

Our Ref : CS/FCI18006948/N

15 April 2018

M/s First Capital Insurance Limited

36 Robinson Road #16-01

City House

Singapore 068877

TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE INSURED VEHICLE SHD 6966H ON 30 MARCH 2018

1. We refer to your letter dated 12 April 2018 and the instructions therein.
2. Our analysis, comments and opinions with respect to the cause of fire to the insured vehicle SHD 6966H (herein referred to as "**Insured Vehicle**") are set out below.

Inspection of the Insured Vehicle

3. The Insured Vehicle was physically inspected on 13 April 2018 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 6966H
Make / Model	: Hyundai I40 1.7 CRDI F/L AT ABS AIRBAG 4DR
Chassis No	: KMHLB41UMGU078467
Year of Registration	: October 2015
Mileage	: N.A. (battery melted)

4. The Insured Vehicle was noted to have sustained fire damage that was confined to its front portion. The entire engine compartment of the Insured Vehicle was observed to be severely burnt while the interior compartment was observed to be relatively unaffected by the fire except for the centre portion of the dashboard panel which was observed to be partially burnt and/or melted.
5. The fire had resulted in the body parts at the front portion of the Insured Vehicle to be burnt. This had included its front bumper, front bonnet, front grille, front headlamps, and front windscreen, amongst others. See photos 1 – 4 below.

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Photo 1 shows the general view of the front portion of the Insured Vehicle at the time of our inspection. The fire damage to the Insured Vehicle was confined to its front portion. Its front bumper, front bonnet, front grille, front windscreen and front headlamps were amongst the body parts that were found to have been affected as a result of the fire.



Photo 2 shows the general view of the front windscreen of the Insured Vehicle at the time of our inspection. The fire damage to the Insured Vehicle was confined to its centre portion.



Photo 3 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 4 shows the interior compartment of the Insured Vehicle which was relatively unaffected by the fire except for the centre portion of the dashboard panel which was observed to be partially burnt and/or melted (circled).

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 rear left portion of the engine compartment. This can be determined from the burn pattern and the high heat intensity burn marks (whitish burn marks) found on the rear right portion of the bonnet of the Insured Vehicle and also the rust that had developed on the underside of the front bonnet, at the bottom 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 bottom right portion, is an indication that the rear right portion of the engine compartment had sustained exposure to prolonged high heat intensity. See photos 5 & 6 below.



Photo 5 shows the burn pattern and whitish burn marks that were found on the rear right portion of the front bonnet of the Insured Vehicle (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 6 shows the rust that had developed on the underside of the front bonnet, around the bottom 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 rear right portion of the engine compartment.

9. Upon closer examination of the rear 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 rear 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 7 - 10 below.



Photo 7 shows the original factory fitted wirings around the rear 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 (arrowed). 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 8 shows a closer view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (circled). The presence of such greenish residue suggests occurrence of an electrical short circuit.



Photo 9 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 10 shows a close up view of the greenish residue found on some of the burnt stretches of original factory fitted wirings (circled). The presence of such greenish residue suggests occurrence of an electrical short circuit.

10. From the Singapore Police Report No. J/20180331/2068 and Accident Statement, which were made by Mr Toh Francis (herein referred to as “Mr Toh”), we note that the fire to the Insured Vehicle had started at a time when he was parking. Mr Toh was first alerted of the fire when he saw white smoke coming out of the front bonnet of the Insured Vehicle.
11. We managed to speak to Mr Toh on 15 April 2018 where 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 Toh, he started his shift at about 1000hrs on 30 March 2018. He made a check on the Insured Vehicle prior to the start of his shift. According to Mr Toh, there were no issues with the Insured Vehicle. He proceeded with a couple of trips and took a few bookings before going to the Beach Road Hawker Centre for lunch. He bought food for his family and left for home at 1215 hours. Mr Toh reached the open space carpark of his home located at Block 241 Bukit Batok East Avenue 5 at about 1240 hours. He reversed parked the Insured Vehicle. He stays in a unit on the ground floor.
13. After he had parked the Insured Vehicle, he saw white smoke emitting from the rear portion of the front bonnet. He was also alerted of the white smoke by a passer-by. Mr Toh immediately switched off the engine and quickly retrieved the fire extinguisher from the boot as he also saw some sparks from the front bonnet. Mr Toh attempted to put out the fire but was unsuccessful. He called out to his brother to contact the SCDF while he called CDGE to report the incident.
14. The police arrived at 1255 hours followed by the SCDF at 1300 hours. The fire was extinguished shortly after. The police took Mr Toh’s statement and he also assisted the SCDF in their preliminary investigations. Mr Toh made towing arrangements at 1400 hours. The police and SCDF had left the incident location by the time the tow truck arrived. The Insured Vehicle was towed to CDGE.
15. Mr Toh made the insurance report at CDGE the next day, 31 March 2018 at 1304 hours. He lodged a police report at the Bukit Batok Neighbourhood Police Centre later that day at 1410 hours.
16. With regard to the history of the Insured Vehicle, we were able to gather from Mr Toh that he is the hirer of the Insured Vehicle. To the best of his recollection, there has not been any major mechanical problem and/or electrical problem with the Insured Vehicle.

17. Mr Toh 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 Toh told us that he neither noticed any warning lights nor abnormally high temperatures whilst driving the Insured Vehicle.

Incident Scene Photographs

19. We were able to obtain from Mr Toh several photographs of the Insured Vehicle which were taken after the fire had been extinguished. In general, the information that could be gathered from these photographs had corresponded to the events that were related to us by Mr Toh. Our close examination of these photographs also showed no unusual foreign material(s) and/or object(s) found on the ground in the immediate area of the lot where the Insured Vehicle was parked. See photos 11 - 16 below.



Photo 11 shows the Insured Vehicle after the fire was extinguished. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Toh, which is the fire broke out after he had parked the Insured Vehicle at the parking lot.



Photo 12 shows firefighters attempting to put out the fire to the Insured Vehicle.



Photo 13 shows firefighters ensuring that the fire had been completely extinguished (arrowed). In general, the information that could be gathered from this photograph had corresponded to Mr Toh's account of the incident, which is the police (arrowed) and SCDF were present at the incident location.



Photo 14 shows the engine compartment of the Insured Vehicle post- incident. In general, the damages sustained to the engine compartment and the fire extinguisher residue found all around the engine compartment had corresponded to the events that were related to us by Mr Toh, which is the fire had started from the engine compartment.



Photo 15 shows the burnt marks and/or burnt residual remains on the ground of the lot where the Insured Vehicle was parked (circled), taken after the Insured Vehicle was towed to CDGE. Our close examination of this photograph showed no unusual foreign material(s) and/or object(s) found on the ground in the lot where the Insured Vehicle was parked at the material time of incident.



Photo 16 shows the Insured Vehicle in the parking lot after the fire was extinguished. Our close examination of this photograph showed no unusual foreign material(s) and/or object(s) found on the ground in the immediate area of the lot where the Insured Vehicle was parked.

20. Pertaining to the maintenance aspect, Mr Toh services the Insured Vehicle at a ComfortDelGro workshop located in Sin Ming and the last servicing was done on 16 March 2018, approximately 2 weeks before the incident occurred.
21. During the course of our investigations, we were also able to obtain from Mr Lim Tien Song, who is a service advisor at CDGE, documents relating to the servicing of the Insured Vehicle for the past 3 months. We noted that there was an issue with the air-conditioning in the Insured Vehicle but it was rectified as per the 27 January 2018 invoice without further complaint of similar nature recorded.

22. The latest servicing package included changing of engine oil, oil filter and auto transmission fluid (ATF). The battery and engine mounting bracket assembly were also replaced. Refer to Invoices 1- 3 below.

Date: 30.03.2018 TAXI SERVICE HISTORY Time: 16:15:43
YTSS11F Page: 1

Taxi Nos: SHD6966H ← Model: I-40 Reg Date: 08.10.2015 Workshop: SM

Serviced on: 27.01.2018 / 15:30:00 ← Time Out: 28.01.2018 / 10:53:38
Remarks: (AIR CON NOT COLD (O/N))
Job Card Nos: 602737424 Type: JC Odometer Reading: 316,018

PM/PROBLEM REPORTED

1.0 Aircon Team Repair - Chung Min Sung
1.1 A/Con Not Cold
QC QC TEST BY LAT - Leong Chun Kit

MATERIAL CHANGED

SN	DESCRIPTION	QTY
1	I40VC CABIN FILTER ASSY-AIR	1.000 EAC
2	I40VC VALVE-EXPANSION	1.000 EAC
3	I40VC VALVE CONTROL	1.000 EAC
4	HYUNDAI DESICCANT-R/DRIER	1.000 EAC
5	I40VC MOTOR HEATER BLOWER	1.000 EAC

Invoice 1 shows the servicing done on the Insured Vehicle on 27 January 2018 (arrowed). There was an issue with the air- conditioning in the Insured Vehicle (circled) but it was rectified as per the 27 January 2018 invoice without further complaint of similar nature recorded.

Serviced on: 06.02.2018 / 09:33:00 ← Time Out: 06.02.2018 / 13:29:24
Remarks: (Next PM-16/03/2018 time-15:30)
Job Card Nos: 602725646 Type: JP Odometer Reading: 319,481

PM/PROBLEM REPORTED

H16 HYUNDAI I-40 DOCKING 6
INSP PRE-VICOM INSPECTION
9.4 Auto Gear Jerky [at stationeery vehicle jerky]
15.5 Undercarriage Noisy - Front Suspension [uneven road and over hump]
15.6 Undercarriage Noisy - Rear Suspension [uneven ropad]
17.1 Wiper Blade/Washer [CHECK]
17.8 Others [when accelerate engine loss powerANDrpm REVOLUTION GOES UP]
H000 Mechanic Team Repair - Chia June Siang
S022 Clear A/C drain pipe
QC QC TEST BY LAT - Choong Chee Hooi
S010 Fire Extinguisher

MATERIAL CHANGED

SN	DESCRIPTION	QTY
1	I40VC V-RIBBED BELT	1.000 EAC
2	I40V2 BRKT ASSY-ROLL ROD	1.000 EAC
3	I40VC ARM ASSY-RR ASSIST	2.000 EAC
4	I40VC DIESEL FUEL FILTER	1.000 EAC
5	(I40/E220)WESTLAKE TYRE 205/60R16 RP26	4.000 PC

Invoice 2 shows the servicing done on the Insured Vehicle on 6 February 2018 (arrowed).

Serviced on: 16.03.2018 / 15:16:00 Time Out: 16.03.2018 / 18:13:53
 Remarks: (Next PM-26/04/2018 time-10:30)
 Job Card Nos: 602750098 Type: JP Odometer Reading: 335,044
 PM/PROBLEM REPORTED
 H11 HYUNDAI I-40 DOCKING 1 - Leong Chun Kit
 9.4 Auto Gear Jerky (WHEN STOPPING GEAR MODE DRIVE BRAKING , TEST DRIVE , MANY TIMES REPORTED)
 H000 Mechanic Team Repair - Tan Jin Yan
 QC QC TEST BY LAT - Choong Chee Hooi

MATERIAL CHANGED

SN	DESCRIPTION	QTY
1	(ALL) (EURO IV) *ENGINE OIL F SYN SAE 5W30	5.300 L
2	I40VC OIL FILTER	1.000 EAC
3	(I40)ATF, FULLY SYN SPIV	4.000 LTR
4	(I40)BATTERY ASSY 85D26LBH 12V80AH	1.000 EAC
5	I40VC BRACKET ASSY-ENGINE MTG	1.000 EAC

Verify by: _____

*****End of report*****

Invoice 3 shows the servicing done on the Insured Vehicle on 16 March 2018 (arrowed). The latest servicing package included changing of engine oil, oil filter and auto transmission fluid (ATF). The battery and engine mounting bracket assembly were also replaced (circled).

23. Based on the vehicle service record invoices provided, we are of the opinion that it is unlikely that the fire could have been caused by poor maintenance of the Insured Vehicle. Complaints highlighted by Mr Toh were all rectified by CDGE without any recurring complaint(s).
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 Toh 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 Toh was the one who noticed smoke emitting from the front bonnet while he was parking the Insured Vehicle and switched off the engine of the Insured Vehicle.
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 fire occurred as Mr Toh was parking the Insured Vehicle. The location where the Insured Vehicle caught fire was also 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. 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.

Enquiry on Vehicle Recall - Vehicle Specific

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

Vehicle Owner Particulars

Owner ID Type: Company

Owner ID: 3821R

Vehicle Details

Vehicle Registration number: SHD6966H

Make: HYUNDAI

Vehicle Model: I40 1.7 CRDI F/LAT ABS AIRBAG 4DR

Engine No: D4FDFUS46190

Chassis No: KM4HLB41UMCU079467

Recall Details

No Recall Detail records

OK

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Conclusion

28. 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 wirings inside the engine compartment, somewhere around the rear right portion of the engine compartment.
29. 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.
30. 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.
31. 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.

**Muhd Nazril***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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