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Heavy Vehicle Driveshafts – Design, modification, certification, repair, maintenance and operation

Situation:

Investigation of recent driveshaft failures has highlighted the importance of following proper procedures when driveshafts of heavy vehicles are designed, modified, certified, repaired, maintained and inspected. In one of the investigated cases part of a truck driveshaft detached and fatally struck a person travelling in another vehicle.

It should be understood that driveshafts and their components, especially the universal joints, need appropriate maintenance, otherwise their life will be shortened dramatically, and they may fail prematurely.

Operators, drivers and mechanics, as well as engineers, certifiers and vehicle inspectors, all must take appropriate action to avoid these potentially dangerous failures.

Actions to take:

Operators:

Operators must ensure that the driveshafts are maintained and checked regularly, and that this work is carried out according to the manufacturer's written instructions. However, to avoid in-service failures, industry experience has indicated that in some cases driveshafts need to be lubricated and checked more frequently than specified by the manufacturer.

Regular maintenance that is carried out correctly will reduce repair costs and downtime, as well as greatly improve safety.

Drivers:

Drivers must always engage and disengage the clutch smoothly and gradually, especially when starting or changing gear under heavy load, for example when driving uphill. Abrupt use of the clutch places higher loads on the driveline, which may cause damage to the driveshaft, or, in extreme cases, may lead to immediate driveshaft failure.

Drivers must also be aware that any unusual vibration that can be felt for example on the gear-shifting lever may indicate a problem with the driveshaft. In addition, there may be knocking sounds when starting the vehicle, and/or during gear changes. If the vibration or knocking increases, it may indicate that the driveshaft is about to fail, therefore the driver must immediately slow down, stop the vehicle, and check the driveshaft.

If driveshaft failure occurs at high vehicle speed, the risk of harming other road users is increased significantly.

Maintenance:

Maintenance workshops and mechanics must check and maintain the driveshaft according to the manufacturer's instructions. The instructions are likely to include the following:

"Purge-lubricate" with specified lubricant: greasing must be continued until the fresh lubricant is discharged from all "outlets" of the lubricated component. Ensure that the pressure is not too high as excessive pressure can damage or blow out the seals of universal joints, which in turn will lead to reduced component life.

Check the condition (damage, wear, deterioration, excessive play) of all components, check that all bolts and nuts are present and properly tightened. Check that the bearing cups of the universal joints are correctly positioned, secure, and not able to rotate.

Repair:

Workshops and mechanics that repair driveshafts or carry out repairs where the driveshaft is partially or fully removed from the vehicle must always follow the manufacturer's repair instructions. The instructions are likely to include the following:

Components that are allowed to be re-used must be thoroughly cleaned, inspected, replaced if necessary and lubricated before re-assembly. Components that are required to be replaced once disassembled must be replaced even if they appear to be in good condition. These components may include bolts, nuts, locking tabs, the straps of universal joints etc. The universal joints must be phased as prescribed by the manufacturer. All bolts and nuts must be properly tightened and locking devices must always be used as specified by the manufacturer.

Design, modification and certifications of driveshafts:

Heavy Vehicle Specialist Certifiers must ensure that the requirements, which are in force in respect of driveshaft modifications, are complied with. LTSA Memo 20A highlighted that a modified driveshaft and its components must be within the limits set by the manufacturer of those components. The LTSA has also put together a detailed guide for Certifiers to indicate the aspects of driveshaft design that must be taken into account when a driveshaft is modified and certified.

CoF inspections:

The CoF guide was amended to include detailed inspection requirements for driveshafts. These amendments were sent to inspection organisations in July this year. CoF inspectors must check the condition of driveshafts and their components according to the updated requirements.