Technical Bulletin

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Mass Management Compliance Using Air Suspensions

Introduction:
Recently there has been an initiative by some consignors and consignees to impose an underload policy (10% on gross mass) when loading bulk product. This seems to be primarily on the basis that single deck weighbridges cannot readily provide indication of individual axle group masses and that these consignors and consignees are being over cautious in their commitment to chain of responsibility.
The implication of this to productivity will negate much of the benefits of HPFV's and this approach has the potential to be migrated to other transport tasks (eg: quarrying).

Applying a 10% reduction to a B-double operating at CML (65^{tonnes}) reduces the gross mass to 58.5^{tonnes}, this is all as a reduction in payload. Based on configuration average form the Truck Impact Chart the average payload of a B-double at CML is 40.84^{tonnes}, reducing gross mass by 6.5^{tonnes} results in a payload of 34.34^{tonnes}, a 16% net reduction in payload, a 19% increase in transport costs.

Mass Management:
There are various methods that will provide reliable reference to axle group mass and in conjunction with additional control procedures will meet the requirements of the NHVAS Mass Management Module. These include load cells, strain gauges, and air pressure systems. The level of accuracy is related to the technical sophistication of the system which is typically reflected in initial costs.

With the broad acceptance of air suspensions within the road transport industry, suspension air pressure is a reliable reference to the "sprung mass" at the suspension.

Many operators have embraced various technologies related to air suspensions including using air spring pressure as a reference for axle group mass. Whilst air spring pressure has been demonstrated to provide a reliable reference to axle group mass, there are several very specific issues that must be managed to achieve reliable mass outputs.

The critical aspects include:
- Suspension set up:
- Suspension calibration:
- Combination on Level ground: and,
- Brakes all released: and,
- Allow adequate time for the suspension to "recover".

Suspension set-up:
1. The axle alignment site area should be flat, level, and free of debris.

2. Inspect each tyre set. Tyres of each dual wheel set must be matched to a maximum of 3^{mm} tyre radius or a maximum of 20^{mm} in tyre circumference.

3. Secure trailer and release the trailer's brakes. This will allow wheel rotation while positioning the suspension fore and aft.

4. Set the trailer's skid plate to its designed height. Set suspension at the ride height specified on the suspension/manufacturer's assembly drawing.

5. Then loosen the eyebolt/s on each suspension bush with remaining torque-prevailing to hold the bush between the alignment guide, but loose enough to permit the alignment adjustments.

6. Then follow suspension manufacturer's instructions.

The suspension set-up is most important regardless of which proprietary air pressure-based system you select, for consistency.

- **Align the suspension at Ride Height**
- **Tighten "U" Bolts at Ride Height**
- **Tighten Eye Bolts at Ride height**
- **Tighten Shock Absorber Bolts at Ride Height**

These procedures are supported by ITC Membership suppliers of suspensions:

- BPW Transpec
- Fuwa K-Hitch
- Hendrickson
- SAF Holland
- MaxiTrans

Brake reactivity:
Whilst air suspensions are not considered brake reactive, however the individual modules are brake torque reactive (which is why the suspension tends to *squat* under braking events). Therefore, all brakes must be fully released with sufficient time for the suspension air system to *recover* to achieve consistent response.

Suspension Recovery:
Following a braking event or a change in loading, air suspensions require an interval for recovery. A minimum of five (5) seconds is recommended.

Suspension Calibration:
There are several suppliers of air suspension load monitoring systems including those from ITC members:

- Airtec Australia www.airtecaustralia.com.au
- Haldex Brakes https://www.haldex.com/en/Europe/
- Knorr Bremse www.knorr-bremse.com
- WABCO www.wabco-auto.com

Whilst each supplier provides calibration instructions, there are additional requirements:

- Ready access to a weighbridge will be required and two (2) calibration references will be required.
  - Unladen
  - Fully laden (but ≥ 95%). If operating HML, use HML mass limits.
- Regardless of the weighbridge style (single or multi deck), for superior results, when the combination is parked with the appropriate axle group in the load deck, the vehicle must not roll with all brakes released. Otherwise the outputs/inputs will not provide optimum accuracy.
- Always allow the suspension to recover, do not rush, patience is required.

After loading:

- The vehicle needs to be on level pavement.
- The trailer brake system is only supplied with AIR when the trailer parking brakes are released
- The air system priority charges the brake system – AIR for ancillary systems, including air suspension, will only be available when the system pressure exceeds the brake protection valve setting (typically not less than $425^{kPa} – 62^{PSI}$). An unladen trailer being fully laden when parked may take several minutes for the suspension system to fully recover to ride height.

Validation:

On-board scales are not certifiable weighing systems but can and do provide reliable references to weight and mass management. Mass management requires the record keeping, not only that from on-board systems, but a system validation basis across a certified weighbridge (hence, outputs validated at pre-determined intervals, in accordance with your documented mass management accreditation procedures).

Suspension Maintenance:

The suspension must be maintained in accordance with the suspension manufacturer/suppliers' instructions.

BPW Transpec **Fuwa K-Hitch** **Hendrickson** **MaxiTrans** **SAF Holland**