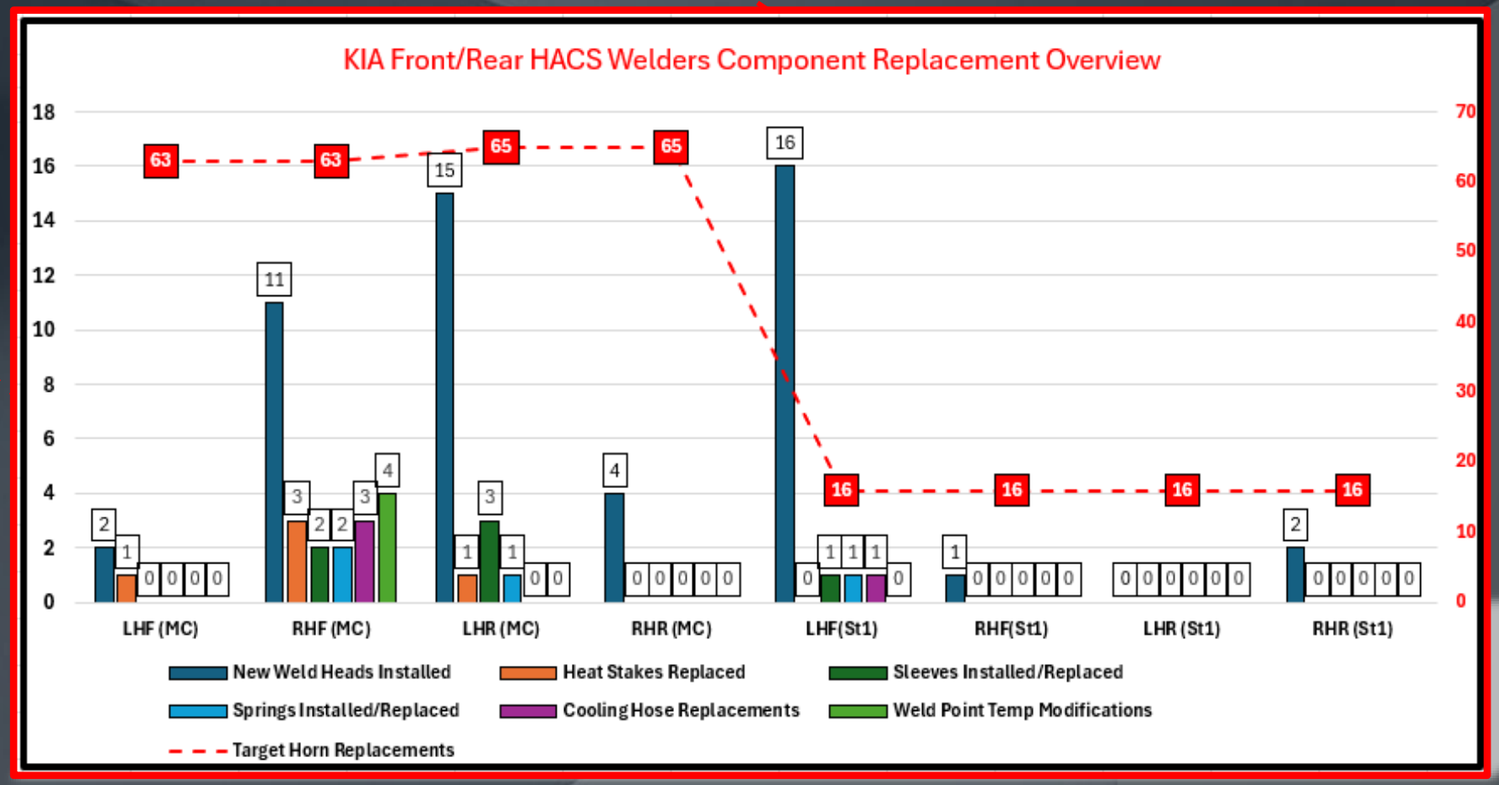
Stake #	New Weld Head	Cooling Hose	Spring	Sleeve	Lock Washer	Comments	Temp Settings	Cooling Hose Size
1	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
2	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
3	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
4	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
5	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
6	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
7	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
8	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
9	Complete	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
10	Complete	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
11	Complete	Yes	Yes	Yes	No	Offset		8mm (OTR)/6mm (INR)
12	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
13	Complete	Yes	Yes	Yes	No			8mm (OTR)/6mm (INR)
14	Complete	Yes	No	No	No	Offset (Added Cooling Hose)		8mm (OTR)/6mm (INR)
15	Complete	No	No	No	No	Offset		8mm (OTR)/6mm (INR)
16	Complete	No	No	No	No			8mm (OTR)/6mm (INR)
Totals	0	3	3	3	16			
Overall Component Efficiency %	81%							

KIA HACS Welders Component Replacement Overview

Variants	Weld Points	Stake Voltage	New Weld Heads Installed	Target Horn Replacements	Remaining	Heat Stakes Replaced	Sleeves Installed/ Replaced	Springs Installed/ Replaced	Cooling Hose Replacements	Weld Point Temp Modifications	Total Adjustments
LHF (MC)	63	110	2	63	61	1	0	0	0	0	3
RHF (MC)	63	110	11	63	52	3	2	2	3	4	25
LHR (MC)	65	110	15	65	50	1	3	1	0	0	20
RHR (MC)	65	110	4	65	61	0	0	0	0	0	4
LHF(St1)	16	240	16	16	0	0	1	1	1	0	19
RHF(St1)	16	240	1	16	15	0	0	0	0	0	1
LHR (St1)	16	240	0	16	16	0	0	0	0	0	0
RHR (St1)	16	240	2	16	14	0	0	0	0	0	2
Total Heat Stakes	320		51	320	269	5	6	4	4	4	74
Total 110V	256		32	256	224	5	5	3	3	4	52
Total 240V	64		19	64	45	0	1	1	1	0	22

Addressed Tools Only

HACS Welders Component Replacement Tracker



Upcoming Improvements (Angled Air Fitting)

INITIATE ANNUAL PREVENTATIVE MAINTENANCE PROGRAM TO SPLIT TOOLS AND MAKE REPAIRS TO DAMAGED COMPONENTS

(LEON) LIQING WANG WILL CONTACT CHINESE TOOL MAKER TO MAKE REQUEST FOR INFORMATION

- CONTACT CHINESE TOOL SUPPLIER FOR TEARDOWN INSTRUCTIONS OF TOOLS
- CONTACT CHINESE TOOL SUPPLIER FOR SPECIAL TOOLS REQUIRED TO MAKE HEIGHT ADJUSTMENTS ON HEAT STAKE ASSEMBLIES
- CONTACT CHINESE TOOL MAKER FOR SPECIAL TOOLS REQUIRED TO SPLIT HEAT STAKE CARRIER PLATE FROM TOP PLATE

ADD 90° AIR FITTINGS ON TOP OF HEAT STAKE TUBE TO PREVENT AIR LINE KINKING AND LOSING AIR VOLUME TO HEAT STAKE (NOT ENOUGH CLEARANCE FOR CURRENT FITTING)

ADD CORRECT BRACKETS TO AFFIX COOLING AIR LINE TO THE END OF THE HEAT STAKE TO COOL AFTER WELD PROCESS (CURRENTLY MANY COOLING LINES ARE NOT ATTACHED AS INTENDED

Upcoming Improvement (Lock Washer Addition)

Wave Disc Springs

With multiple contact points to distribute the load, wave disc springs provide more balanced support than curved and notched disc springs. They're also known as wave spring washers.

ID	OD	Thick.	Ht.	Compressed Ht. @ Working Load	Working Load, lbs.	Material	Pkg. Qty.		Pkg.
1.014"	1.245"	0.028"	0.145"	0.114"	67	Steel	10	**9714K706**	$10.60

Wave Disc Spring, Steel, 1.014" ID, 1.245" OD, 0.028" Thick — Packs of 10

DURING ANNUAL PM FOR HEAT STAKE TOOLING ADD WAVE DISC SPRING WASHER IN BETWEEN CARRIER AND LOCKING COLLAR TO PREVENT PRE-MATURE LOOSENING OF THE LOCKING COLLAR ALLOWING THE HEAT STAKE TO STAY CENTERED IN POSITION

Problematic Issues (Rear Door Weld Quality After Cylinder Failure)

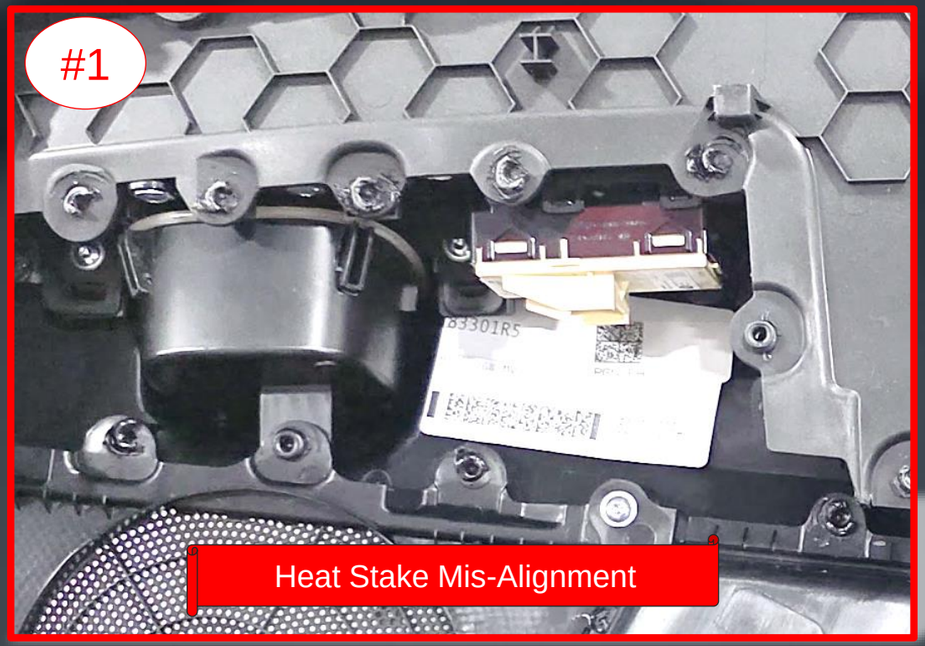
#2

Clogged Weld Horns

#3

Deformed/Damaged Weld Heads

#1



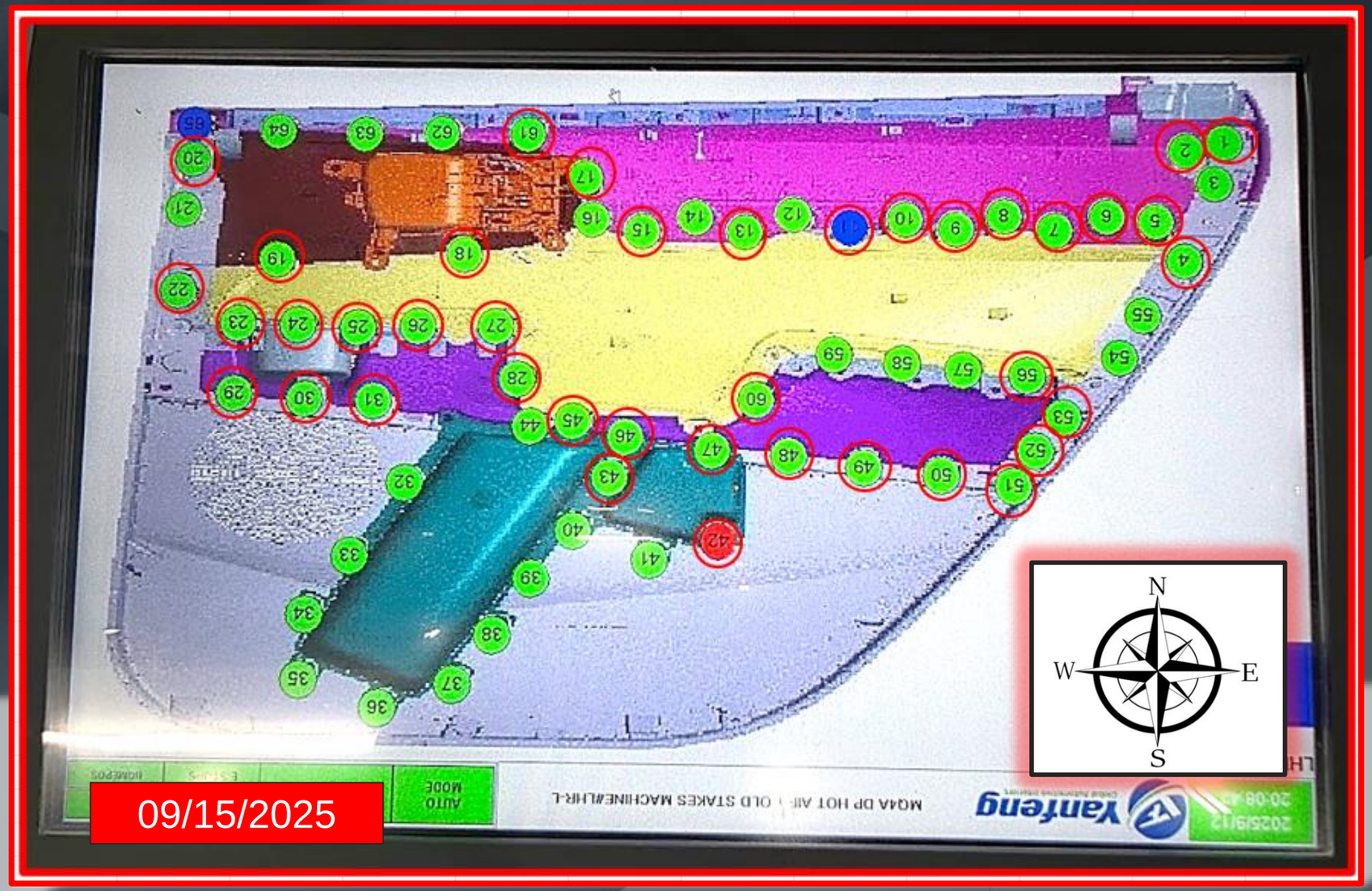
Heat Stake Mis-Alignment

#4

Missing Cooling Sleeves

LEFT HAND REAR MAIN CARRIER AFTER CYLINDER FAILURE

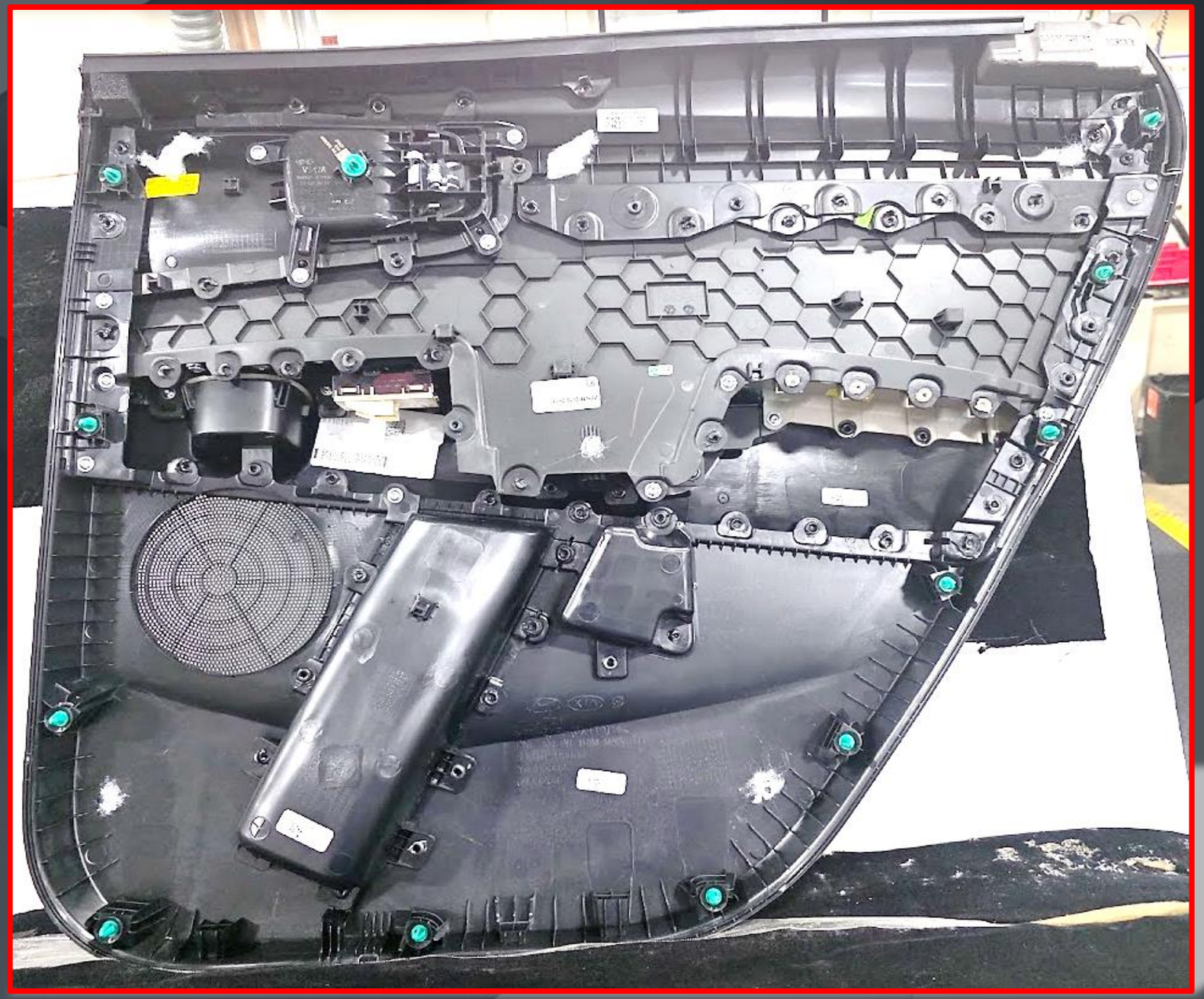
Welder Adjustment Overview	
Weld Point	**Adjustments Made**
1	Position Adjustment (X/Y) NE (2mm)
2	Position Adjustment (X/Y) N (2mm)
4	Position Adjustment (X/Y) NE (2mm) (Z Down 2mm)
5	Position Adjustment (X/Y) NNE (2mm)
6	Position Adjustment (X/Y) N (2mm)
7	Position Adjustment (X/Y) NE (2mm)
8	Position Adjustment (X/Y) NE (2mm)
9	Position Adjustment (X/Y) N (2mm)
10	Position Adjustment (X/Y) NNW (2mm)
11	Position Adjustment (X/Y) NNE (2mm)
13	Position Adjustment (X/Y) NNW (2mm)
15	Position Adjustment (X/Y) N (2mm)
17	Position Adjustment (X/Y) NW (2mm)
18	Position Adjustment (X/Y) NW (2mm)
19	Position Adjustment (X/Y) NW (1mm)
20	Position Adjustment (X/Y) NNE (2mm)
21	Position Adjustment (X/Y) NW (2mm)
22	Position Adjustment (X/Y) NE (2mm) (Z Down 2.5mm)
23	Position Adjustment (X/Y) NW (2mm)
24	Position Adjustment (X/Y) WNW (2mm)
25	Position Adjustment (X/Y) WNW (2mm)
26	Position Adjustment (X/Y) W (2mm)
27	Position Adjustment (X/Y) W (2mm)
28	Position Adjustment (Z Down 1.5mm)
29	Position Adjustment (X/Y) WSW (2mm)
30	Position Adjustment (Z Down 1.5mm)
31	Position Adjustment (X/Y) NW (2mm)
32	Position Adjustment (Z Down 1mm)
43	Position Adjustment (Z Down 2mm)
45	Position Adjustment (X/Y) SW (2mm)
46	Position Adjustment (X/Y) WSW (2mm) (Z Down 2mm)
47	Position Adjustment (Z Down 1.5mm)
48	Position Adjustment (X/Y) NW (2mm)
49	Position Adjustment (Z Down 1.5mm)
50	Position Adjustment (Z Down 1.5mm)
51	Position Adjustment (Z Down 3mm)
52	Position Adjustment (Z Down 3mm)
53	Position Adjustment (Z Down 3mm)
56	Position Adjustment (X/Y) NW (2mm)
60	Position Adjustment (X/Y) NW (2mm)
61	Position Adjustment (X/Y) N (3 mm)

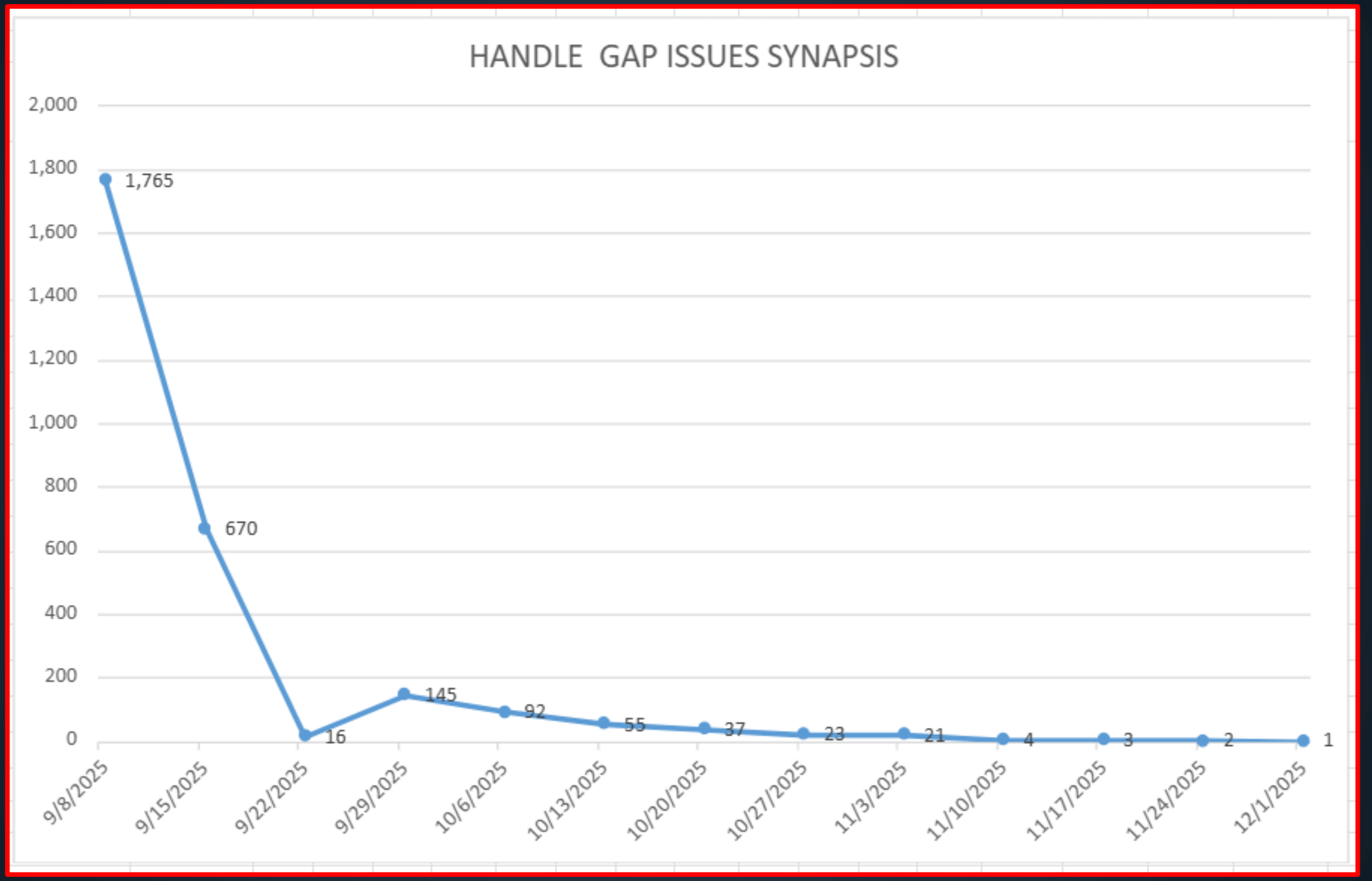


Weld Efficiency=37%

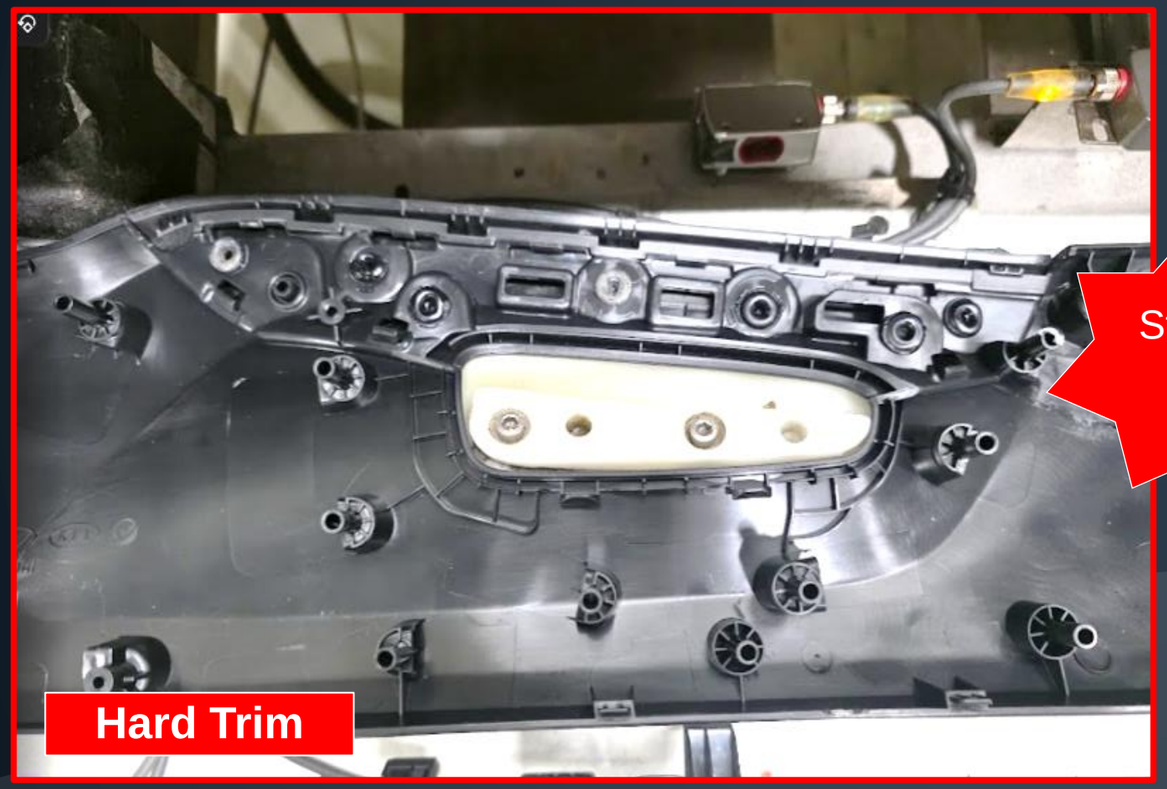
LIVE PANEL VIEW ON BACK SIDE

LIVE PANEL VIEW AFTER CYLINDER FAILURE



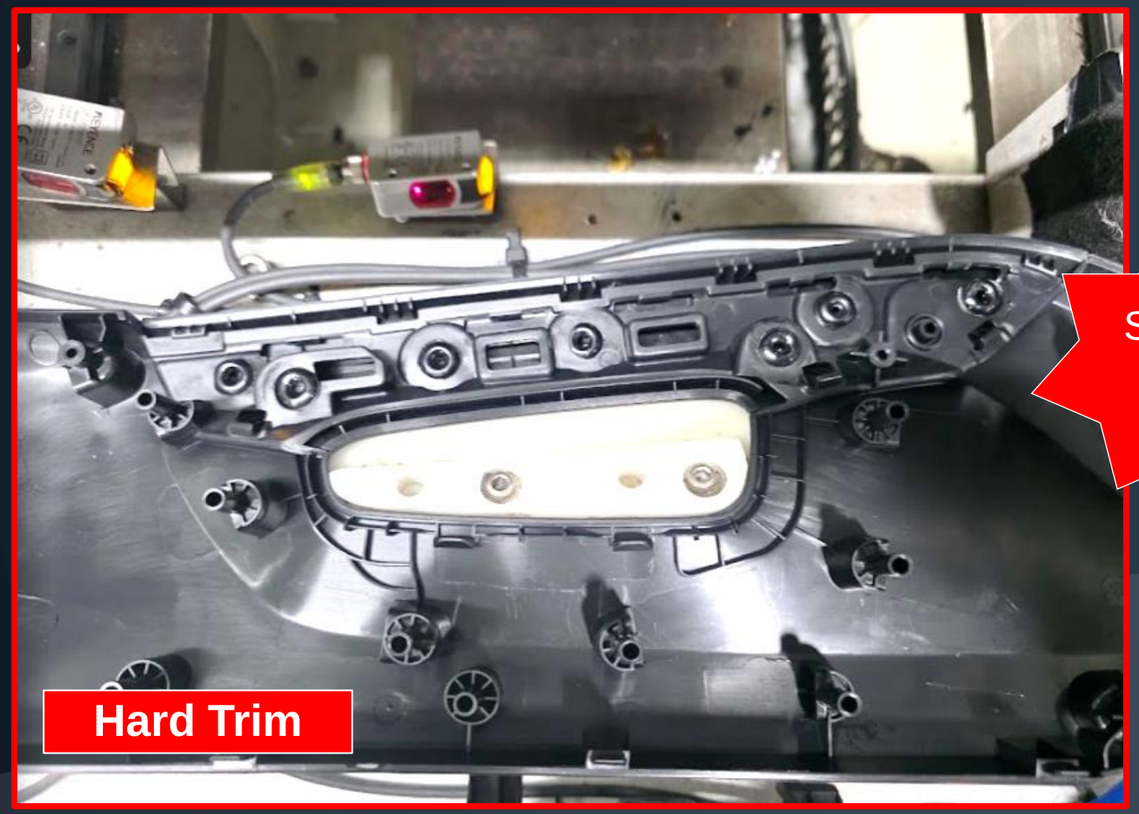

HANDLE GAP ISSUES SYNAPSIS
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1,765
670
16
145
92
55
37
23
21
4
3
2
1
9/8/2025
9/15/2025
9/22/2025
9/29/2025
10/6/2025
10/13/2025
10/20/2025
10/27/2025
11/3/2025
11/10/2025
11/17/2025
11/24/2025
12/1/2025

LHF Current Welds



Station 1

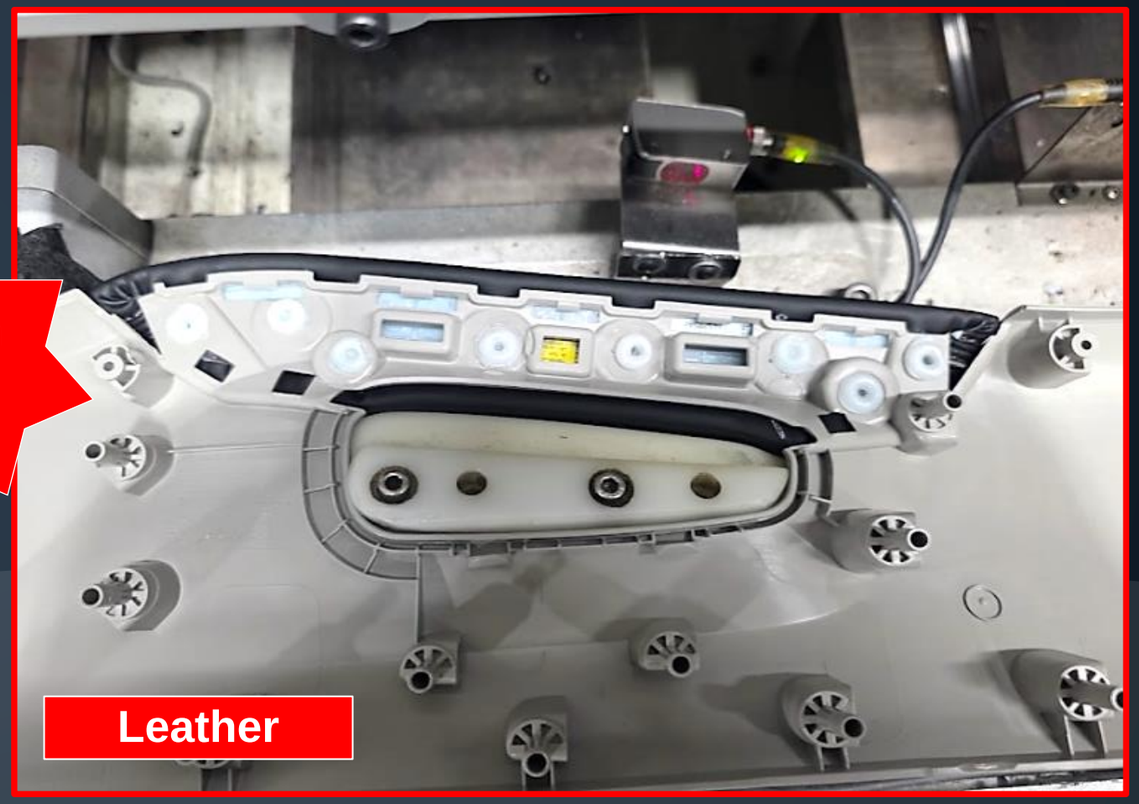
RHF Current Welds



Station 1

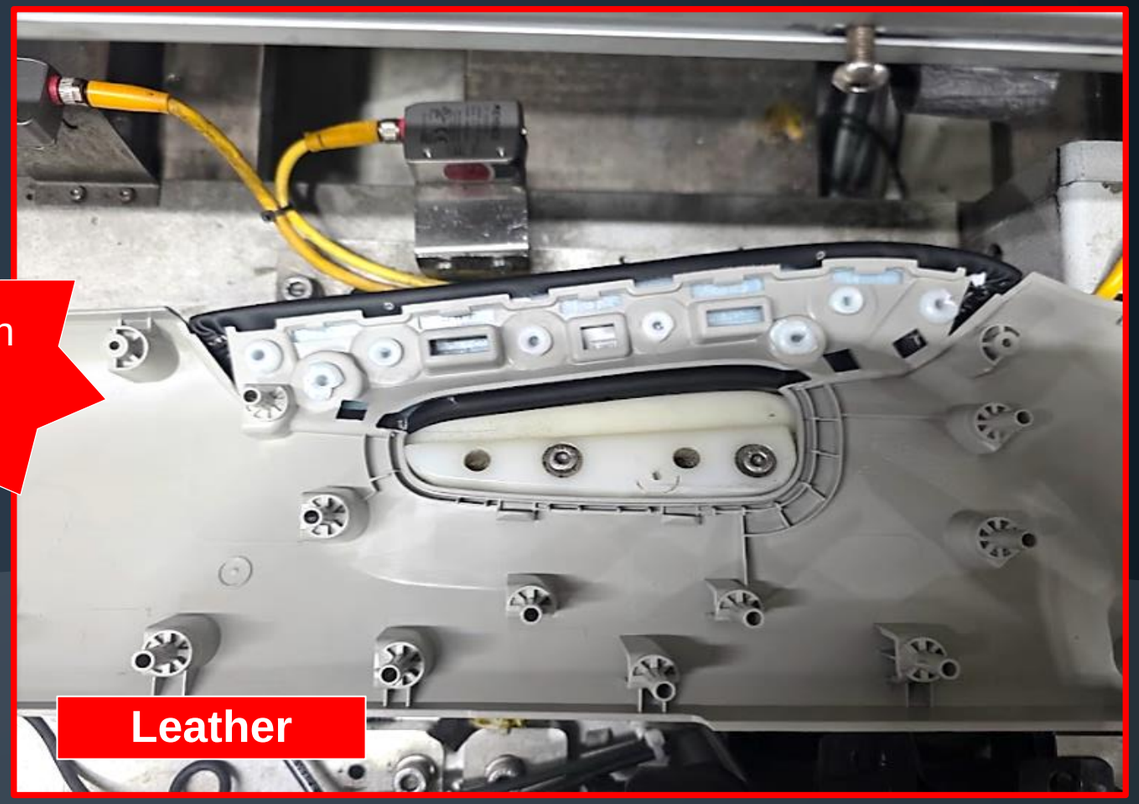
LHR Current Welds

Station 1

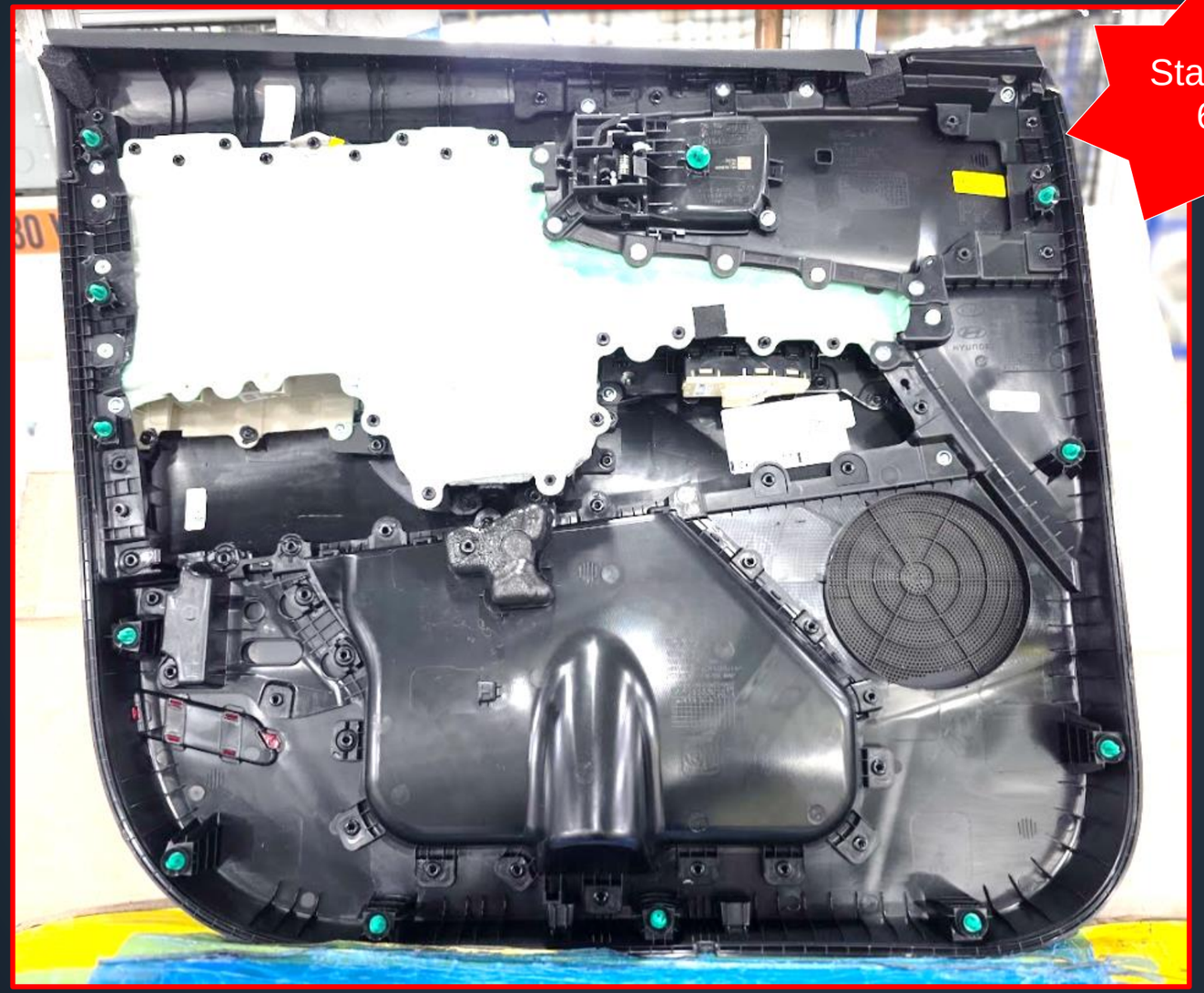


RHR Current Welds

Station 1

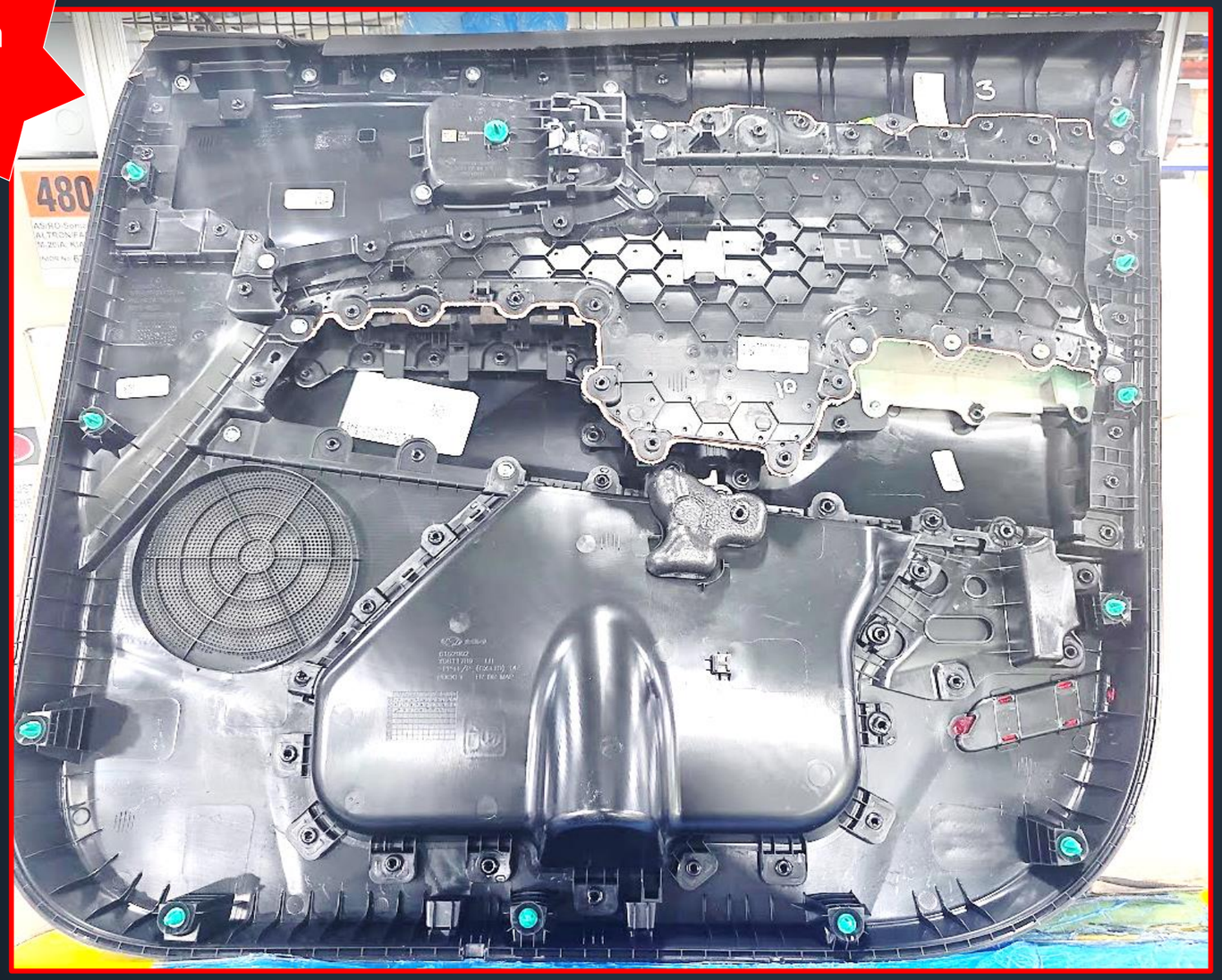


RHF Main Carrier Current Welds



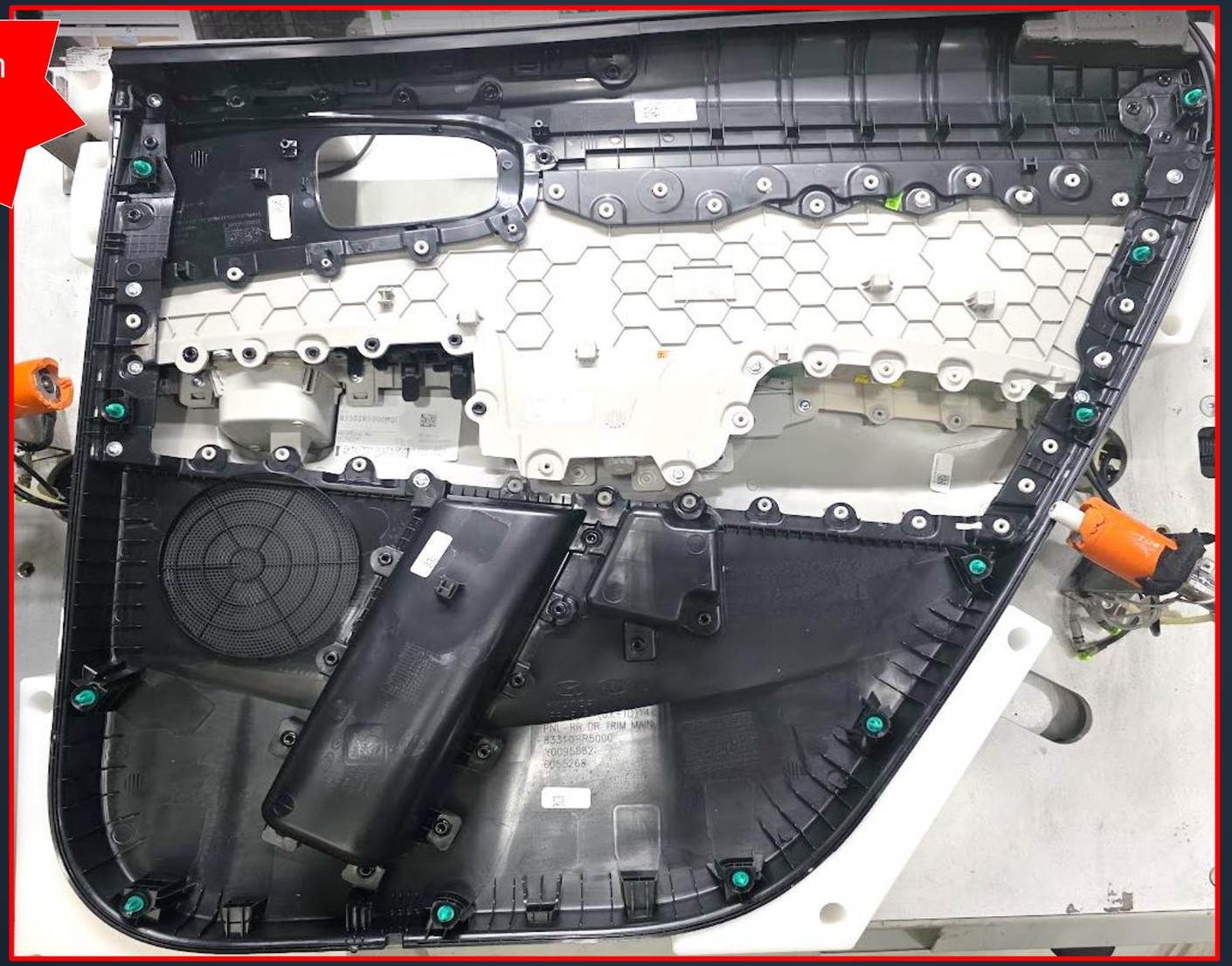
LHF Main Carrier Current Welds

Station 6



LHR Main Carrier Current Welds

Station 6



RHR Main Carrier Current Welds