



Auto
Consultants
Pte Ltd

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Your Ref : D18006707MFSH/JY/KT
Our Ref : CI/FCI18018348/N

21 September 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 6567B ON 6 SEPTEMBER 2018**

1. We refer to your letter dated 17 September 2018 and the instructions therein.
2. Our analysis, comments and opinions with respect to the cause of fire to the insured vehicle SHD 6567B (herein referred to as "**Insured Vehicle**") are set out below.

Inspection of the Insured Vehicle

3. The Insured Vehicle was physically inspected on 20 September 2018 at the premises of ComfortDelGro Engineering Pte. Ltd. (herein referred to as "**CDGE**") located at 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 6567B
Make / Model	: HYUNDAI I40 1.7L CRDI AT ABS AIRBAG 4DR
Chassis No	: KMHLB41UMEU061493
Year of Registration	: Dec 2014
Mileage	: N.A. (battery melted)

4. The Insured Vehicle was observed to have sustained severe fire damage all around. Its engine compartment and interior compartment were completely burnt. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time. See photos 1 – 5 below.



Photo 1 shows the general view of the front portion of the Insured Vehicle at the time of our inspection. The Insured Vehicle was observed to have sustained extensive fire damage all around. Its engine compartment and interior compartment were completely burnt. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time.



Photo 2 shows the general view of the left body of the Insured Vehicle at the time of our inspection. The Insured Vehicle was observed to have sustained extensive fire damage. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time.



Photo 3 shows the general view of the right body of the Insured Vehicle at the time of our inspection. The Insured Vehicle was observed to have sustained extensive fire damage. Rust had accumulated all over the Insured Vehicle as a result of exposure to environmental condition for a period of time.



Photo 4 shows the general view of the interior compartment of the Insured Vehicle at the time of our inspection. Its interior compartment was completely burnt as a result of the fire.



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.

5. At the time of inspection, we did not find any unusual skeletal remains which could have suggested that there was possible modification(s) on the Insured Vehicle.

Investigation and Technical Analysis

6. For this particular case, the fire appears to have originated within the engine compartment of the Insured Vehicle given that the fire damage around the engine compartment was most extensive.
7. Upon closer examination of the left portion of the engine compartment we had found greenish residue on several burnt stretches of original factory fitted wirings leading from the battery of the Insured Vehicle. 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 6 - 9 below.



Photo 6 shows the original factory fitted wirings around the left 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 leading from the battery of the Insured Vehicle (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 7 shows 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 8 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 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.

8. From the Singapore Police Report No. J/20180906/2181 and Accident Statement, which was made by Mr Tay Chor Kwee (herein referred to as "**Mr Tay**"), we note that the fire to the Insured Vehicle had started at a time when he was driving. Mr Tay was first alerted of the fire when he saw thick white smoke coming out of the front bonnet of the Insured Vehicle.
9. We managed to speak to Mr Tay on 21 September 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.
10. According to Mr Tay, on 6 September 2018 at about 1300 hours, he together with his wife and cousin were travelling from his home located in Woodlands and heading towards Potong Pasir via the PIE. He exited at Bendemeer. As he waited at the traffic light adjacent to the Ministry of Manpower Services Centre, he noticed white smoke emitting from the top of the front bonnet followed by flames. Mr Tay could not remember if he had turned off the engine as he mentioned that he had panicked when the fire broke out. He quickly got out of the Insured Vehicle together with his wife and cousin. He used his wife's mobile phone to call the SCDF as he had left his in the Insured Vehicle.
11. SCDF, police and an ambulance soon arrived at the incident location. Mr Tay informed us that firefighters took a long time to extinguish the fire. Mr Tay called CDGE to make towing arrangements. The tow truck arrived after the fire was put out shortly after and the Insured Vehicle was towed to CDGE. Mr Tay hitched a ride with the towing personnel to CDGE and made the insurance report. Mr Tay later went to the Woodlands East Neighbourhood Police Centre to lodge a police report at 2159 hours.
12. With regard to the history of the Insured Vehicle, we were able to gather from Mr Tay that he is the hirer of the Insured Vehicle. He has a relief driver who will drive for 3 or 4 days a week. To the best of his recollection, there was no mechanical or electrical/electronic problem with the Insured Vehicle.
13. Mr Tay also told us that he neither noticed any warning lights nor abnormally high temperatures while he was driving the Insured Vehicle. He added that he had not driven the Insured Vehicle early that morning which was his usual routine.

Site Inspection

14. With the information gathered, we visited the incident location on 20 September 2018 taking the reports made by Mr Tay and the information that we had gathered from him as references.
15. Firstly, we note that the incident had occurred at the traffic light of the slip road towards Bendemeer Road adjacent to the Ministry of Manpower Services Centre.
16. At the time of our visit, we observed burn marks and/or burnt residual remains on the ground as well as on the kerb nearest to where the Insured Vehicle was positioned when the fire occurred. We also observed that the traffic light and grass closest to the Insured Vehicle was affected by the fire. A part of the road where the Insured Vehicle was positioned when the fire broke out was repaved. We did not observe any other damaged or newly replaced government property at the time of our visit to the incident location. See photos 10 – 12 below.



Photo 10 shows the slip road towards Bendemeer Road adjacent to the Ministry of Manpower Services Centre where the incident occurred (circled).



Photo 11 shows the burn marks and/or burnt residual remains on the ground of the slip road towards Bendemeer Road adjacent to the Ministry of Manpower Services Centre where the incident occurred (circled). Part of the road where the Insured Vehicle was positioned when the fire broke out was repaved (arrowed).



Photo 12 shows the burn marks and/or burnt residual remains on the ground, kerb and grass nearest to the Insured Vehicle which were affected by the fire (arrowed). We did not observe any other damaged or newly replaced government property at the time of our visit to the incident location.

Incident Scene Photographs

17. We were able to obtain from Mr Tay several photographs of the Insured Vehicle which were taken before, during and after the fire. In general, the information that could be gathered from these photographs had corresponded to the events that were related to us by Mr Tay. 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 along the slip road where the Insured Vehicle was positioned. See photos 13 - 15 below.



Photo 13 shows the Insured Vehicle engulfed in flames 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 Tay, which is the fire had started from the front portion of the Insured Vehicle (arrowed).



Photo 14 shows the Insured Vehicle after the fire was extinguished by firefighters. In general, the information that could be gathered from this photograph had corresponded to the events that were related to us by Mr Tay, which is the SCDF had responded to the incident (arrowed).



Photo 15 shows a rear view of the Insured Vehicle as it was being prepped to be towed away (arrowed). 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 slip road where the Insured Vehicle was positioned when the fire broke out.

18. Pertaining to the maintenance aspect, Mr Tay informed us that the Insured Vehicle was periodically serviced at a ComfortDelGro workshop located in Senoko Drive.



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19. During the course of our investigations, we were also able to obtain from Mr Fauzy bin Mokhtar who is a service advisor at CDGE, documents relating to the servicing of the Insured Vehicle for the past 3 months. We noted that the Insured Vehicle was brought in for an engine overhaul and other repair works on 2 August 2018. See Invoice 1 below.

Serviced on: 02.08.2018 / 10:00:00 Time Out: 02.08.2018 / 17:16:58
Remarks: (Engine Overhaul)
Job Card Nos: 602851609 Type: JC Odometer Reading: 509,986

PM/PROBLEM REPORTED

8.5 Smoky Exhaust
8.6 Engine Overhaul
10.1 Lighting - External
12.1 Steering Noisy
15.0 Mechanical Team Repair - Ng Kok Fei
15.5 Undercarriage Noisy - Front Suspension

QC QC TEST BY LAT - Hong Leong Teck

MATERIAL CHANGED

SN	DESCRIPTION	QTY
1	I40VC ACAMSHAFT ASSY-LH	1.000 EAC
2	I40VC AGUIDE-T/CHAIN	1.000 EAC
3	I40VC AD-RING-FUEL INJECTOR	4.000 EAC
4	I40VC ASQUARE RING[B]-FUEL INJECTOR	4.000 EAC
5	HYUNDAI INJECTOR GASKET(33818-27000)	4.000 EAC
6	I40VC COMPLETE ENGINE ASSY	1.000 EAC
7	I40VC ACHAIN SPROCKET-CAMSHAFT	2.000 EAC
8	I40VC ACHAIN SPROCKET-INJECTION PUMP	1.000 EAC
9	I40V2 ACHAIN SPROCKET-CRANKSHAFT	1.000 EAC
10	I40V2 ACHAIN-TIMING	1.000 EAC
11	I40V2 ACHAIN-HIGH PRESSURE PUMP	1.000 EAC
12	I40VC AGUIDE-T/CHAIN	2.000 EAC
13	I40VC ALEVER-TIMING CHAIN	1.000 EAC
14	I40VC ALEVER-TIMING CHAIN	1.000 EAC
15	I40V2 AGASKET-CYLINDER HEAD	1.000 EAC
16	I40VC GASKET-TIMING CHAIN CASE UPP	1.000 EAC
17	I40VC AASSY-CAM FOLLOWER SHORT	16.000 EAC
18	I40VC ADJUSTER ASSY-ROCKER ARM LASH	16.000 EAC
19	I40VC AHOSE-OIL COOLER RETURN	1.000 EAC
20	I40VC APIPE ASSY-E.G.R COOLER IN	1.000 EAC
21	(I40/SONATA)AAGASKET SILICON (GS-75)*	1.000 EAC
22	I40VC APUMP ASSY-COOLANT	1.000 EAC
23	I40VC AINJECTOR ASSY-FUEL	4.000 EAC
24	I40SONV2 SEAL-OIL RR CRANKSHAFT	1.000 EAC
25	I40VC OIL FILTER	1.000 EAC
26	I40VC AD-RING-EGR COOLER	1.000 EAC
27	I40VC ATENSIONER ASSY	1.000 EAC

REMARKS

SN DESCRIPTION

4

Invoice 1 shows the engine overhaul and other repair works done on the Insured Vehicle on 2 August 2018 (arrowed).

20. The Insured Vehicle was last serviced on 17 August 2018. There were no mechanical issues reported by Mr Tay after the Insured Vehicle underwent an engine overhaul. The servicing package had included changing of engine oil, oil filter, air filter and diesel fuel filter. The front brake pads and radiator cooling fan were also replaced. See Invoice 2 below.

Serviced on: 17.08.2018 / 14:17:00		Time Out: 17.08.2018 / 15:25:11	
Remarks: (+INSP+Next PM-27/09/2018 time-09:30)			
Job Card Nos: 602860368		Type: JP	Odometer Reading: 516,559
PM/PROBLEM REPORTED			
HI6	HYUNDAI I-40 DOCKING 6		
H000	Mechanic Team Repair - Koh Nian Kha		
QC	QC TEST BY LAT - Leong Chee Keong		
MATERIAL CHANGED			
SN	DESCRIPTION	QTY	
1	(ALL)(EURO IV)ENGINE OIL F SYN SAE 5W30	5.300	L
2	140VC OIL FILTER	1.000	EAC
3	140VC FILTER-AIR CLEANER	1.000	EAC
4	140VC CABIN FILTER ASSY-AIR	1.000	EAC
5	140VC DIESEL FUEL FILTER	1.000	EAC
6	140VC PAD KIT-FR DISC BRAKE	1.000	EAC
7	140VC MOTOR-RADIATOR COOLING FAN	1.000	EAC
REMARKS			
SN	DESCRIPTION		
5	HI6 - 120,000 KM		

Invoice 2 shows the latest servicing done on the Insured Vehicle on 17 August 2018 (arrowed). There were no mechanical issues reported by Mr Tay after the Insured Vehicle underwent an engine overhaul. The servicing package had included changing of engine oil, oil filter, air filter and diesel fuel filter. The front brake pads and radiator cooling fan were also replaced (circled).

21. 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.

22. 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 Tay 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 Tay was the one who noticed thick white smoke emitting from the front bonnet while he was driving the Insured Vehicle and proceeded to stop along the slip road before the fire broke out.

23. 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 Tay was driving the Insured Vehicle. The location where the Insured Vehicle caught fire was also observed to be not at a secluded location.
24. 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 7 above.
25. 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

*Check information on vehicle recall information from LTA website

Vehicle Owner Particulars	
Owner's Name	Chuan
Owner ID	3029

Vehicle Details	
Vehicle Registration No.	940501
Make	HYUNDAI
Vehicle Model	9413LTDG4254954102
Engine No.	2451240534
Chassis No.	09412451240534

Recall Details	
Is Recall Confirmed	

[X]

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Conclusion

26. 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 leading from the battery inside the engine compartment, somewhere around the left portion of the engine compartment.
27. 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.
28. 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.
29. 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
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