LKK Auto Consultants Pte Ltd
Company Registration No. 199607198R
51 UBI AVE 1, #01-25 PAYA UBI INDUSTRIAL PARK, SINGAPORE 408933 TEL : (065) 62563561 FAX : (065) 67414108

Your Ref: MC/MC14193/2018
Our Ref : CI/LAW19015806/D

11 September 2019

Mechanical Condition Report Of A Motor Car SJH 2373A

Requested By
Andrew Tan Tiong Gee & Co
10 Anson Road #30-04
International Plaza
Singapore 079903

A. Introduction & Background Information

1. I refer to your request dated 15 August 2019.

2. By way of introduction, I set out below a brief description of my professional qualifications and professional work experiences.

3. I am a Senior Technical Investigator and certified Accident Reconstructionist with LKK Auto Consultants Pte Ltd. I have been carrying out assessments, valuations, inspections and technical investigations of motor vehicles involved in, among other things, accident since 2007. I have also carried out accident reconstruction basing on the laws of dynamics and physics by applying mathematical equations with technique competencies aligned with international standards, ensuring proper cause analysis. Some of my clients include the Singapore Police Force, NTUC Income Insurance Co-Operative Limited, AIG Asia Pacific Insurance Pte Ltd, AXA Insurance Singapore Pte Ltd, Cycle & Carriage Industries Pte Ltd and Performance Motors Limited amongst others. I also have experience in providing analysis and commentaries on damages and faults of motor vehicles.

4. I have given oral evidence as an expert witness in both the State Court and High Court, for both the prosecution and the defence for criminal proceedings and also for both the plaintiff and the defendant in civil proceedings. For instance, in MC Suit 17701/2010/Q, I acted as an expert witness in proceedings which involved among other things, a claim by an owner of a Mercedes sedan against the dealer for allegedly carrying out negligent works on the Mercedes sedan; in Suit 760/2011, I was asked by the dealer to provide my expert opinion on whether a brand new BMW sedan sold to a customer was defective. I have also been jointly appointed by both a car dealer and a car owner to provide my expert opinion as to whether the transmission of a brand-new car was defective.

5. My testimony as an expert witness for accident reconstruction and speed analysis cases involving criminal proceedings for the prosecution include amongst others, MAC 2350-51/2011, an accident involving four motor cars and a motorcycle resulting in the death of the motorcyclist; DAC 039421-2011, a motor car and motorcycle accident resulting in the death of the motorcyclist; MAC 3935/12, a motor lorry and pedal bicycle accident resulting in the death of the cyclist.

6. Cases where I have been engaged by an accused person include amongst others, DAC 60889-90/10, a motorcycle and motor car accident resulting in the death of the pillion rider; DAC 049130-2013 & DAC 049131-2013, self-accident involving a SMRT bus resulting in the death of one of its passengers.

7. I have also carried out numerous line of sight simulation, in close replication of an accident scenario, to determine a driver's view and sighting capability.

8. I hold a certificate in Technical Accident Investigation and Reconstruction from the Society of Automotive Engineers Australasia and a National ITE Certificate (Intermediate) in Automotive Technology (Light Vehicle) from the Institute of Technical Education. I have also attended training and passed a practical examination on correct repair methods, safe and cost-effective assessment of damaged motor vehicles (Thatcham Escribe System).

9. I am an affiliate member of the Society of Automotive Engineers Australasia; an affiliate member of the Institute of Automotive Engineer Assessors (UK); an associate member with the Society of Operations Engineers (UK).

10. In this MC Suit No. 14193/2018, I am appointed as a Single Joint Expert to provide my comments and opinions with respect to the disputed issues in relation to a Volkswagen Touran motor car with registration number SJH 2373A (herein referred to as "**Motor Car**"). The issues that I had considered are limited to issues that are within my scope of expertise ie the mechanical condition of the Motor Car and its relating aspect.

11. The issues that the Plaintiff had asked me to consider are as follows: -

    a) whether the Defendant's alleged failure to rectify the Motor Car when requested by the Plaintiff on various occasions resulted in damage to the Motor Car and stalling on 10 July 2018;

    b) whether the Defendant's failure to change the engine gasket and/or thermostat upon the Plaintiff's request on 18 June 2018 and 02 July 2018 exacerbated the state of the Motor Car and eventually caused the Motor Car to malfunction; and

c) whether the engine gasket tear and/or faulty thermostat caused the coolant to leak, thereby causing the Motor Car's engine to overheat and subsequently the Motor Car to malfunction on 10 July 2018.

12. The issues that the Defendant had asked me to consider are as follows: -

a) where was the actual location of the radiator coolant leakage;

b) what is the function of the coolant thermostat;

c) was the warning indicator "Stop Check Coolant" working at the material time;

d) what would cause the engine of the Motor Car to be damaged to this extent; and

e) when the warning indictor "Stop Check Coolant" appeared, what should be the next course of action for the driver.

B. Documents Referred To & Methodology

13. The following documents were provided to me for consideration in the preparation of this report: -

a) Affidavit of the Plaintiff dated 05 April 2019 (herein referred to as "**Plaintiff's AFF-1**");

b) Affidavit of the Plaintiff dated 12 June 2019 (herein referred to as "**Plaintiff's AFF-2**")

c) Affidavit of the Defendant dated 27 February 2019 (herein referred to as "**Defendant's AFF-1**");

d) Affidavit of the Defendant dated 22 April 2019 (herein referred to as "**Defendant's AFF-2**");

e) Repair invoice for the Motor Car dated 15 September 2018;

f) Towing service receipt for the Motor Car dated 10 July 2018.

14. I did not have an opportunity to carry out a physical inspection of the Motor Car in its damaged condition as repairs have been carried out. For the purpose of this report, I had instead relied on the photographs, information, records etc contained in the documents that were set out at paragraph 13, for analysis.

15. The issues set out in paragraph 11 and paragraph 12, that both the Plaintiff and the Defendant had asked me to consider, are relatively similar and can be broadly summarized as: -

    a) the cause of the damage to the Motor Car's engine; and

    b) what actions, if any, could have prevented the damage.

16. I now set out below, my comments and opinions with respect to the aforesaid issues.

C. Damage to the Motor Car's Engine

17. The Motor Car broke down on 10 July 2018 whilst it was being driven and had to be towed to the Defendant's premises.

18. The Defendant appointed VICOM to conduct a thorough investigation on the damage to the Motor Car, and the cause of it. Mr Tommie Lim from VICOM carried out the investigation and thereafter he had put up a written report "Automobile Technical Investigation Report Of SJH 2373A" (herein referred to as "**VICOM Report**"), which can be found in page 32 to 42 of the Defendant's AFF-1.

19. Upon my review of the VICOM Report, it was noted that the Motor Car was inspected on 14 July 2018 at the Defendant's premises. A pressure test to the engine cooling system of the Motor Car was first carried out to check for any vacuum and/or coolant leakage. It was subsequently discovered that there was coolant leakage from the thermostat housing. The engine of the Motor Car was also dismantled and signs that the engine had overheated were seen on the engine gasket and engine housing.

20. In general, I concur with the methodology and findings in the VICOM Report. In other words, the engine of the Motor Car had overheated causing the Motor Car to break down. The overheating was due to the continued usage of the Motor Car with an inefficient engine cooling system that arose from coolant leakage at the thermostat housing.

21. The thermostat in an engine cooling system controls the amount of coolant that flows into the engine for cooling purposes, preventing the engine from overheating. The thermostat has a sensor which detects the operating temperature of the engine and opens itself to allow coolant to flow into the engine. The photographs contained in the VICOM Report had showed the Motor Car's thermostat cracked. Refer to page 36 & 37 of the Defendant's AFF-1.

22. The thermostat fitted on the Motor Car comes in a housing as an assembly. From the photographs seen in the VICOM Report, the housing is of hard plastic material type. The strength of the hard plastic would deteriorate over a period of time from exposure to heat from within the engine compartment. This led to the crack of the thermostat housing. A damage that is considered to be of fair, wear and tear.

23. For this case, whenever the Motor Car's engine was in operation, the coolant will flow through the thermostat into the engine, travelling through water passages to remove the heat within the engine. Some of the coolant leaked from the crack at the thermostat housing, causing a reduction of coolant. When there is insufficient coolant, the heat within the engine cannot be efficiently removed and the temperature within the engine will also rise. Correspondingly, the temperature of the coolant would rise as it flows around the engine cooling system.

24. For completeness, the engine gasket issue did not cause the Motor Car's engine to be overheated. Usually, the term engine gasket leaking refers to engine oil leak from the engine gasket. The engine gasket (refer to the photographs in VICOM Report, page 38 of the Defendant's AFF-1) sits between the engine top block and engine lower block providing a sealing effect between the 2 engine blocks. Over time, engine oil could leak from gaps formed when the engine gasket begins to lose its sealing capability due to heat from within the engine.

25. When this happens, engine oil level will be reduced. Although insufficient engine oil could also lead to an engine to overheat, for this case, the cause of the Motor Car's engine to overheat was due to the coolant leak rather than an engine oil leak.

D. Preventive Action(s)

26. Modern-day motor vehicles have multiple engine control systems, commonly referred to as ECUs, to monitor the various operating parameters of a motor vehicle, enabling the motor vehicle to operate in an optimal and efficient condition. The relevant control system triggers a warning message or an icon to be displayed on the instrument panel of the motor vehicle, and/or sound to alert the driver of the warning message when the system senses that the temperature of the coolant becomes too hot.

27. Whilst the motor vehicle will still be driveable, there is a risk of causing significant damage to the engine by allowing the engine to operate under too hot temperature. When the warning is triggered, a driver should stop the motor vehicle as quickly and safely as possible to let the engine cool down and thereafter seek assistance from professionals.

28. The VICOM Report had contained a photograph showing a warning message "Stop Check Coolant" displayed on the instrument panel of the Motor Car. This was after first re-filling coolant, and thereafter letting the Motor Car's engine operate at idle. Based on the VICOM Report, warning message to alert the driver of the Motor Car regarding the condition of the coolant was in working condition as at the time of 14 July 2018.

29. If the Motor Car had remained untouched from the time it was towed into the Defendant's premises till the time of inspection on 14 July 2018, I would expect the warning message for the coolant to be in working condition prior to the engine breakdown. When the warning message was triggered, it would be reasonable to expect the driver of the Motor Car to be aware. As mentioned in paragraph 25, although the Motor Car is still driveable, it should be brought to a stop as quickly and safely as possible. Thereafter the engine should be turned off to let the engine cool down.

30. The towing service receipt for the Motor Car dated 10 July 2018 had indicated that the Motor Car was towed from Block 190A Rivervale Drive. The Plaintiff's AFF-1 stated that his wife was driving the Motor Car heading towards the Defendant's premises before it broke down. No other details pertaining to the occurrence of the breakdown were stated in the Plaintiff's AFF-1. Given this lack of details, I sought some clarification and according to the Plaintiff, his wife was driving the Motor Car along TPE towards the direction of Changi Airport when she noticed the warning light for the coolant appear on the instrument panel of the Motor Car (exact location along TPE unable to recall). She then exited at the nearest exit to stop the Motor Car as she felt unsafe stopping the Motor Car along TPE. She eventually ended up at Block 190A Rivervale Drive. My checks from Google Maps revealed that this location was close to the exit/entry of TPE. See screenshot below.

31. Base on this furnished information, it is reasonable to consider that the Plaintiff's wife, who was the driver of the Motor Car at the material time when it broke down, had took appropriate action(s) to bring the Motor Car to a stop as quickly and safely as possible upon noticing the coolant warning message.

32. The warning message for the coolant that the Plaintiff's wife noticed just prior to the breakdown on 10 July 2018 was in fact not the first time that the warning message had appeared. I note from the Plaintiff's AFF-1, paragraph 27, that on 02 July 2018, the Plaintiff had informed the Defendant to check on the coolant as the coolant and engine light came on.

33. Also, in paragraph 28 of the Plaintiff's AFF-1, it was noted that on 08 July 2018, the coolant warning message again came on. This time, the Plaintiff re-filled the coolant with water. The Plaintiff was also informed by a mechanic in JB that the Motor Car's thermostat and engine gasket were leaking.

34. Taking these incidents into account, it can be established that the Motor Car experienced coolant issues at least 8 days or thereabouts before its engine eventually overheated on 10 July 2018.

35. The Defendant's AFF-1, in paragraph 24, also acknowledged that they were informed to check on the coolant. In paragraph 27, upon checking the engine cooling system, the Defendant, found all were in order. I note that it was not stated how or what was checked. However, in the Defendant's AFF-2, paragraph 22, it was further stated that the Motor Car's coolant was checked, and it was observed that there was still coolant in the radiator. A little bit of coolant was added into the engine cooling system. There was no coolant warning message displayed. The Motor Car was returned to the Plaintiff on the same day, 02 July 2018.

36. From what can be gathered in paragraph 32 to 35 above, the coolant warning message of the Motor Car was triggered before 02 July 2018. Given that the Defendant did not observe this particular warning message when the Motor Car was at their premises for other repair works, would suggest that the coolant was re-filled in order for the coolant warning message to be no longer triggered.

37. Given the potentially severe damage that could arise if a driver ignores the coolant warning message, refer to VICOM Report at page 36 of the Defendant's AFF-1, it would be reasonable to expect the Defendant to carry out thorough checks of the engine cooling system when the Motor Car was in their premises on 02 July 2018. Apart from checking on the level of the coolant, there was no other scope of activities stated in the Defendant's AFF-1 and the Defendant's AFF-2. At minimum, carrying out a pressure test to the engine cooling system to check for any vacuum and/or coolant leakage, akin to the test that was shown in the VICOM Report at page 33 & 34 of the Defendant's AFF-1, had to be carried out. Especially so when there was already indication (Plaintiff's observation of the coolant warning message) to suggest that there was coolant leakage to the Motor Car.

38. In all likelihood, if the Defendant had carried out thorough checks to the engine cooling system of the Motor Car on 02 July 2018, the leakage of engine coolant would have been discovered, and regardless of the scope of warranty extended to the Motor Car, I would expect repairs/rectifications to be carried out. If this was done, the Motor Car would not have experienced the breakdown on 10 July 2018.

39. In the same context, I also note that there was another opportunity to repair/rectify the coolant leakage to the Motor Car on 08 July 2018 whilst the Motor Car was in JB. Refer to paragraph 28 of the Plaintiff's AFF-1. At this point of time, the location of the coolant leak and item needed to be replaced were identified by a mechanic in JB. This was the thermostat. Like the opportunity that the Defendant had on 02 July 2018, if action(s) was taken to replace the damaged thermostat at this time (08 July 2018), the Motor Car would not have experienced the breakdown on 10 July 2018.

40. From the discussions above, it would appear to me that thorough checks and replacement action(s) could easily have been done on 02 July 2018 and on 08 July 2018 to prevent the Motor Car's engine from overheating. Even though the continued driving to bring the Motor Car to a stop, after the coolant warning message was triggered on 10 July 2018, had ultimately led to the overheating, the Motor Car's engine should not have been put in a position where it could potentially overheat since the coolant leak issue could and should have been rectified at an early stage.

E. Conclusion & Duty

41. Having considered the material evidence in the documents that were provided to me in preparation of this report, I am of the opinion that the Motor Car's engine had overheated. The overheating was due to the continued usage of the Motor Car with an inefficient engine cooling system that arose from coolant leakage at the thermostat housing.

42. The breakdown of the Motor Car's engine occurred when the driver was bringing the Motor Car to a stop as quickly and safely as possible upon noticing the coolant warning message.

43. The coolant leakage had occurred before 02 July 2018. The Motor Car's engine would not have overheated if the Defendant had carried out proper and thorough checks to the engine cooling system of the Motor Car on 02 July 2018, when the Motor Car was at their premises for other repair works, after being informed by the Plaintiff to do so.

44. The Motor Car's engine would also not have been damaged if the thermostat was replaced on 08 July 2018 when the Plaintiff was informed by a mechanic in JB that there was coolant leakage from the thermostat.

45. The documents provided to me had showed that there were 2 opportunities for repair/rectification work to be carried out to the Motor Car before the eventual breakdown on 10 July 2018. I am therefore of the view that the Motor Car's engine should not have been put in a position where it could potentially overheat given that the coolant leak issue could and should have been rectified at an early stage.

46. I have rendered these opinions and conclusions after careful evaluation and analysis of the documents provided, based on my education, training and experience. The factual matters stated in the report are, as far as I know, true and I have made all enquiries which I consider appropriate.

47. The opinions stated in this report are genuinely held by me and the report contains reference to all matters I consider significant. I understand and acknowledge my duty to the Court and believe I have complied with that duty.

Ang Bryan Tani
Senior Technical Investigator
Technical Investigation & Accident Reconstructionist (SAE-A)

DISCLAIMER OF LIABILITY TO THIRD PARTIES:- This Report is made solely for the use and benefit of the Client named on the front page of this Report. No liability or responsibility whatsoever, in contract or tort, is accepted to any third party who may rely on the Report wholly or in part. Any third party acting or relying on this Report, in whole or in part, does so at his or her own risk.