

Reduction of defects in Kanger 2(TATA Motors)

Kanger 2 was the name given to the now known as Nexon EV in the market. Defect reduction usually involves the following steps that I focused on-

Analysis included:

1. Understanding defect
2. Categorizing defect
3. Finding root cause of defect
4. Generating possible solution to remove the defect

Situation

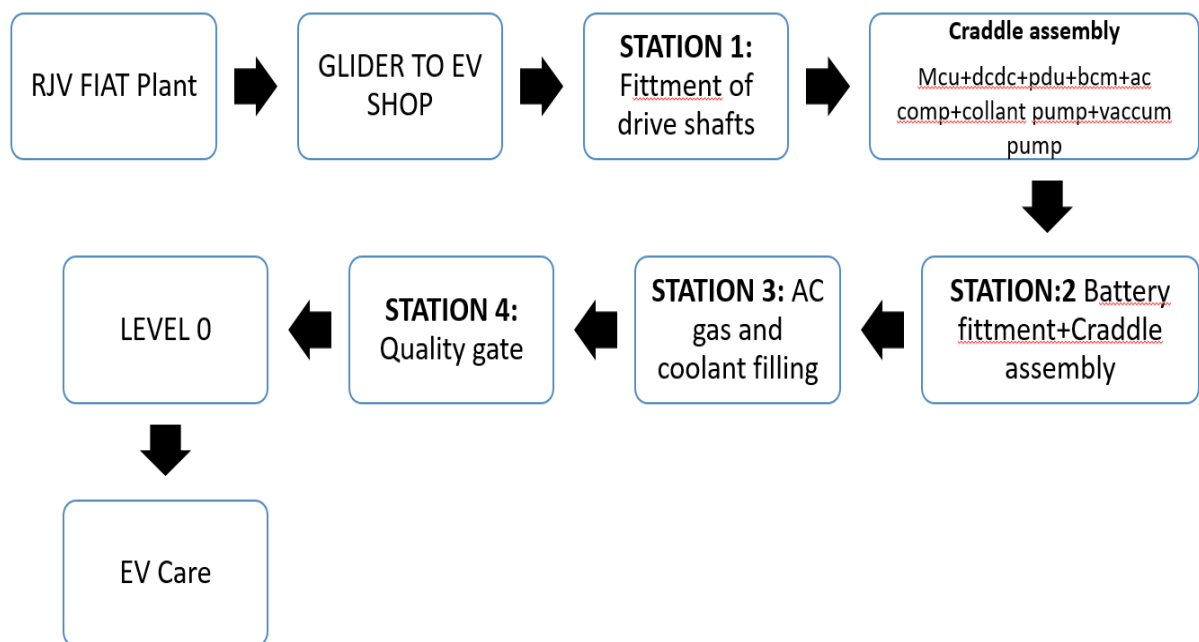
As part of my internship at Tata Motors, I worked on improving the quality of the Nexon EV, specifically addressing defects in the upcoming Kanger 2.0 variant (featuring a 40kWh battery). The EV shop faced challenges with recurring defects at Level 0 (initial inspection) and Level 2 (final quality check), many originating from the Ranjangaon (RJV) plant or design limitations. These defects, including mechanical routing issues and electrical faults, increased rework time and delayed production.

Task

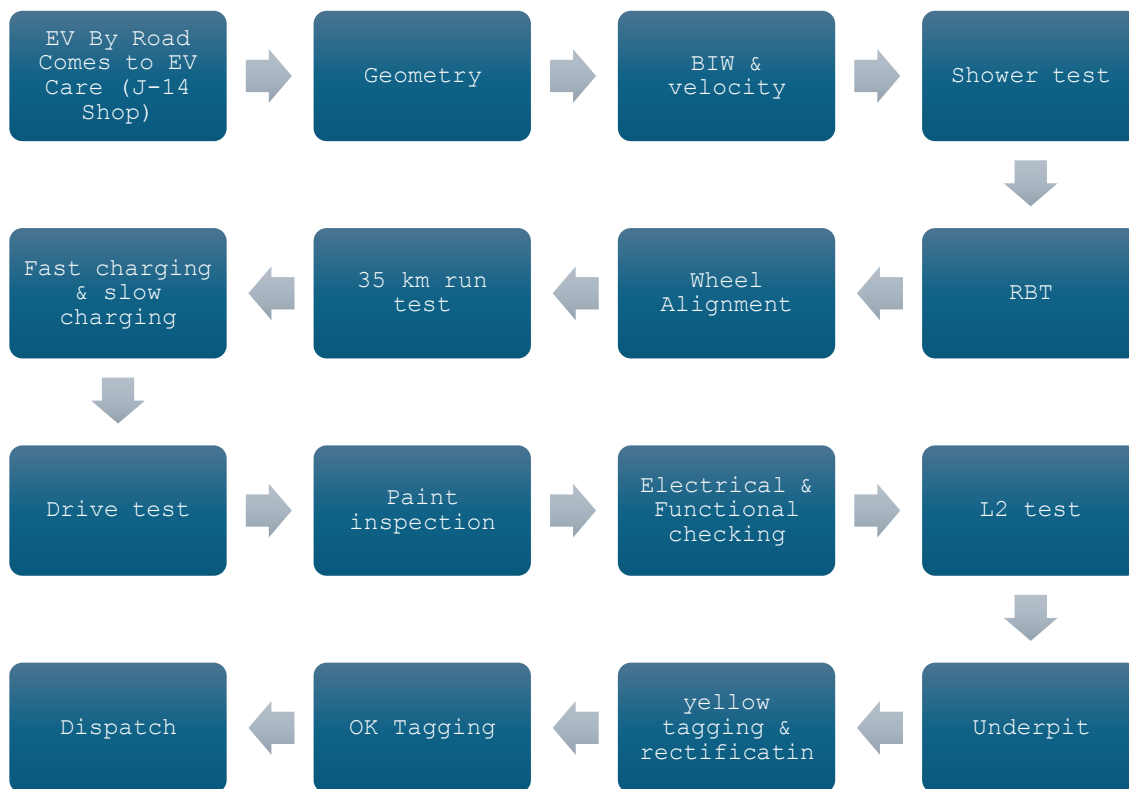
My task was to identify, categorize, and analyse defects at Level 0 and Level 2, determine their root causes, and propose solutions to reduce their occurrence. The objective was to minimize production time by eliminating defects early in the process, ensuring fewer fallouts during quality assurance (QA) checks, and improving the reliability of the Nexon EV Kanger 2.0.

The image below shows the path of production of this vehicle-

EV Shop layout



After the vehicle reaches EV care the image below will show the next operations needed to be conducted.



This is where my work begins. I had to majorly focus on the processes mentioned above in the image and make sure that there are no repeated defects. I also had to inspect the defected vehicles, identifying the root cause and avoiding the repetition of these errors. The SOP of the production process was quite set before my arrival as Tata Motors is a big firm so I could focus completely on defects occurred in each station and could work on each defect individually.

Action

I undertook the following actions to achieve the project goals:

1. **Defect Identification and Data Collection:** I collected data on defects from QA reports, focusing on the top 10 defects at Level 2 and shower test defects from RJV. I categorized defects by origin (RJV, EV shop, or design) to understand their sources. For example, RJV defects included improper routing of HV cables, while EV shop defects involved fitment errors.

2. Root Cause Analysis: I conducted a detailed analysis of each defect to identify root causes. For instance, HV battery fitment issues at Station 3 were due to inconsistent hose pipe alignment, while shower test failures stemmed from panel misalignments from RJV. I used fishbone diagrams to map out causes, such as equipment calibration errors or operator training gaps.
3. Solution Development: I proposed targeted solutions for each defect category:
 - RJV Defects: I drafted a communication to the Ranjangaon plant, recommending stricter quality checks on cradles before shipping. I suggested standardized checklists for HV cable routing to prevent misrouting.
 - EV Shop Defects: I recommended operator training for precise fitment of HV batteries and hoses, along with calibration of tools at Station 3 to ensure accurate torque application.
 - Design Defects: Although major design changes were not feasible, I suggested minor adjustments, such as improved sealing for shower test panels to reduce water ingress.

I am adding images of some of these errors captured on the respective shop or during the respective procedure and reduced its repetition.

Kanger 2 - BITS																	
Sr	Reported date	PPPT	Sever	Fitment Locati	Category	Aggregati	Issue Description	Resp.	Date wise Remarks/ Actions from CoC	Stat	Beta 13 20-	Beta 14 03-	Beta 15 03-	DML Num	Release Target Da	Part Availability Date	Date to Green
1	08-07-2021	Design	Medium	EV Shop	Assy Feasibility	ERC - E&E LV	Three in one 'coolant In' hose's separator clamp undersized (separator clamp on WH)	ERC - E&E LV	Design change to be done for releasing the clamp for hose of OD 27 mm. Current clamp is for hose of OD 23 mm.	R	X	X	X				
2	08-07-2021	Design	Medium	EV Shop	Quality	ERC - E&E LV	Three in one 'coolant In' hose fouling to signal branch of wiring harness	ERC - E&E LV	Intended separator is not available now, this harness will be available from beta 14	B	X	Ok	Ok	18PMJ16168			
3	08-07-2021	Design	Medium	EV Shop	Assy Feasibility	ERC - Advance Engg	Earthing cable (51238000123) parking clip missing	ERC - Advance Engg	Proto part, Earthing cable 512380100123 A3 has clip in design, intended part not available.	B	X	Ok	Ok				
4	08-07-2021	Design	High	EV Shop	Quality	ERC - HVAC	Suction hose compressor side (512383606908) fold/ pinch	ERC - HVAC	Issue not observed after the other end of suction hose is fitted. Issue disappeared in Beta 13 after fitment of hose at other end.	R	X	X					
5	08-07-2021	Design	High	EV Shop	Quality	ERC - E&E LV	AC Compressor LV connector branch in tension	ERC - E&E LV	Root Cause- Beta Phase I Wiring Harness used on these vehicles, for first 13 vehicles this issue will be observed Action Plan-Increased Length Branch will be implemented in Beta Phase II wiring harness(14th Beta onwards)	B	X	Ok	Ok	DML 18PMJ16168			

Image 1 1 This image shows the defects captured in the EV shop and the actions taken for it.

Sr.no	PPD	Number	Issue Description
1	RJV	B-17,18	IVBAC LV w/H clip parking not done due to bracket missing/wrong bracket fitted
2	RJV	B-17	Front suspension omtg on Blw rubber cap missing on suspension tower
3	RJV	B-17	Driver seat mtg screw not fitted
4	RJV	B-17,19	Door setting not okay
5	RJV	B-17	Brake tube mtg clamp missing on IVBAC mtg bracket
6	RJV	B-17,19	Seat mtg & A mount fitment torque mark missing
7	RJV	B-17,19	Cradle mtg, subframe mtg, RTB mtg & wheel mtg torque mark missing
8	RJV	B-17,18	Regen,eco & sport mode switch proper fitment to be done
9	RJV	B-17,18,21	Spare wheel missing
10	RJV	B-17	Spare wheel carpet cover missing
11	RJV	B-17,19	Steering nacelle gap hider properly not fitted
12	RJV	B-17	Eco & sport mode switch wrong fitted(regen switch fitted)
13	RJV	B-17	Front strut mtg & banjo tightening torque mark missing
14	RJV	B-17	Tool kit missing
15	RJV	B-17,18,19,21	Minifuse box mtg bracket missing
16	RJV	B-17,18,19	Dust sensor mtg bracket missing
17	RJV	B-21	VCU connector mating not done
18	RJV	B-21,19	Front w/H parking bracket missing LH side
19	RJV	B-21,18,19	Battery -ve parking not done
20	RJV	B-21	Front w/H LH side separator clamp not parked on brake tube
21	RJV	B-21,18,19	Firewall Insulation button missing
22	RJV	B-21	Combo to Blw earth cable fitment not done
23	RJV	B-21	Battery +ve cap broken
24	RJV	B-21	AC pipe fouling with fuse box & front w/H
25	RJV	B-21	Bonnet opening cable routing wrong
26	RJV	B-21	RH head lamp w/H mtg bracket intrap between aux tank mtg on Blw
27	RJV	B-21,19	Leaf screen mtg on water channel wrong hardware fitted
28	RJV	B-21,18	Telematic w/H connector meeting & parking not done

Image 1 2- This image shows the most common defects captured

Collaboration and Reporting: I collaborated with cross-departmental teams, including the Electronic Division (ED) for TDS Tool usage, and presented my findings to Mr. Nitin Kolekar and Mr. Vajinath Gochikar (TCF Head). I used data tables to show defect trends and reduction rates, ensuring actionable insights were shared with relevant agencies.

Results-

The project significantly reduced defects at Level 0 and Level 2, with a notable decrease in RJV-origin defects after implementing stricter quality checks at Ranjangaon. The SOP for defect rectification reduced rework time by standardizing processes, enabling faster clearance of vehicles during QA checks. Shower test defects dropped due to improved panel alignment and sealing techniques. The use of the TDS Tool minimized electrical defect resolution time, enhancing Level 2 efficiency. My analysis and recommendations were incorporated into the EV shop's quality improvement plan, contributing to the smoother production of the Kanger 2.0 variant. This project honed my skills in quality control, root cause analysis, and cross-functional collaboration, equipping me for challenges in automotive engineering.

