

Your Ref: TP/IP/52309/2018
Our Ref : CI/TPD18019476/Z

11th March 2019

General Investigation Team 'D'

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

MECHANICAL INSPECTION REPORT OF TIPPER TRUCK XD 4360D

1. We refer to your request on 19th October 2018 to conduct a physical inspection of a tipper truck bearing registration number XD 4360D (herein referred to as "**Tipper Truck**"), which was involved in a road traffic accident on 12th August 2018.
2. The objective of this inspection is to determine if there was any possible mechanical failure to the Tipper Truck that may have contributed to the accident.
3. Following the request, we had carried out a physical inspection of the Tipper Truck on 19th November 2018 at the premises of Traffic Police vehicle pound, 517 Airport Road Singapore 539942. We now set out below our observations and comments with respect to this inspection.

General Condition

4. The mileage of the Tipper Truck at the time of our inspection was recorded as 754071km.
5. The Tipper Truck was found to sustain above minor damages which affects its rear container as a result of the accident. Its rear container bracket was found to be broken due to the impact. Its front top left portion was also observed to be affected by the accident.
6. This was likely to be the consistency of the accident's case facts that on 12th September 2018 at about 0425hrs, the driver of Tipper Truck (XD 4360D) claimed mechanical fault to the rear container, which resulted it to reclined and collided into two 4.5m gantry height limit along Sungei Kadut Street 1. See photo 1 to 8 below.

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Photo 1 shows the mileage of the Tipper Truck at the time of our inspection was recorded as 754071km.



Photo 2 shows a general view of the front body of the Tipper Truck at the time of our inspection. The Tipper Truck was observed to sustain minor damages at its top left portion due to the accident impact.

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Photo 3 shows a general view of the front right body of the Tipper Truck at the time of our inspection. The Tipper Truck was observed to have no signs of fresh damages on its front portion except for rear container in recline condition due to the accident's impact.



Photo 4 shows a general view of the front left body of the Tipper Truck at the time of our inspection. . The Tipper Truck was observed to have no signs of fresh damages on its front portion except for rear container in recline condition due to the accident's impact.

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Photo 5 shows a general view of the rear body of the Tipper Truck at the time of our inspection. The Tipper Truck's rear container was observed to sustain misalignment due to the accident.



Photo 6 shows a general view of the rear right body of the Tipper Truck at the time of our inspection. The Tipper Truck was observed to have no signs of fresh damages on its front portion except for rear container in recline condition and misaligned due to the accident's impact.

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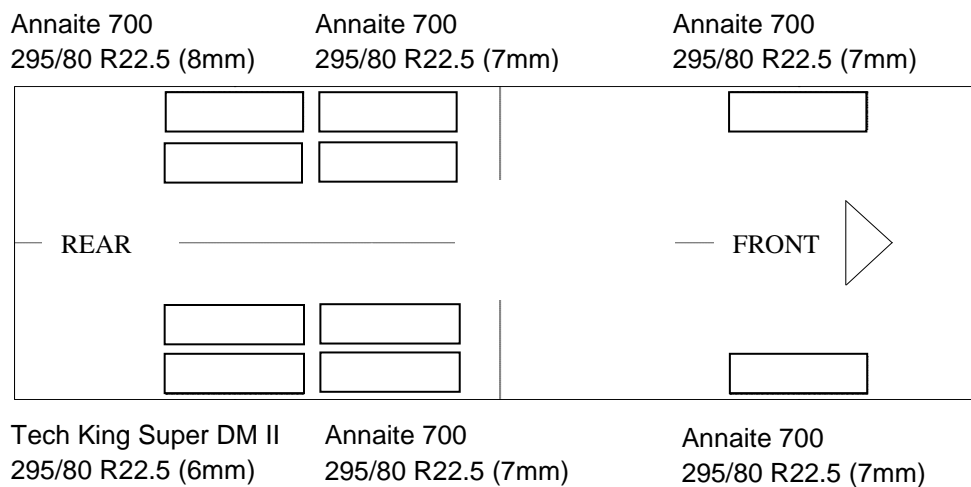
Photo 7 shows a semi close-up view of the damaged bracket for the rear container due to the accident's impact.



Photo 8 shows a semi close-up view of the damaged top left portion due to the accident's impact.

Tyres and Wheel Rims

7. The 10 tyres fitted on the Tipper Truck were all observed to be in serviceable condition. We 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 10 tyres.
8. However, front right tyre, rear left middle outer tyre, rear left outer tyre, rear right middle outer tyre & rear right outer tyre were observed to be deflated likely due to the stationery position for a long period of time which in turn causes the abovementioned tyres to sustained loss of air pressure.
9. The tyre brand, tyre size and remaining tread depth of the Tipper Truck's 10 tyres were recorded as follows:-



10. The 10 tyres were observed to be wrapped around standard steel wheel rims that were found to be without any damage. See photo 9 – 15 below.

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Photo 9 shows the condition of the front left tyre of the Tipper Truck, which was observed to be in serviceable condition with remaining tread depth of approximately 7mm.



Photo 10 shows the condition of the front right tyre of the Tipper Truck, which was observed to be in serviceable condition with remaining tread depth of approximately 7mm.

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Photo 11 shows the condition of the rear left tyres of the Tipper Truck, which were observed to be in serviceable condition with remaining tread depth of approximately 8mm. The tyres were also observed to be sufficiently inflated for vehicular operation.



Photo 12 shows the condition of the rear left tyres of the Tipper Truck, which were observed to be in serviceable condition with remaining tread depth of approximately 8mm. The tyres were also observed to be sufficiently inflated for vehicular operation.

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Photo 13 shows the condition of the rear left tyres (centre axle) of the Tipper Truck, which were observed to be in serviceable condition with remaining tread depth of approximately 7mm. The tyres were also observed to be sufficiently inflated for vehicular operation.



Photo 14 shows the condition of the rear right tyres of the Tipper Truck, which were observed to be in serviceable condition with remaining, tread depth of approximately 6mm. The tyres were also observed to be sufficiently inflated for vehicular operation with no tear, cut or burst mark(s) on the outer and the inner sidewalls.



Photo 15 shows the condition of the rear right tyres (centre axle) of the Tipper Truck, which were observed to be in serviceable condition with remaining, tread depth of approximately 8mm. The tyres, which were wrapped around standard alloy wheel rims, were also observed to be sufficiently inflated for vehicular operation.

Engine Compartment & Operating Fluids

11. We are unable to examine the engine compartment of the Tipper Truck due to the malfunction of the hydraulic system which lifts the cabin compartment to assess the engine compartment.
12. We however, can only observed parts and components where assessable. From the underside of the engine compartment, we found visually it was intact and unaffected by the accident. The clutch fluid, engine fluid and engine coolant were all found to be of sufficient level for operating purposes. Visually, there was also no contamination found to these fluids.
13. Our subsequent checks on the underside of the Tipper Truck also revealed no fluid stain. Visually, the various undercarriage components of the Tipper Truck were all observed to be intact and without any visible damage. See photo 16 – 21 below.



Photo 16 shows a general view of the engine compartment area from the front bonnet of the Tipper Truck. It was observed to be intact and unaffected by the collision. There was also no sign(s) or indication(s) of fluid leak and/or fluid stain found.



Photo 17 shows a close-up view of the clutch fluid. It was observed to be at sufficient level without any contamination.

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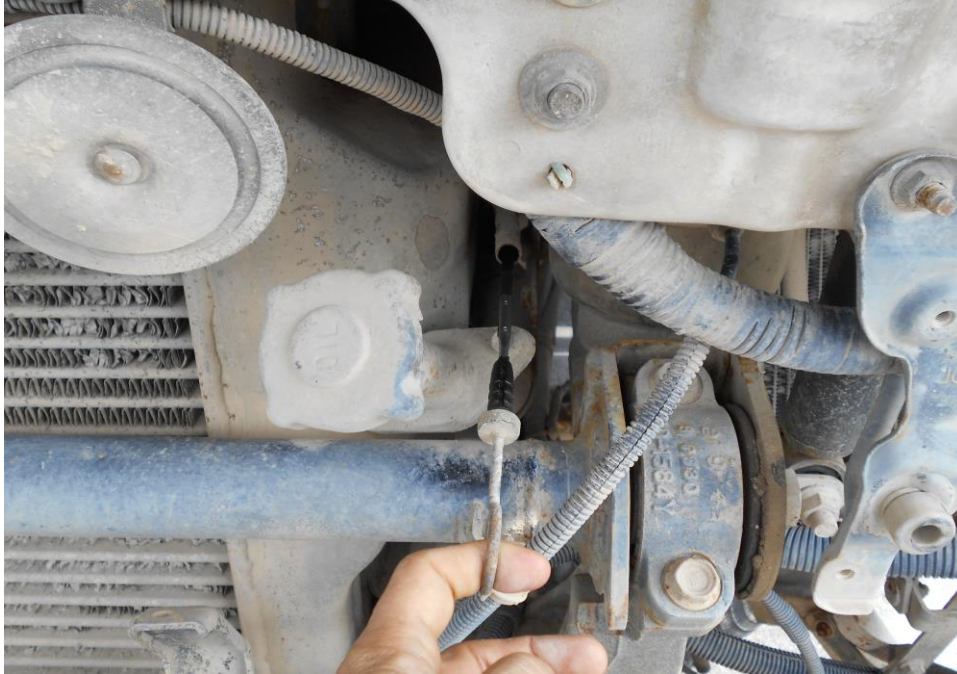


Photo 18 shows a close-up view of the dip stick which was located at the front bonnet.



Photo 19 shows a close-up view of the dip stick which indicated the engine fluid was at a sufficient level for operational purposes.

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Photo 20 shows the engine coolant reservoir of the Tipper Truck at the time of our inspection. The engine coolant was observed to be of sufficient level and without any visible contamination for operational purposes.



Photo 21 shows a general view of the undercarriage at the engine compartment area of the Tipper Truck. It was observed to be intact and unaffected by the collision. There was also no sign(s) or indication(s) of fluid leak and/or fluid stain found.

Steering System & Braking System

14. The mechanical components of the Tipper Truck's steering system were all found to be visually intact and undamaged. The steering shaft and steering rack of the Tipper Truck were observed to be intact and securely attached to the front left wheel and front right wheel. The steering ball joints were also observed to be in a serviceable condition.
15. Static test on the steering system of the Tipper Truck also revealed no abnormality to the steering system. We did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions. It is likely that the steering system of the Tipper Truck was in serviceable condition at the material time of accident since its mechanical components were all found to be generally intact and securely fitted. See photo 22 – 26 below.



Photo 22 shows some of the mechanical components (arrowed) of the Tipper Truck's steering system. Our visual checks on the various mechanical components of the steering system revealed all to be intact and in good condition. The steering system of the Tipper Truck is hence likely to be in serviceable condition at the time of accident.

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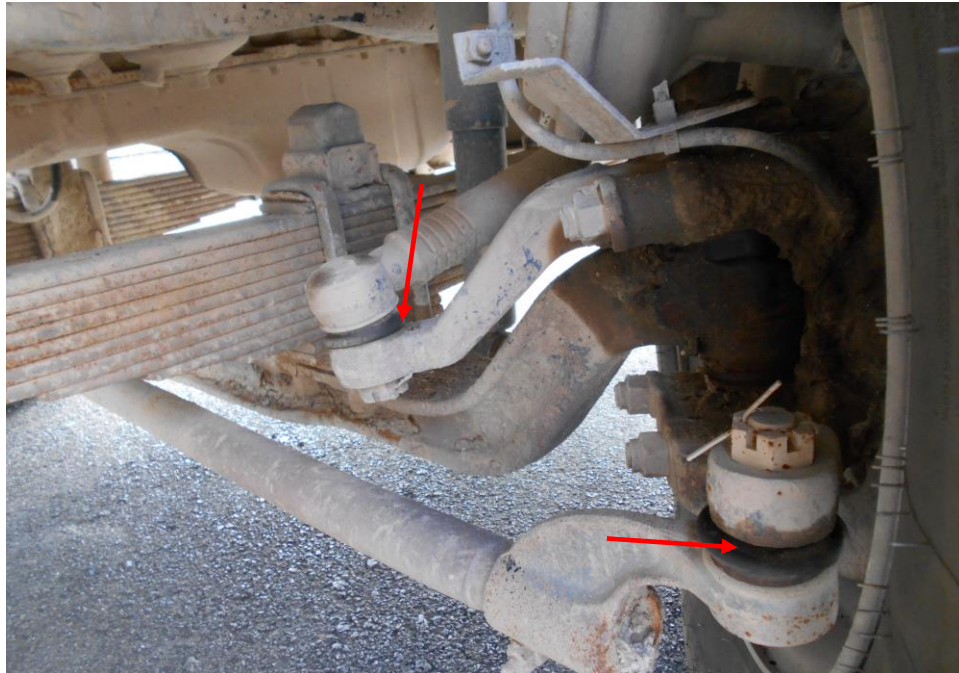


Photo 23 shows the undercarriage components at the front right wheel of the Tipper Truck. The various undercarriage components of the Tipper Truck were all observed to be intact and without any visible damage. This had included the steering rack and steering linkages (arrowed) of the Tipper Truck.



Photo 24 shows the undercarriage components at the front left wheel of the Tipper Truck. The various undercarriage components of the Tipper Truck were all observed to be intact and without any visible damage. This had included the steering rack (arrowed) of the Tipper Truck, which was observed to be securely attached to the front left wheel and front right wheel.

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Photo 25 shows that we did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions.



Photo 26 shows that we did not experience any abnormal free play and/or other resistance when turning the steering wheel left and right to full lock positions.

16. The braking system of the Tipper Truck was noted to be of an air-assisted hydraulic braking system. Briefly, in this system, compressed air is used to force the hydraulic fluid to the brake wheel cylinders (for drum brakes) or to the brake callipers (for disc brakes). The pressurized hydraulic fluid then presses onto the brake shoes (for drum brakes) or onto the brake pads (for disc brakes), through the respective braking mechanism, thus slowing the rotation of the wheels.
- 17.3 numbers of air tanks in particular were observed to be also in serviceable condition. Air built up to an acceptable level which is level 8.5 to 9 (On the speedometer display panel) for both air tanks for operational ready status after a warming up session prior the operational test. Both air tanks were monitored for about 10 minutes for an observation of any abnormalities. Both air tanks pressure found to be normal without any drop in pressure during the course of our monitoring session. This would indicate that there was no leak of air pressure from the air braking system of the Motor Trailer. See photo 27 below.

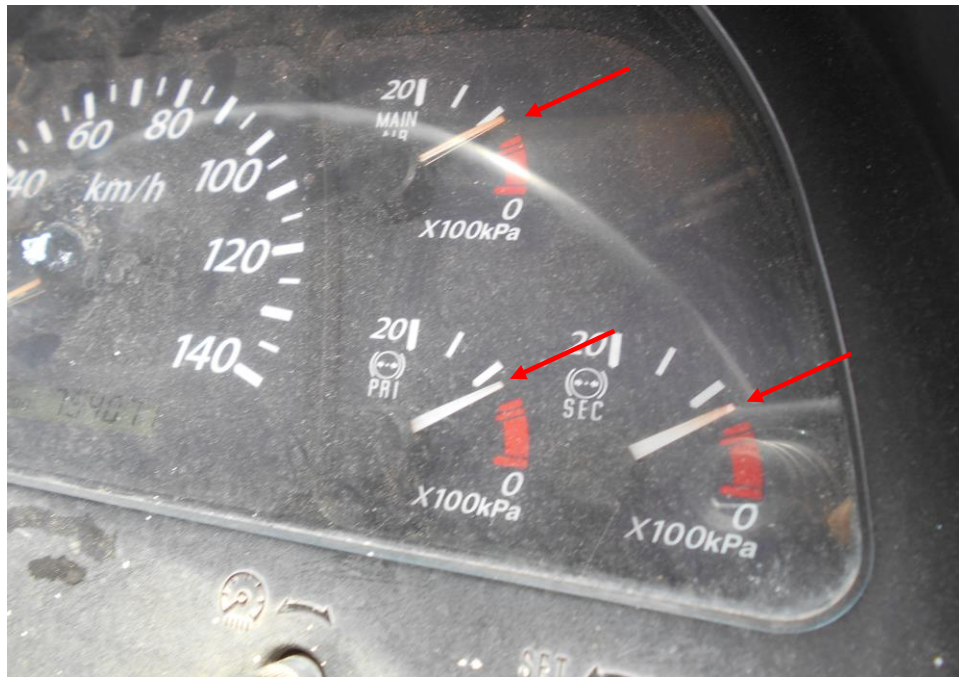


Photo 27 shows the compressed air meters for braking system. This shows that there's no dropped of pressure. Hence, revealed that no air leakage at the time of our inspection.

18. A static brake test(s) was able to be carried at time of our inspection. This is to determine on whether there was any leakage of compressed air that could have affected the braking efficiency of the Tipper Truck. The air pipes, air tanks and connecting valves had all appeared to be in good general condition and securely fitted upon our static brake test. The static brake test was of a satisfactory result. Its brake pedal responded by releasing excessive compressed air upon stepping on the brake pedal suggesting that it's braking system was in serviceable condition at the material time of accident. See photo 28 - 32 below.



Photo 28 shows the air tanks, valves, pipes and hoses, which are some of the components for the air-assisted braking system of the Tipper Truck. These components were mainly located around the right centre body of the Tipper Truck, and were unaffected by the accident.

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Photo 29 shows the brake hoses (arrowed) leading to the rear left wheel and rear right wheel of the Tipper Truck. At the time of our inspection, the various mechanical components of the air-assisted hydraulic braking system of the Tipper Truck were all found to be in good general condition and securely fitted.



Photo 30 shows the brake air cylinder (arrowed) at the rear left rear wheel of the Tipper Truck. Such air cylinder, which is amongst the various components for the air-assisted hydraulic braking system, can be found attached to all the front wheels and all the rear wheels of the Tipper Truck. Upon our checks, we had found all the brake air cylinders to be undamaged and securely fitted to all the wheels of the Tipper Truck.

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Photo 31 shows the brake air cylinder (arrowed) at the rear right rear wheel of the Tipper Truck. Such air cylinder, which is amongst the various components for the air-assisted hydraulic braking system, can be found attached to all the front wheels and all the rear wheels of the Tipper Truck. Upon our checks, we had found all the brake air cylinders to be undamaged and securely fitted to all the wheels of the Tipper Truck.



Photo 32 shows the brake shoes (brake pads) at the rear left wheel (rear axle) of the Tipper Truck. The brake shoes (brake pads) of the Tipper Truck were all found to be in serviceable condition with sufficient frictional material for operational purposes.

Electronic Safety / Warning Indicator

19. The Tipper Truck's automatic self-test of the functionality of its electronic operating systems such as the Anti-Brake Lock System (ABS) during cranking of the engine was observed to be lighted up. The indicator was noted to stay lighted up even after the engine was in idling speed. See photo 33 to 35 below.



Photo 33 shows the warning indicator for Anti-Brake Lock System (ABS) was observed to be lighted up during cranking & after engine was in idling speed.



Photo 34 shows the warning indicator for Anti-Brake Lock System (ABS) was observed to be lighted up during cranking & after engine was in idling speed.



Photo 35 shows the cut off ABS wires found dangling at the rear right wheel area of the Tipper Truck.

Operational Behaviour of the Tipper Truck

20. All the deflated tyres were firstly prepared before the operational test. A team of tyre mechanics were deployed to prepare and pumped up the deflated tyres for operational test purposes.
21. During the operational test, the transmission system of the Tipper Truck was able to be shifted to drive mode and reverse mode without any difficulty. There were no abnormal sounds heard and/or abnormal behaviour of the Tipper Truck's engine system. The braking system was also found to be in working condition. See photo 36 below.



Photo 36 shows a general view tyre mechanic tried to pumped up the deflated tyres of the Tipper Truck for operational purposes.

Tipper Truck Rear Compartment

22. Our examination on the Tipper Truck's rear compartment reveals that upon accessing into the Tipper Truck's cabin area, we found that the control lever 'On/Off' button of the rear compartment was set to 'Off' position. This indicated that there was no electric supply to activate the rear compartment.
23. The rear compartment of the Tipper Truck method of operation was only activated by manually lifted-up the control level which was located at the right side of the driver's seat. There was no other automatic control or alternative control of the Tipper Truck rear compartment for activation.
24. Further investigation reveals that the rear compartment hydraulic system & supporting mechanical compartment was damaged due to the accident's impact. We were hence unable to conduct any test on the operational of the rear compartment. The accident had caused the rear compartment hydraulic system to be in a state of immobility. See photo 37 below.



Photo 37 shows a close-up view of the damaged hydraulic system which immobilized the operational of the rear compartment.

Conclusion

25. From our physical inspection of the Tipper Truck, it appears that its engine system, transmission system, steering system and braking system were all in serviceable condition. We did not find any evidence(s) to suggest that there was possible mechanical failure to the Tipper Truck that may have caused and/or contributed to the accident.
26. A short operational test of the Motor Car, which we had conducted, did not produce any sign(s) or symptom(s) to suggest that there was any abnormality to its engine system, its transmission system and braking system.
27. The Anti-Brake Lock System (ABS) indicator was noted to stay lighted up even after the engine was in idling speed. This would indicate that there was an electronic fault to the Anti-Brake Lock System (ABS). Further investigation found that the ABS wiring which was located at the rear area was noted to be cut off likely due to the daily heavy operations and environment. However, we are of the opinion that this did not cause and/or contributed to the accident as the braking system was still able to function normally.
28. As for the driver's claimed of a mechanical fault to the rear compartment, we were unable to comment on whether it contributes to the accident. This was due to upon accessing into the Tipper Truck's cabin area; we found that the control lever 'On/Off' button (which was located on the right side at the driver's seat) of the rear compartment was set to 'Off' position. This indicated that there was no electric supply to activate the rear compartment. No operational test on the rear compartment was able to be conducted due to the accident impact damages.

29. The 10 tyres fitted on the Tipper Truck were also found to be in serviceable condition. There was no tear, cut or burst mark(s) on the outer and the inner sidewalls as well as across the tread of the 10 tyres. The 10 tyres were sufficiently inflated for vehicular operation with remaining tread depth of approximately 6mm to 8mm.

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