

Your Ref : S1M038QS
Our Ref : CS4/ASM21005094/N

27 April 2021

M/s AXA Insurance Pte. Ltd.
8 Shenton Way #24-01
AXA Tower
Singapore 068811
(Motor Claims Department)

TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE INSURED VEHICLE SHD 3272X ON 22 APRIL 2021

1. We refer to your letter dated 23 April 2021 and the instructions therein.
2. Our analysis, comments and opinions with respect to the cause of fire to the insured vehicle SHD 3272X (herein referred to as “**Insured Vehicle**”) are set out below.

Inspection of the Insured Vehicle

3. The Insured Vehicle was physically inspected on 26 April 2021 at the premises of ComfortDelGro Engineering Pte. Ltd. (herein referred to as “**CDGE**”) located 59 Loyang Drive, Singapore 508969. A static inspection was carried out to the Insured Vehicle where the following general information was recorded:-

Vehicle Registration No.	: SHD 3272X
Make / Model	: HYUNDAI I40 1.7L CRDI F/L AT ABS AIRBAG 4DR
Chassis No	: KMHLB41UMGU092273
Year of Registration	: July 2016
Mileage	: N.A. (battery melted)

4. The Insured Vehicle was noted to have sustained fire damage that was confined to its frontal portion. The entire engine compartment of the Insured Vehicle was observed to be severely burnt while the interior compartment was observed to be seriously affected by the fire.
5. The fire had resulted in the body parts at the frontal portion of the Insured Vehicle to be burnt. This had included its front bumper, front bonnet, front grille, front headlamps, front windscreen and front windscreen wipers, amongst others. See photos 1 – 6 below.



Photo 1 shows the general view of the right rear portion of the Insured Vehicle at the time of our inspection. The rear portion of the Insured Vehicle was relatively unaffected by the fire.



Photo 2 shows the general view of the frontal portion of the Insured Vehicle at the time of our inspection. The fire damage to the Insured Vehicle was confined to its frontal portion. The entire engine compartment of the Insured Vehicle was observed to be severely burnt while the interior compartment was observed to be severely affected by the fire.



Photo 3 shows the closer view of the right front body of the Insured Vehicle at the time of our inspection. The fire damage to the Insured Vehicle was confined to its frontal portion. Its front bumper, front bonnet, front grille, front headlamps, front windscreen and front windscreen wipers were amongst the body parts that were found to have been affected by the fire.



Photo 4 shows the general view of the front windscreen of the Insured Vehicle at the time of our inspection. The fire damage to the front windscreen was severe.



Photo 5 shows the engine compartment of the Insured Vehicle at the time of our inspection. The entire engine compartment of the Insured Vehicle was observed to be severely burnt. Most of the parts inside the engine compartment were found to be burnt and/or melted as a result of the fire.



Photo 6 shows the interior compartment of the Insured Vehicle, which was seriously affected by the fire.

6. At the time of inspection of the Insured Vehicle, we did not find any additionally fitted electronic and/or electrical component(s) on the Insured Vehicle. There also appears to be no modification(s) fitted on the Insured Vehicle.

Investigation and Technical Analysis

7. For this particular case, the fire appears to have originated within the engine compartment of the Insured Vehicle, somewhere around the right portion of the engine compartment. This can be determined due to the nature of the fire damage which was more extensive at the right portion, the burn pattern found on the right portion of the front bonnet of the Insured Vehicle and also the high heat intensity burn marks (whitish burn marks) as well as rust that had developed on the underside of the front bonnet, at the right portion.
8. The whitish burn marks are a result of exposure to prolonged heat intensity. Rust would normally start to develop around these areas soon after a fire as prolonged exposure to high heat intensity usually causes steel/metal material body parts to be exposed to natural environmental condition. The rust that had developed on the underside of the front bonnet, around the right portion, is an indication that the right portion of the engine compartment had sustained exposure to prolonged high heat intensity. See photos 7 - 9 below.



Photo 7 shows the burn pattern that was found on the right portion of the front bonnet of the Insured Vehicle (arrowed). Such whitish burn marks are a result of exposure to prolonged heat intensity, which may indicate where the fire had started. Rust would also begin to develop on these areas soon after the fire.



Photo 8 shows the whitish marks that were found on the underside of the front bonnet of the Insured Vehicle, at the right portion (circled). Such whitish burn marks are a result of exposure to prolonged heat intensity, which may indicate where the fire had started. Rust would also begin to develop on these areas soon after the fire.



Photo 9 shows the rust that had developed on the underside of the front bonnet, around the right portion (circled). The development of rust is an indication that this area was subjected to prolonged exposure to high heat intensity, which had caused the steel/metal material of the front bonnet to be exposed to natural environmental condition. Hence the fire to the Insured Vehicle can be determined to have originated towards the right portion of the engine compartment.

9. Upon closer examination of the right portion of the engine compartment, which was where the fire to the Insured Vehicle had likely started, we had found greenish residue on several burnt stretches of original factory fitted wirings around the right portion of the engine compartment. The presence of such greenish residue indicates internal heating of copper wires, a sign of an electrical short circuit occurring. The greenish residue is normally left behind from oxidation as a result of chemical reaction involving the copper wires. This physical evidence would then appear to suggest that the cause of fire to the Insured Vehicle could have possibly been due to electrical in nature. See photos 10 - 13 below.



Photo 10 shows the original factory fitted wirings around the right portion of the engine compartment, which is in the immediate vicinity where the fire to the Insured Vehicle had likely started. We had found greenish residue on several burnt stretches of these wirings (circled). The presence of such greenish residue indicates internal heating of copper wires, a sign of an electrical short circuit occurring. The greenish residue is normally left behind from oxidation as a result of chemical reaction involving the copper wires.



Photo 11 shows a closer view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (arrowed). The presence of such greenish residue suggests occurrence of an electrical short circuit.

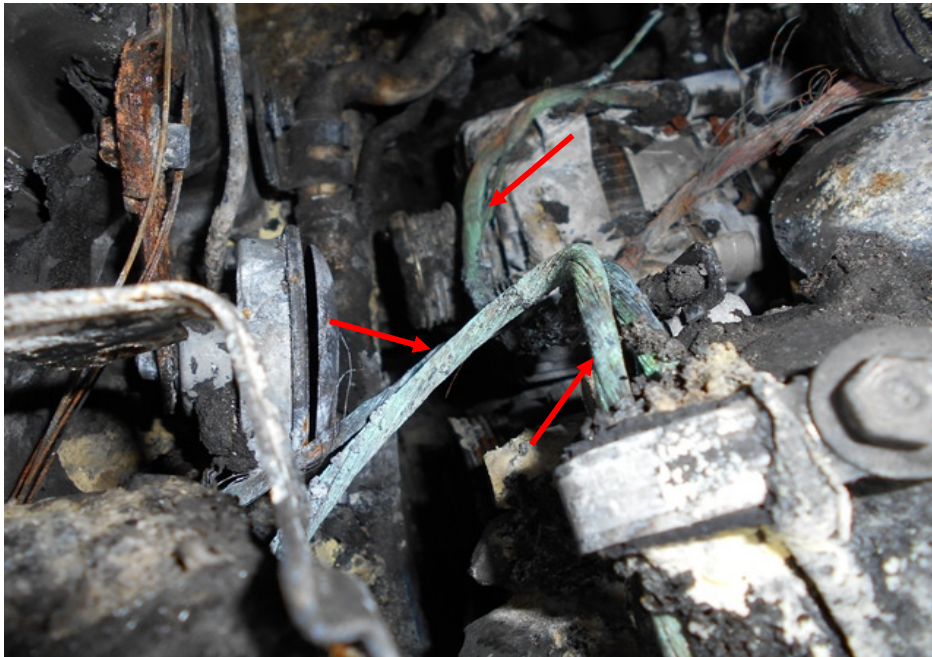


Photo 12 shows a close up view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (arrowed). The presence of such greenish residue suggests occurrence of an electrical short circuit.

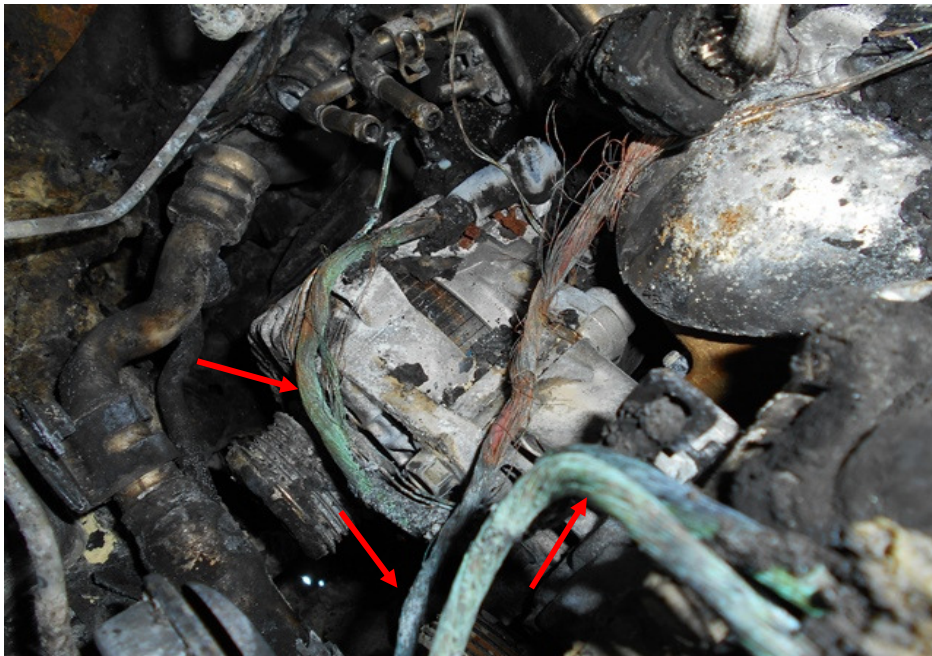


Photo 13 shows a close up view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (arrowed). The presence of such greenish residue suggests occurrence of an electrical short circuit.

10. From the Singapore Accident Statement which was made by Mr Lim Ang Swee Stephen (herein referred to as “**Mr Lim**”), we note that the fire to the Insured Vehicle had started at a time when it was being driven. Mr Lim was first alerted of the fire when there was a burning smell coming from the Insured Vehicle.
11. We were able to gather further information pertaining to the incident as well as information pertaining to the history of the Insured Vehicle.
12. According to Mr Lim, on 22 April 2021 at about 1000 hours he had dropped a passenger at Chinatown and decided to drive to the Tekka Centre taxi stand. While he was waiting in line, a passer-by informed Mr Lim that there was white smoke emitting from the exhaust muffler of the Insured Vehicle. Mr Lim alighted and inspected the Insured Vehicle. He saw white smoke emitting from the exhaust muffler. He then checked the speedometer panel if there were any warning lights displayed. Since he saw none, he decided to drive to CDGE to get the Insured Vehicle examined.
13. He travelled along Serangoon Road towards PIE (Changi). As he passed the Kitchener Road junction, he noticed a burning smell coming from the Insured Vehicle. He decided to stop the Insured Vehicle at the right side of Serangoon Road, before Kitchener Link. He switched off the engine and released the front bonnet hatch. When he lifted up the front bonnet, the right portion of the engine compartment was on fire. Mr Lim quickly retrieved a fire extinguisher from the Insured Vehicle and tried to put out the fire but to no avail. A construction worker who was near the incident scene also helped with a fire extinguisher but the fire had gotten bigger.
14. Mr Lim mentioned that the police and SCDF arrived whilst he was attempting to put out the fire and extinguished it shortly after. The police took Mr Lim’s statement. Mr Lim also assisted the SCDF in their preliminary investigations. EMAS towing personnel were also present at the incident scene and informed Mr Lim that they could assist Mr Lim in towing the Insured Vehicle to an open carpark near Paya Lebar Road. Mr Lim hitched a ride with EMAS. After the Insured Vehicle was towed to Paya Lebar Road, Mr Lim called CDGE and made towing arrangements.
15. The tow truck had arrived around 1300 hours. The Insured Vehicle was towed to CDGE. Mr Lim filed an insurance report the following day, on 23 April 2021.

16. With regard to the history of the Insured Vehicle, we were able to gather from Mr Lim that he is the hirer of the Insured Vehicle. He mentioned that he had no issues whilst driving the Insured Vehicle. There was no loss of power to the Insured Vehicle.
17. Mr Lim also informed us that ever since he drove the Insured Vehicle, he has not done any modification(s) and/or additionally fitted any electrical or electronic component(s) to the Insured Vehicle.
18. Mr Lim told us that he neither noticed any warning lights nor abnormally high temperatures whilst driving the Insured Vehicle. According to Mr Lim, the SCDF had not informed him how the fire to the Insured Vehicle had started.

Incident Scene Photographs

19. We were able to obtain photographs of the Insured Vehicle which were taken after the fire had been extinguished. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Lim. Our close examination of this photograph also showed no unusual foreign material(s) and/or object(s) found on the ground in the immediate area of the parking lot where the Insured Vehicle was parked. It was also observed that a motor van parked on the right side of the Insured Vehicle had sustained damage of heat nature at its left side. See photos 14 - 16 below.



Photo 14 shows the Insured Vehicle on fire before the arrival of the SCDF. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Lim, which is the fire had started from the right portion of the engine compartment of the Insured Vehicle (arrowed).

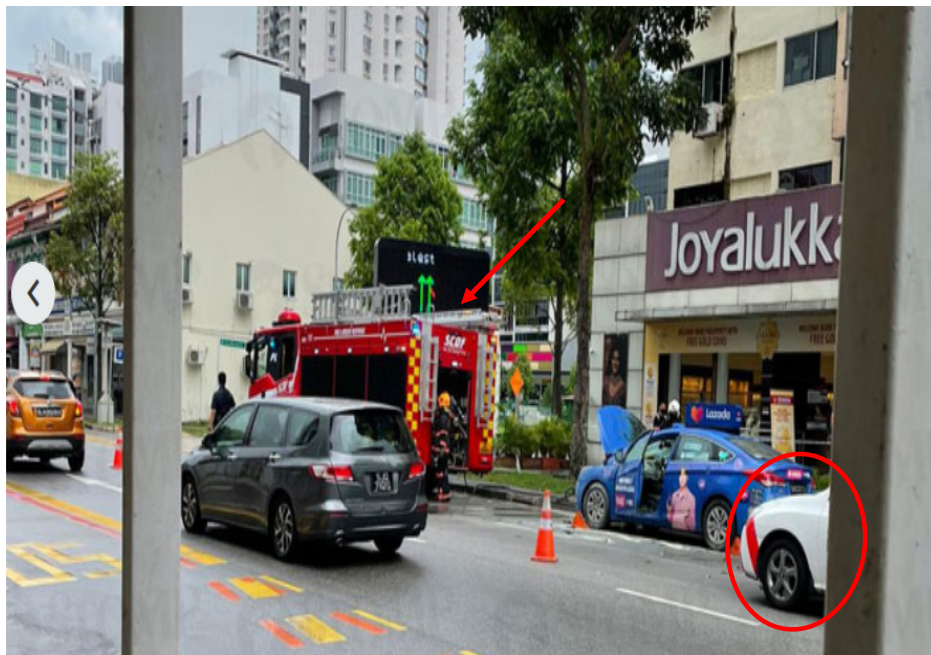


Photo 15 shows Insured Vehicle after the fire was extinguished by the SCDF. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Lim, which is the police (circled) and SCDF (arrowed) were present at the incident location.



Photo 16 shows the Insured Vehicle after being towed to an open carpark near Paya Lebar Road by EMAS towing personnel post- incident.

20. Pertaining to the maintenance aspect, the Insured Vehicle is serviced at a ComfortDelGro workshop located in Loyang.
21. During the course of our investigations, we were also able to obtain from Mr Lim Tien Siong, who is a service advisor at CDGE, documents relating to the servicing of the Insured Vehicle. The Insured Vehicle was last serviced on 23 March 2021, about a month before the incident occurred.

22. The servicing package had included the changing of engine oil, oil filter and air filter. The compressor assembly, expansion valve, motor heater blower and tyres were also replaced. Refer to Invoice 1 below.

Date: 26.04.2021		TAXI SERVICE HISTORY		Time: 17:47:11	
YTSS11F				Page: 1	
Taxi Nos: SHD3272X		Model: I-40	Reg Date: 28.07.2016	Workshop: LY	
Serviced on: 23.03.2021 / 08:42:18		Time Out: 23.03.2021 / 12:38:50			
Remarks: (I40 PM Service, No air con. Head lamp. En)					
Job Card Nos: 603245731		Type: JP	Odometer Reading: 612,323		
PM/PROBLEM REPORTED					

20.0 Mechanical Team Repair - U-ESwords					
20.1 Service - USE SWORDS ONLY					
QC QC TEST BY LAT - Swords					
MATERIAL CHANGED					

SN	DESCRIPTION	QTY			
1	OIL FILTER	1.000	EAC		
2	FILTER-AIR CLEANER	1.000	EAC		
3	HALOGEN BULB H7 12V55W 2PIN	2.000	EAC		
4	BULB PANEL BU-504 12V5W	2.000	PC		
5	COMPRESSOR ASSY	1.000	EAC		
6	VALVE-EXPANSION	1.000	EAC		
7	MOTOR HEATER BLOWER	1.000	EAC		
8	CABIN FILTER ASSY-AIR	1.000	EAC		
9	TYRE WESTLAKE RP26 205/60R16	2.000	EAC		
10	GLXXMOBIL-SUPER-3000-XE-5W30 (TOTE)	5.250	L		
REMARKS					

SN	DESCRIPTION				
3	I40 PM Service, No air con. Head lamp. En				

Invoice 1 shows the servicing done on the Insured Vehicle at the CDGE workshop at Loyang on 23 March 2021 (red arrows). The servicing package had included the changing of engine oil, oil filter and air filter. The compressor assembly, expansion valve, motor heater blower and tyres were also replaced (circled).

23. Based on the vehicle service record invoice provided, we are of the opinion that it is unlikely that the fire could have been caused by poor maintenance of the Insured Vehicle.

24. Given the circumstances of incident as reported, the possibility of the cause of fire to the Insured Vehicle being due to engine overheating would seem unlikely as Mr Lim had mentioned to us there were no indications of abnormally high temperatures when he was driving the Insured Vehicle on the day of the incident. Moreover, an overheated engine would have caused the Insured Vehicle to stall. However in this case, Mr Lim was the one who noticed a burning smell while he was driving and stopped the Insured Vehicle. Therefore, we are of the opinion that the fire was not caused by an overheated engine.


25. The possibility of the fire being due to external factors (foreign material(s) stuck on hot surfaces, arson and sabotage amongst others) would also seem unlikely as the location where the Insured Vehicle caught fire was observed to be not at a secluded location.
26. The possibility of the fire being due to electrical in nature would then seem more likely given that engine overheating and external factors would both seem unlikely. The fire being due to electrical nature is also supported by the condition of the wirings that were found in the engine compartment of the Insured Vehicle, which was earlier discussed in paragraph 9 above.
27. For this case, the driver had seen white smoke emitting from the exhaust muffler. This is likely to be overheating of the turbocharger or malfunction of the turbocharger. During our physical inspection of the Insured Vehicle, we observed that the turbocharger was fitted at the rear right portion of the engine compartment and this is in the immediate vicinity to where the fire had likely started. See photo 17 below.



Photo 17 shows during our physical inspection of the Insured Vehicle, we observed that the turbocharger was fitted at the rear right portion of the engine compartment (circled) and this is in the immediate vicinity to where the fire had likely started.

28. From the statement of Mr Lim, he had continued to drive the Insured Vehicle after seeing the white smoke emitting from the exhaust muffler. In our opinion, this continued driving had accelerated the heat intensity from the turbocharger which could have then deteriorated the wirings, leading to the electrical short circuit and subsequent fire. In other words, the fire would not have started if the Insured Vehicle was not driven / operated after the white smoke was seen. The fire is a consequence of the continued usage of the Insured Vehicle.

29. Our checks with both local and international bodies and associations had revealed that at the time of writing this report, there is no manufacturer recall of electrical nature to similar make and model vehicle as the Insured Vehicle that may possibly be related to this incident. See search result from LTA below.



Vehicle Recall Details

ONLY INFORMATION ON VEHICLE RECALLS SUBMITTED FROM 9 APRIL 2007 IS AVAILABLE

<i>Owner ID Type</i> Company	<i>Owner ID</i> 821R
<i>Vehicle No.</i> SHD3272X	<i>Make/Model</i> HYUNDAI/ I40 1.7 CRDI F/L AT ABS AIRBAG 4DR
<i>Engine No.:</i> D4FDGU660679	<i>Chassis No.:</i> KMHLB41UMGU092273
<i>Recall Details:</i> No Recall Detail records	

Conclusion

30. Having investigated and technically analysed the damages of burnt nature to the Insured Vehicle, we are of the view that the cause of fire to the Insured Vehicle was of electrical in nature. For this particular case, the fire had originated along the original factory fitted wirings inside the engine compartment, somewhere around the right portion of the engine compartment.
31. For this case, Mr Lim had continued to drive the Insured Vehicle after seeing the white smoke emitting from the exhaust muffler. In our opinion, this continued driving had accelerated the heat intensity from the turbocharger which could have then deteriorated the wirings, leading to the electrical short circuit and subsequent fire. In other words, the fire would not have started if the Insured Vehicle was not driven / operated after the white smoke was seen. The fire is a consequence of the continued usage of the Insured Vehicle.
32. We did not find any evidence which had suggested that the cause of fire to the Insured Vehicle was due to poor maintenance and/or recurring electrical problem.
33. There were no modification(s) or additional electronic and/or electrical component(s) fitted on the Insured Vehicle at the time of our inspection of the Insured Vehicle.
34. Our investigations had also revealed that at the time of writing this report, there is no manufacturer recall of electrical nature to similar make and model vehicle as the Insured Vehicle that may possibly be related to this incident.

35. SCDF was activated to attend to the fire incident and a fire report pertaining to their findings will likely be forthcoming. We have applied for this fire report and will forward a copy of the report once it is made available to us.

**Muhd Nazril***Senior Technical Investigator***Ang Bryan Tani***AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA**Senior Technical Investigator**Technical Investigation & Reconstructionist (SAE-A)*

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