

Your Ref: TP/IP/33089/2019
Our Ref : CI/TPD19011268/P

21st October 2019

General Investigation Team

Traffic Police Department
Singapore Police Force
10 Ubi Avenue 3
Singapore 408865

MECHANICAL INSPECTION REPORT OF MOTOR LORRY GBB 5739K

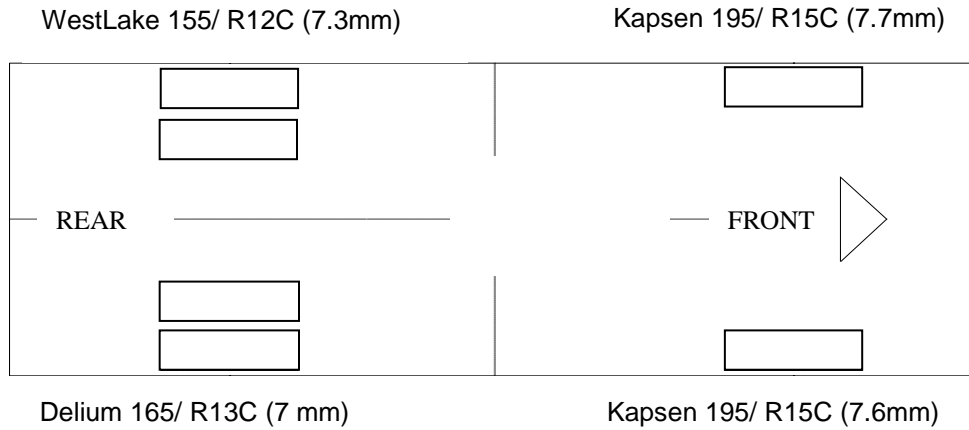
1. I refer to your request on 20th June 2019 to conduct a physical inspection of a motor lorry bearing registration number GBB 5739K (herein referred to as "**Motor Lorry**"), which was involved in a road traffic accident on 25th May 2019
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Motor Lorry that may have contributed to the accident.
3. Following the request, I had carried out a physical inspection of the Motor Lorry on 27th August 2019 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. I now set out below my observations and comments with respect to this inspection.

General Condition

4. The mileage of the Motor Lorry at the time of my inspection was 325,125km.
5. The Motor Lorry appeared to have sustained moderate damage at its front portion. Its front windscreen, front right headlamp, left and right door panel were damage as a result of the accident at the time of my inspection.

Tyres and Wheel Rims

6. The 2 front tyres and 4 rear tyres of the Motor Lorry were observed to be in serviceable condition and sufficiently inflated for vehicular operation. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The tyre brand, tyre size and remaining tread depth of the 6 tyres of the Motor Lorry were recorded as follows:-



7. The 6 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 1 – 11 below.



Photo 1 shows a general view of the instrument cluster of the Motor Lorry at the time of my inspection. The mileage of the Motor Lorry was 325,125km



Photo 2 shows a general view of the Motor Lorry's front portion at the time of my inspection. Its front windscreen, front right headlamp, left and right door panel were damage as a result of the accident at the time of my inspection



Photo 3 shows a close up view of the front portion of the Motor Lorry at the time of my inspection. Its front windscreen was damage as a result of the accident at the time of my inspection.



Photo 4 shows a close up view of the front portion of the Motor Lorry at the time of my inspection. Its front right headlamp was damage as a result of the accident at the time of my inspection.



Photo 5 shows a close up view of the front portion of the Motor Lorry at the time of my inspection. Its right door panel was damage as a result of the accident at the time of my inspection.



Photo 6 shows a general view of the left portion body of the Motor Lorry at the time of my inspection. Its left door panel was observed to be intact and unaffected by the accident.



Photo 7 shows a general view of the rear portion body of the Motor Lorry at the time of my inspection. Its rear was observed to be intact and unaffected by the accident.



Photo 8 shows the condition of the front right tyre of the Motor Lorry, which was observed to be in serviceable condition with remaining tread depth of approximately 7.6mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Lorry.



Photo 9 shows the condition of the rear right tyre of the Motor Lorry, which was observed to be in serviceable condition with remaining tread depth of approximately 7mm. The tyre, which was wrapped around standard steel wheel rim, was also observed to be sufficiently inflated for vehicular operation.



Photo 10 shows the condition of the rear left tyres of the Motor Lorry, which was observed to be in serviceable condition with remaining tread depth of approximately 7.3mm. The tyres, which were wrapped around standard steel wheel rim, were also observed to be sufficiently inflated for vehicular operation. There was also no damage found on all 6 steel wheel rims of the Motor Lorry.



Photo 11 shows the condition of the rear right tyres of the Motor Lorry, which were observed to be in serviceable condition with remaining tread depth of approximately 7.7mm. There was also no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres that were fitted on the Motor Lorry.

Engine Compartment & Operating Fluids

8. Upon examination of the Motor Lorry's engine compartment, I had observed all the parts and components inside the engine compartment to be intact and unaffected by the accident. The brake fluid, engine oil and engine coolant were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.
9. Further examination of the engine compartment revealed, there was no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment of the Motor Lorry.
10. My subsequent checks on the underside of the Motor Lorry also revealed no fluid stain. Visually, the various undercarriage components of the Motor Lorry were all observed to be intact and without any visible damage. See photo 12 – 16 below.



Photo 12 shows a general view of the Motor Lorry's engine compartment, which was accessed by lifting the front cabin of the Motor Lorry. The various parts and components inside the engine compartment were unaffected by the accident. There was also no sign(s) or indication(s) of fresh fluid leakage and/or fluid stain within the engine compartment (photograph shows the engine compartment as viewed from the right front side of the Motor Lorry).



Photo 13 shows the brake fluid reservoir of the Motor Lorry at the time of my inspection. The brake fluid was observed to be of sufficient level (arrowed) and without any visible contamination.



Photo 14 shows the engine coolant reservoir of the Motor Lorry at the time of my inspection. The engine coolant was observed to be of sufficient level and without any visible contamination.



Photo 15 shows the engine oil dipstick of the Motor Lorry at the time of my inspection. The engine oil was observed to be low but sufficient level for operation and without any visible contamination.



Photo 16 shows the undercarriage of the Motor Lorry, at the area where the engine housing and transmission housing are located. Observed was minor old engine oil stain on the housing of the engine oil sump

Steering System & Braking System

11. Static brake tests conducted on the Motor Lorry revealed abnormality. The brake booster had not responded well to the various tests conducted. There was abnormal movement of the brake pedal when it was depressed as the brake pedal when depressed felt hard and stiff. Suggesting that there was issue to the brake servo component in the braking system of the Motor Lorry at the time of accident. This was likely cause the Driver of the Motor Lorry unable to stop in time upon depressing on the brake pedal.
12. Static test on the steering system of the Motor Lorry also revealed no abnormality to the steering system. I did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. My visual examination of the various steering components which had included the rack and pinion, tie rods, tie rod ends and ball joints had revealed that these components were all generally in good condition. See photo 17 - 23 below.



Photo 17 shows the various undercarriage components at the front right wheel of the Motor Lorry, in particular the steering tie rod end (arrowed). The various steering components were all found to be intact, suggesting that the steering system of the Motor Lorry was likely to be in serviceable condition at the material time of accident. There was also no sign of fluid stain(s) observed on the various undercarriage components.



Photo 18 shows the various undercarriage components at the front left wheel of the Motor Lorry, in particular the steering tie rod end (arrowed). The various Undercarriage components of the Motor Lorry were all found to be intact without any visible damage. There was also no sign of fluid stain(s) observed on the various undercarriage components.



Photo 19 shows the brake pipe (arrowed) at the rear right wheel of the Motor Lorry. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Lorry. My static tests of the Motor Lorry's braking system, along with my visual examination of the various mechanical components in the braking system, had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



Photo 20 shows the brake pipe (arrowed) at the rear left wheel of the Motor Lorry. I did not observe any leakage of brake fluid at the time of my inspection of the Motor Lorry. My static tests of the Motor Lorry's braking system, along with my visual examination of the various mechanical components in the braking System had indicated that there was no internal leakage of pressure/vacuum. Hence the braking system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.



Photo 21 shows the brake hose/pipe (arrowed) at the front right wheel of the Motor Lorry. No leakage of brake fluid was observed. Visual examination of the various components of the braking system like the brake caliper (circled), brake booster, brake pedal etc had revealed all to be intact and without visible damage at the time of accident. There was also no sign of fluid stain(s) observed on the various undercarriage components.



Photo 22 shows the brake hose/pipe (arrowed) at the front left wheel of the Motor Lorry. No leakage of brake fluid was observed. Visual examination of the various components of the braking system like the brake caliper (circled), brake booster, brake pedal etc had revealed all to be intact and without visible damage at the time of accident. There was also no sign of fluid stain(s) observed on the various undercarriage components.



Photo 23 shows the front right wheel of the Motor Lorry turned to its full left. During my steering system test, I did not experience any abnormal free play and/or resistance when I had turned the steering wheel towards full left and full right. This would suggest that the steering system of the Motor Lorry was likely to be in serviceable condition at the material time of accident.

Electronic Safety / Warning Indicators

13. The Motor Lorry automatic self-test of the functionality of its various electronic operating system like the Anti-Lock Brake System (ABS) during cranking of the engine had indicated that these system were in working condition and without abnormality. This can be established from the warning lights disappearing from the instrument panel after the self-test. See photo 24 & 32 below.



Photo 24 shows the warning light for Anti-Lock Brake System (ABS) (arrowed) appearing on the instrument panel of the Motor Lorry during the self-test of its various electronic operating system when its engine was cranked.



Photo 25 shows no warning lights illuminated on the instrument panel of the Motor Lorry after the engine was cranked. This would suggest that there was no abnormality to the various electronic operating system of the Motor Lorry, like the ABS and etc.

Operational Behaviour of the Motor Lorry

14. A short operational test of the Motor Lorry, to primarily determine whether there was any abnormality to its various operating systems like its engine system, its transmission system, steering system and braking system was subsequently carried out. The test was conducted by driving the Motor Lorry forward, stopping, before reversing and coming to a stop again.
15. During the operational test, the various transmission gears of the Motor Lorry were able to be engaged without any difficulty by stepping on the clutch pedal and manually shifting the gear lever. There were no abnormal sounds heard and/or abnormal behaviour of the Motor Lorry's engine system. It was able to move forward and backward normally. Refer to photo 2 & 23 above.
16. The braking system was tested to be in abnormal condition, during static and operational test, when depressing of the brake pedal it felt hard and stiff and required high pedal effort to bring the Motor Lorry to a complete stop suggesting a mechanical fault in the braking system of the Motor Lorry.

Others

17. Given that there were signs to suggest that there were issues with the braking system of the Motor Lorry, we had requested to send the Motor Lorry for a roller brake test.
18. A Roller brake test on the Motor Lorry was conducted at STA inspection centre at Sin Ming Road on 16th October 2019 to test the brake efficiency of the Motor Lorry's braking system. Test results revealed that the Motor Lorry had failed the roller brake test. See Photo 26-32 below



Photo 26 shows the Motor Lorry towed to STA inspection centre at Sin Ming road for roller brake test the purpose is to test the braking efficiency of the Motor lorry's braking system at the point of accident.



Photo 27 shows the Motor Lorry proceeding into STA inspection centre at Sin Ming road for roller brake test the purpose is to test the braking efficiency of the Motor lorry's braking system at the point of accident.



Photo 28 shows the Motor Lorry front right wheel on the roller brake test machine upon testing process. The purpose is to test the braking efficiency of the Motor lorry's braking system at the point of accident.



Photo 29 shows the Motor Lorry front left wheel on the roller brake test machine upon testing process. The purpose is to test the braking efficiency of the Motor lorry's braking system at the point of accident.



Photo 30 shows the Motor Lorry rear right wheel on the roller brake test machine upon testing process. The purpose is to test the braking efficiency of the Motor lorry's braking system at the point of accident.

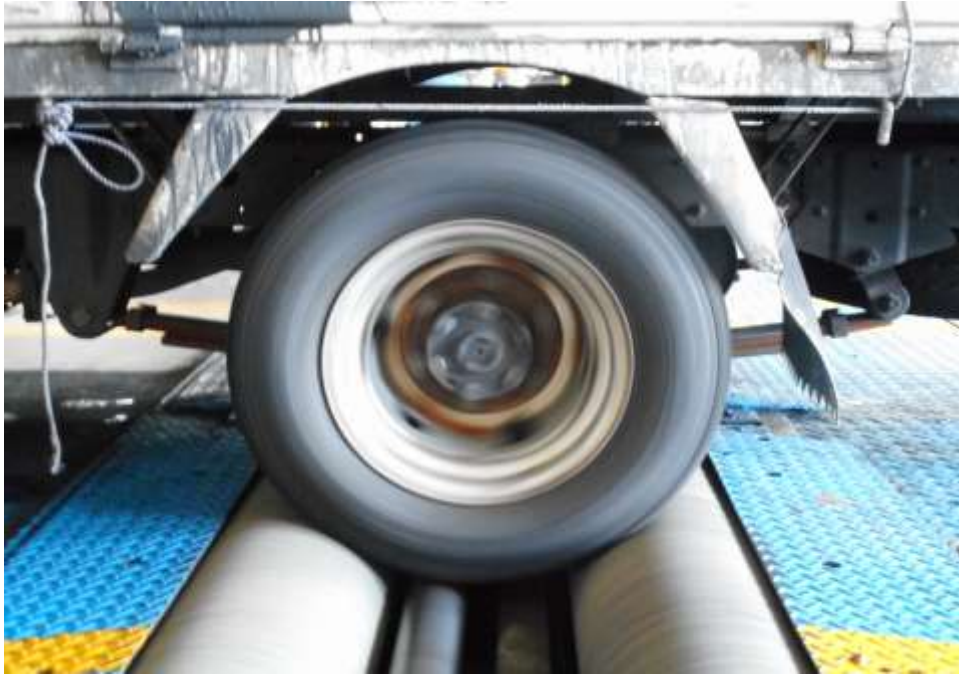



Photo 31 shows the Motor Lorry rear left wheel on the roller brake test machine upon testing process. The purpose is to test the braking efficiency of the Motor lorry's braking system at the point of accident.

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VEHICLE INSPECTION FORM


VEHICLE NO. GBB5739K		MILEAGE 325126		REF NO. LB191016083																																									
TYPE OF INSPECTION Self-Request First Inspection		DATE OF REGISTRATION 24/06/2009		MOTOR NO. -																																									
DATE OF INSPECTION 16/10/2019		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">BRAKES</th> <th>Front</th> <th>Rear</th> <th>Left</th> <th>Right</th> <th>Left</th> <th>Right</th> </tr> </thead> <tbody> <tr> <td>1S</td> <td>1518</td> <td>288</td> <td>283</td> <td>37</td> <td>0</td> <td>2</td> <td></td> </tr> <tr> <td>1P</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2S</td> <td>1216</td> <td>190</td> <td>154</td> <td>28</td> <td>3</td> <td>3</td> <td></td> </tr> <tr> <td>2P</td> <td></td> <td>297</td> <td>288</td> <td>48</td> <td>1</td> <td></td> <td></td> </tr> </tbody> </table>		BRAKES		Front	Rear	Left	Right	Left	Right	1S	1518	288	283	37	0	2		1P								2S	1216	190	154	28	3	3		2P		297	288	48	1			ENGINE NO. ZD30224882K	
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EMISSION TEST				HEADLIGHT																																									
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Photo 32 shows the test report of the Motor Lorry braking efficiency. The Motor Lorry braking system had failed (arrowed) and the braking efficiency results for the front and rear axle (circled) from the roller brake test, suggesting that the braking system was not efficient to stop the Motor Lorry in time at the point of accident.

19. From the readings, both the front and rear axle were tested a braking efficiency of 37% and 28% respectively. This finding is below the LTA minimum requirements of 50% for braking efficiency for the Motor Lorry.

Conclusion

20. From my physical inspection of the Motor Lorry, it appears that its engine system, transmission system, steering system were all in serviceable condition. However, I had found the braking system to be in an inefficient conduct which may have caused and/or contributed to the accident.

21. A short operational test of the Motor Lorry, which I had conducted, revealed a longer stopping distance and effort to bring the Motor Lorry to a complete stop. The Motor Lorry had also failed roller brake test results from STA inspection centre. The braking system was found to be not efficient
22. The 2 front tyres and 4 rear tyres fitted on the Motor Lorry were also found to be in serviceable condition. I did not find any tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 6 tyres. The 6 tyres were also observed to be sufficiently inflated for vehicular operation with remaining tread depth of approximately 7mm – 7.7mm.

Sherwin Beh

Technical Investigator

Ang Bryan Tani

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Technical Investigation & Reconstructionist (SAE-A)

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