

Your Ref: M1806615
Our Ref :CS/TMI18023192/D

04 January 2019

Tokio Marine Insurance Singapore Ltd

20 McCallum Street #09-01

Tokio Marine Centre

Singapore 069046

(Motor Claims Department)

TECHNICAL INVESTIGATION REPORT OF FIRE INCIDENT INVOLVING THE INSURED VEHICLE SGR 5364P ON 25 DECEMBER 2018

1. I refer to your request dated 27 December 2018 and the instructions therein.
2. My analysis, comments and opinions with respect to the cause of fire to the insured vehicle SGR 5364P (herein referred to as "**Insured Vehicle**") are set out below.

Inspection of the Insured Vehicle

3. The Insured Vehicle was physically inspected on 28 December 2018 at the premises of M/s Sin Yew Hup Auto Pte Ltd, 393M Woodlands Road, Yew Tee Industrial Estate, Singapore 677981.
4. A static inspection was carried out to the Insured Vehicle where the following general information was first recorded: -

Vehicle Registration No.	: SGR 5364P
Make / Model	: Toyota Wish 1.8X Limited A
Chassis No	: ZNE100339006
Year of Registration	: 2007 (February)
Mileage	: N.A (battery melted)

5. 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 partially burnt and/or melted at the front area.
6. 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 fenders, front support panel, front grille, front headlamps, front windscreen, front dashboard and roof upholstery amongst others. See photo 1 – 4 below.



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

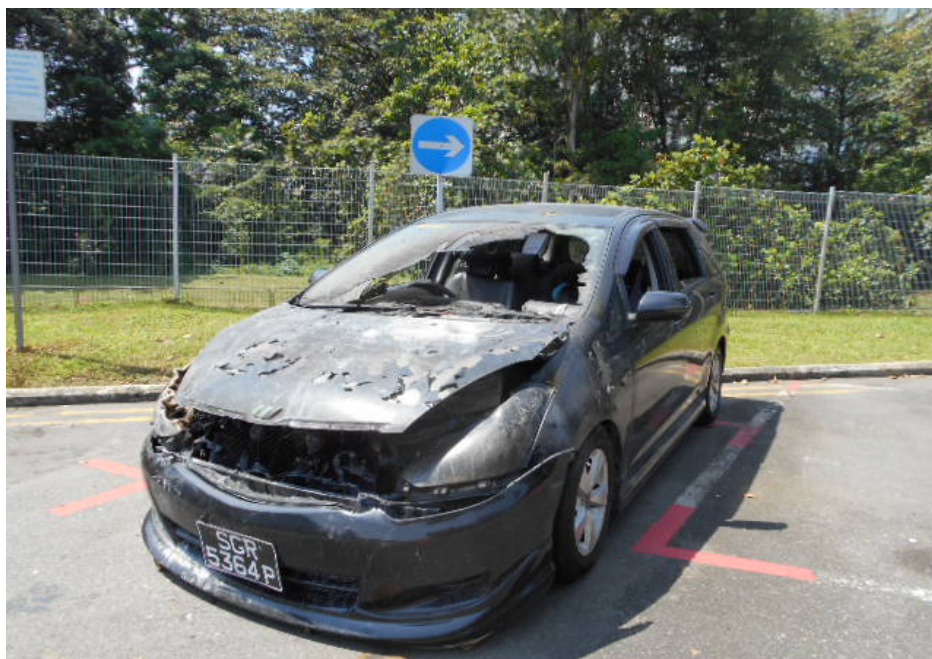


Photo 2 shows a general view of the front left portion of the Insured Vehicle. The fire damage to the Insured Vehicle was confined to its front portion. Its front bumper, front bonnet, front left headlamp and front left fender were affected as a result of the fire. Its front windscreen was also shattered.



Photo 3 shows the engine compartment of the Insured Vehicle at the time of my inspection. The entire engine compartment of the Insured Vehicle was observed to be severely burnt. Most of the parts inside the engine compartment were burnt and/or melted as a result of the fire. This include the radiator, air intake manifold, fuse box, various rubber hoses and pipes amongst others.



Photo 4 shows the interior compartment of the Insured Vehicle, which was observed to be partially burnt and/or melted at the front area. The front dashboard, various trims and roof upholstery were amongst the parts that were burnt and/or melted as a result of the fire.

7. At the time of my inspection of the Insured Vehicle, I did not find any additionally fitted electronic and/or electrical component(s) on the Insured Vehicle. There was also no modification(s) fitted on the Insured Vehicle.

Circumstance of Incident

8. From the police report J/20181225/2085, which was made by one Lee Teng Yong (herein referred to as "**Mr Lee**"), I note that the fire to the Insured Vehicle had started at a time when he was driving the Insured Vehicle. Mr Lee had first detected burn smell and upon stopping the Insured Vehicle to check, he observed smoke and fire from the engine compartment of the Insured Vehicle.
9. I spoke to Mr Lee on 28 December 2018 and through telephone conversation, I was 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 Lee, on 25 December 2018 at about 2030hrs, he was driving the Insured Vehicle along Choa Chu Kang North 6, heading to his sister's home at Choa Chu Kang. His wife and their 2 children, his sister and her son were all onboard the Insured Vehicle. They had just returned to Singapore after a one-day trip to Johore Bahru. Mr Lee estimates leaving Johore Bahru at about 1900hrs and took about an hour to clear immigration at both sides of the Woodlands Causeway. Traffic condition was relatively slow moving during his drive back to Singapore. During the journey, he did not experience any abnormality to the Insured Vehicle. The Insured Vehicle was operating normally as per usual.
11. Whilst travelling along Choa Chu Kang North 6, Mr Lee smelt burning smell coming out from the air-conditioning vents of the Insured Vehicle. He then steered the Insured Vehicle towards the left side of the road and stopped, intending to check the cause of the burning smell. Upon alighting from the Insured Vehicle, he saw smoke and a small flame coming out from the gaps surrounding the front bonnet. Concern for the safety of the occupants inside the Insured Vehicle, he immediately asked all of them to alight and to walk away from the Insured Vehicle. Mr Lee informed me that he could not recall whether he had turned off the engine during this period.

12. SCDF was activated and arrived shortly to extinguish the fire that had engulfed the frontal portion of the Insured Vehicle. After relating the earlier events to the SCDF officers and the police officers who had attended to the incident scene, Mr Lee was advised to tow the Insured Vehicle away. Arrangement was subsequently made to tow the Insured Vehicle to Sin Yew Hup Auto Pte Ltd at Yew Tee Industrial Estate.
13. With regard to the history of the Insured Vehicle, I was able to gather from Mr Lee that he is the registered owner and main driver of the Insured Vehicle. He purchased the Insured Vehicle second hand in 2012 and has been using it mainly for work and leisure purposes. The COE of the Insured Vehicle was extended in 2007 for another 5 years till 2022. As far as he can recall, he did not experience any major mechanical and/or electrical problem(s) with the Insured Vehicle.
14. According to Mr Lee, the last servicing of the Insured Vehicle was in August 2018, where the transmission fluid and engine oil were replaced. Mr Lee also informed me that he has not done any modification and/or fitted any electrical/electronic component(s) on the Insured Vehicle. Mr Lee took some photographs during his time at the incident location after the fire was extinguished and these photographs were forwarded to me for review.

Incident Scene Photographs

15. The photographs taken by Mr Lee had showed the Insured Vehicle stopped along the side of a 2-lane dual direction roadway with the fire already extinguished. I note that the damage of fire nature to the Insured Vehicle, as seen from the photographs provided, was similar to what I had observed during my inspection of the Insured Vehicle.
16. In general, the observations gathered from my review of the photographs that were taken by Mr Lee at the incident scene had corresponded to the description of events that he had related to me during our conversation on 28 December 2018. See photo 5 & 6 below.



Photo 5 shows a general view of the Insured Vehicle at the incident scene after the fire was extinguished. The Insured Vehicle could be seen stopped along the left side of a 2-lane dual direction roadway. Generally, the information that could be gathered from the incident scene photographs provided by Mr Lee had corresponded to the events that he had related to me.



Photo 6 shows a general view of the Insured Vehicle with its frontal portion burnt as a result of the fire. The damage of fire nature to the Insured Vehicle, as seen from the photographs provided, was similar to what I had observed during my inspection of the Insured Vehicle.

Technical Analysis

17. Firstly, the burnt pattern of the Insured Vehicle indicates that the fire had occurred from its engine compartment. High heat intensity burned marks (whitish burn marks) were formed at the rear left area of the front bonnet. These whitish burn marks are a result of exposure to prolong 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.
18. Correspondingly, the underside of the front bonnet at the rear left area was found with similar high heat intensity burn marks (whitish burn marks). Rust had also started to develop at this area. Following the characteristic of heat rising upwards, the burn pattern of the front bonnet would therefore indicate that the origin of fire was at the rear left area of the Insured Vehicle's engine compartment. See photo 7 - 9 below.



Photo 7 shows the whitish burn marks (circled) that were formed on the rear left area of the Insured Vehicle's front bonnet. Such whitish burn marks are a result of exposure to prolong heat intensity. Following the characteristic of heat rising upwards, the fire to the Insured Vehicle can then be determined to have originated around the rear left area of the engine compartment.



Photo 8 shows the whitish burn marks and rust that had developed (circled) on the underside of the front bonnet, directly under the area where similar whitish burn marks were formed. These whitish burn marks are a result of exposure to prolong heat intensity and can typically be used to determine the origin of fire.



Photo 9 shows a general view of where the fire to the Insured Vehicle had originated, which was around the rear left area of the engine compartment (circled). This was established basing on the burn pattern (whitish burn marks and rust) that was formed on the Insured Vehicle's front bonnet.

19. Upon closer examination of the area around the rear left of the engine compartment, which was where the fire to the Insured Vehicle had likely started, I had found greenish residue on several stretches of original factory fitted wirings. The presence of 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 was due to electrical in nature. See photo 10 – 12 below.
20. To further explain briefly, the rubber insulation of the wires and/or wiring harness in motor vehicles may lose its flexibility and become hardened after a prolong period of time. The hardened rubber insulation may then become brittle and break off bits by bits, exposing live wires that may come into contact with each other and/or the metal body of the vehicle, creating sparks that could ignite a fire. Heat within the engine compartment during engine operation could accelerate this hardening of rubber insulations, and any other rubber material parts within the engine compartment.

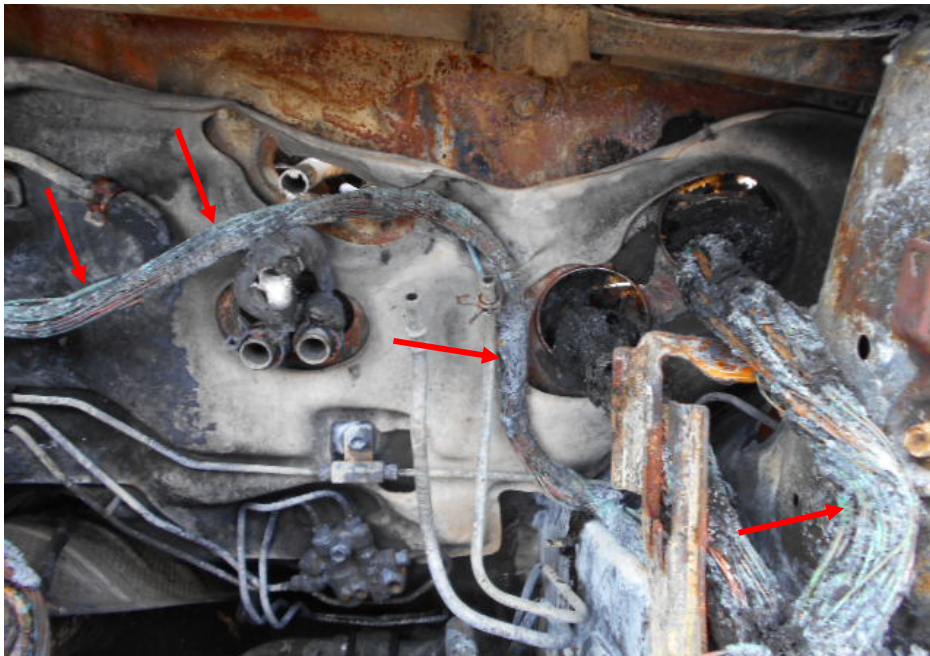


Photo 10 shows the wirings around the rear left of the engine compartment, which was where the fire to the Insured Vehicle had likely started. Greenish residue (arrowed) was found on multiple stretches of wirings. These wirings were original factory fitted wirings. The presence of such greenish residue suggests occurrence of an electrical short circuit. This physical evidence would then appear to suggest that the cause of fire to the Insured Vehicle was due to electrical in nature.



Photo 11 shows a closer view the wirings at the rear left area of the Insured Vehicle's engine compartment that were found with greenish residue (arrowed) The presence of such greenish residue suggests occurrence of an electrical short circuit.

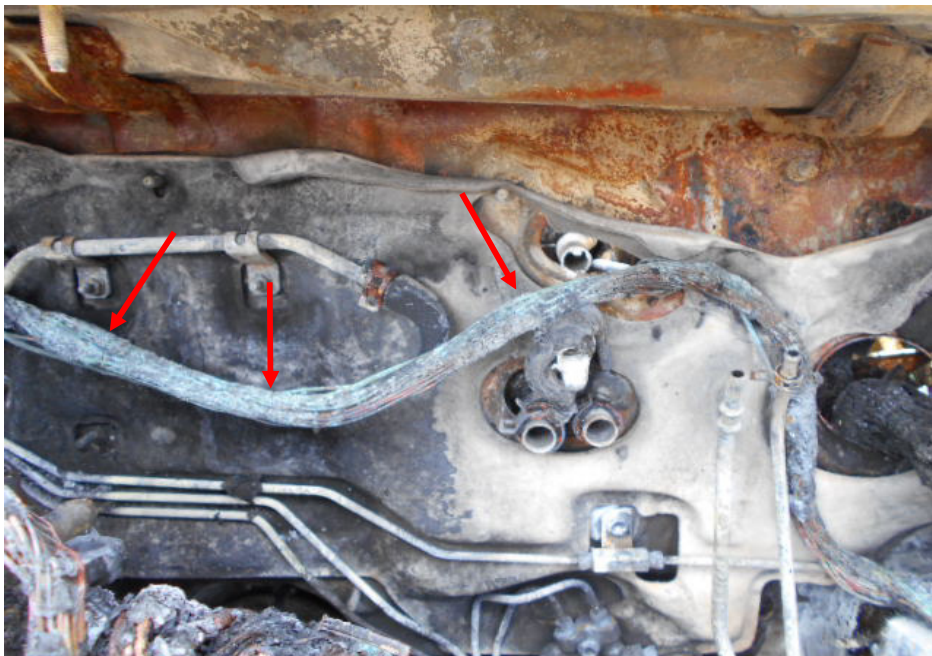


Photo 12 shows another stretch of wirings in the vicinity of the rear left area of the Insured Vehicle's engine compartment that were found with greenish residue (arrowed) The presence of such greenish residue suggests occurrence of an electrical short circuit. This physical evidence would then appear to suggest that the cause of fire to the Insured Vehicle was due to electrical in nature.

21. My checks with both local and international bodies and associations revealed that at the time of writing this report, there is a manufacturer recall of similar make and model vehicle as the Insured Vehicle. The recall, initiated in 2012, was due to mechanical issue with the steering shaft. As at the time of writing this report, the Insured Vehicle has not been sent for any rectification to address the issue. Notwithstanding this, the issue with the steering shaft did not cause and/or contribute to the fire incident as the issue did not pose a fire risk. See screenshot below showing the search result from LTA.

Enquiry on Vehicle Recall - Vehicle Specific

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

Vehicle Owner Particulars	
Owner ID Type:	Singapore NRIC
Owner ID:	4830I
Vehicle Details	
Vehicle Registration number:	SGR5364P ←
Make:	TOYOTA
Vehicle Model:	WISH 1.8X LIMITED A
Engine No.:	1ZZ2762101
Chassis No.:	ZNE100339006
Recall Details	
1	Recall Extension No.: R2012110058X04
	Manufacturer Recall Date: 15 Nov 2012
	Estimated Completion Year of Recall: 2013
	Brief Description (As Provided by Motor Dealer): 1. The steering shaft system of the subject vehicles consists of a steering intermediate shaft assembly, steering sliding yoke sub assembly, and steering intermediate extension shaft assembly. Due to insufficient hardness of the extension shaft for the vehicle with electric power steering system, the splines which connect the extension shaft to the steering gear box may deform if the steering wheel is frequently and forcefully ←

Partial screenshot of the LTA recall search result showing the recall campaign involving the Insured Vehicle. A full-page screenshot of the result is shown below. The recall, initiated in 2012, was due to mechanical issue with the steering shaft. Basing on the description of the cause for recall, the issue to the steering shaft did not cause and/or contribute to the fire incident as it did not pose any fire risk.

Enquiry on Vehicle Recall - Vehicle Specific

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

Vehicle Owner Particulars															
Owner ID Type:	Singapore NRIC														
Owner ID:	48301														
Vehicle Details															
Vehicle Registration number:	SGR5364P														
Make:	TOYOTA														
Vehicle Model:	WISH 1.8X LIMITED A														
Engine No.:	1ZZ2762101														
Chassis No.:	ZNE100339006														
Recall Details															
1	<table> <tr> <td>Recall Extension No.:</td><td>R2012110058X04</td></tr> <tr> <td>Manufacturer Recall Date:</td><td>15 Nov 2012</td></tr> <tr> <td>Estimated Completion Year of Recall:</td><td>2013</td></tr> <tr> <td>Brief Description (As Provided by Motor Dealer):</td><td> <p>1. The steering shaft system of the subject vehicles consists of a steering intermediate shaft assembly, steering sliding yoke sub assembly, and steering intermediate extension shaft assembly. Due to insufficient hardness of the extension shaft for the vehicle with electric power steering system, the splines which connect the extension shaft to the steering gear box may deform if the steering wheel is frequently and forcefully turned to the full-lock position while driving at a slow speed. 2. In the hybrid system of the subject vehicles, there is an electrically driven water pump assembly which circulates coolant through the hybrid components, including the inverter assembly, to provide cooling. There is a possibility that the coil wire of the electric motor installed in the water pump may have been scratched during the coiling manufacturing process at the supplier. *(Not all vehicles are affected by the above-mentioned recall items. For more information, please check with your vehicle dealer or importer)</p> </td></tr> <tr> <td>Date Rectified:</td><td>-</td></tr> <tr> <td colspan="2">For more details, contact SWEE SENG CREDIT PTE LTD</td></tr> <tr> <td>Hotline Information:</td><td>Amy Tan at 64663808</td></tr> </table>	Recall Extension No.:	R2012110058X04	Manufacturer Recall Date:	15 Nov 2012	Estimated Completion Year of Recall:	2013	Brief Description (As Provided by Motor Dealer):	<p>1. The steering shaft system of the subject vehicles consists of a steering intermediate shaft assembly, steering sliding yoke sub assembly, and steering intermediate extension shaft assembly. Due to insufficient hardness of the extension shaft for the vehicle with electric power steering system, the splines which connect the extension shaft to the steering gear box may deform if the steering wheel is frequently and forcefully turned to the full-lock position while driving at a slow speed. 2. In the hybrid system of the subject vehicles, there is an electrically driven water pump assembly which circulates coolant through the hybrid components, including the inverter assembly, to provide cooling. There is a possibility that the coil wire of the electric motor installed in the water pump may have been scratched during the coiling manufacturing process at the supplier. *(Not all vehicles are affected by the above-mentioned recall items. For more information, please check with your vehicle dealer or importer)</p>	Date Rectified:	-	For more details, contact SWEE SENG CREDIT PTE LTD		Hotline Information:	Amy Tan at 64663808
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22. With regard to the servicing and maintenance of the Insured Vehicle, I had found, at the time of my inspection. 2 sticker decals pasted on the front windscreen of the Insured Vehicle. The date written on the decals were 31 August 2018 for the replacement of transmission fluid and engine oil of the Insured Vehicle. The mileage of the Insured Vehicle at 31 August 2018 was 141,163km as seen from the 2 decals. During my telephone conversation with Mr Lee, he had informed me that the last servicing of the Insured Vehicle was in August 2018 and the information that I was able to gather from the 2 decals had corresponded to the information that was provided by him. See photo 13 below.



Photo 13 shows the 2 sticker decals that were pasted on the front windscreen of the Insured Vehicle. The decals were related to the last servicing of the Insured Vehicle and the information written on the 2 decals had corresponded to the information pertaining to the last servicing of the Insured Vehicle that was related to me by Mr Lee during my telephone conversation with him on 28 December 2018.

Conclusion

23. Having investigated and technically analysed the damages of burnt nature to the Insured Vehicle, I am 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, around the rear left of the engine compartment. The wirings were original factory wirings of the Insured Vehicle.

24. I 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.
25. There were no modification(s) or additional electronic and/or electrical component(s) fitted on the Insured Vehicle at the time of my inspection of the Insured Vehicle.
26. My investigations also revealed that at the time of writing this report, there is a manufacturer recall, initiated in 2012, that involved the Insured Vehicle. However, as the cause of the recall does not possess a fire risk, I am of the opinion that the recall is not related to this fire incident.

Ang Bryan Tani

AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA

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