



Longer Semi Trailers

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In October 2011, the DfT officially announced the go ahead for controlled trials of longer semi trailers (LST's). Whilst on the surface the move is welcomed by many in the industry, the implications to each operator are sometimes difficult to understand.

In this document, Don-Bur aims to condense the extensive DfT documentation to enable informed decisions and develop solutions to suit your business.

Don-Bur is no newcomer to longer trailers. In 2004, they engineered a 16m long trailer with an active rear steer system developed in conjunction with Silvertip Design. Even then, Don-Bur were considering the implications of cut-in, swing-out and the penalties of cost and weight. Since then, they have manufactured hundreds of trailers fitted with various steering axle solutions including self-tracking and positive steer technology.

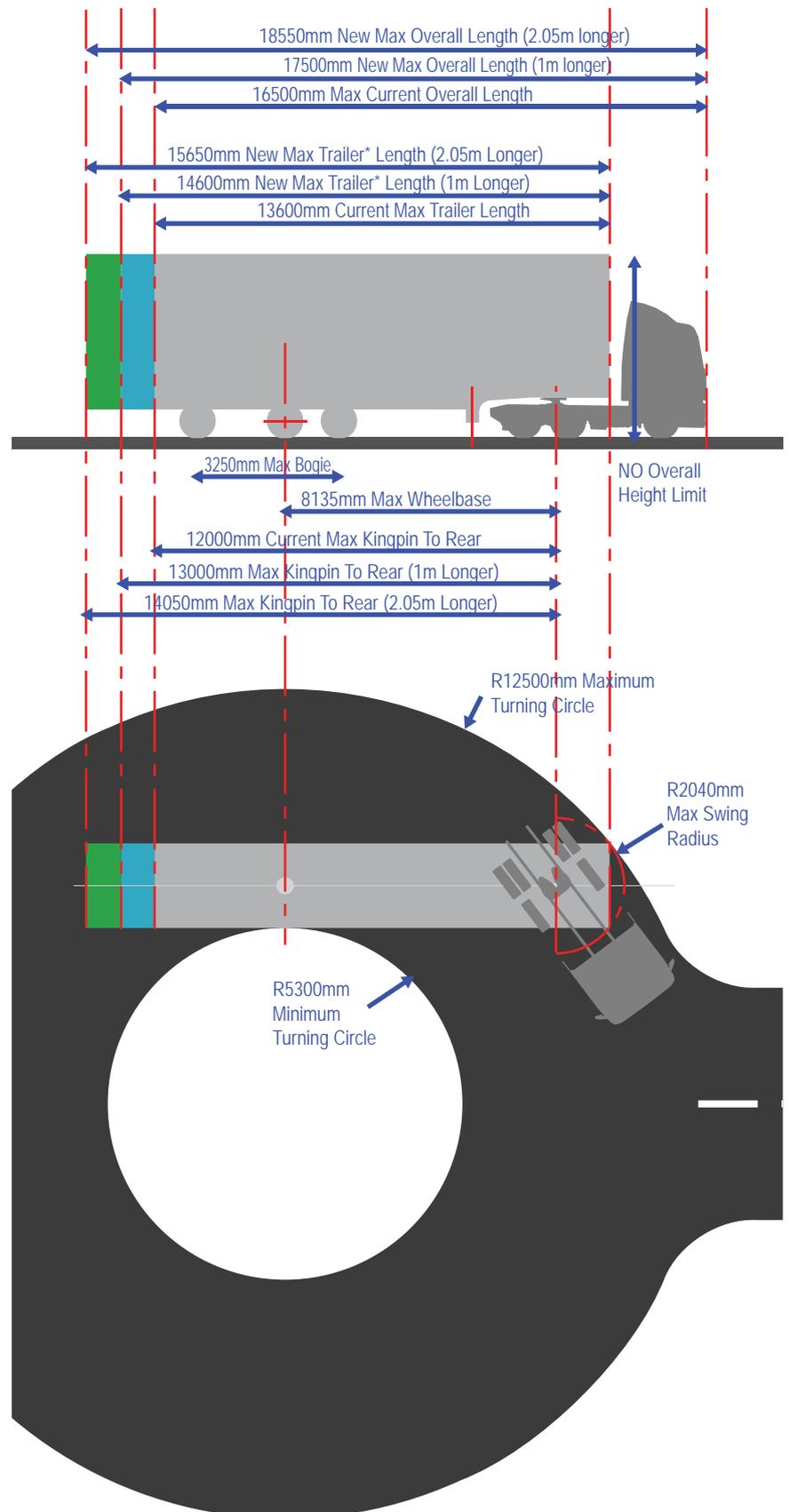


2004: Don-Bur's first 16m long trailer with "SCM" active steering correction mechanism.



LST solution with a fixed axle bogie.

The Don-Bur Quick Guide To LST's



The Trial

The trial will proceed for 10 years, from November 2011 to October 2021. The DfT will closely monitor the trial through an independent body (four monthly frequency). A total of 1800 VSO's (Vehicle Special Orders) will be distributed, split evenly with 900 x 1m longer trailers and 900 x 2.05m longer trailers.

Notes

"Wheelbase" refers to effective wheelbase, irrespective of steering solution.

The trial will commence Level 2 Technical Requirement, Compliant with current C&U standards with the exception of lengths as specified.

In December 2011, an update was issued, clarifying the overall length definition. In addition to the overall trailer length limits of 14.7m and 15.65m for +1m and +2.05m respectively, the DfT have stated that these measurements be from the 'foremost point of the loading area to the rear of the trailer', where the loading area is to include the thickness of the front wall. Additionally, the DfT have included the original C&U length definition; being a combination of a 2.040m front swing radius (forward arc from the kingpin) and a length from kingpin to rear. Now that this has been clarified, the 1m and 2.05m additions in length extend effectively from the kingpin rearwards, meaning that you can extend curtainsider, box van and temperature controlled bodywork to the same degree.

The DfT reserves the right to alter the conditions of the trial at any point and could revoke any issued VSO at the risk of the operator.

In order to maintain standard turning circles, the normal maximum effective wheelbase (8135mm C&U standard) cannot be exceeded. However, an extension in trailer length will alter the load distribution and, depending on payload weight, may overload a standard fixed axle configuration. In such cases, a steering axle system will be required.
affected by the tractor

It must be noted that historically, trailers had to be "deemed to comply" with the inner 5.3m and outer 12.5m turning circles. For the purpose of the trial, the DfT have stated that LST's must physically comply when measured. As turning circles are affected by the tractor unit.



In accord with the trial guidance, three axles are required. If operating at more than 38 tonnes GVW, an on-board weighing device is also required, which should indicate any overload of axles/ axle groups. Where the load is evenly distributed over the axles (e.g. air suspension), a system that indicates an overload of the axle group will be accepted.

Steering Axles

Two steering system types are commercially available to enable compliance and practicality for longer trailer lengths. In either case, it is believed that the maximum bogie length is 3250mm (centre front axle to centre rear axle).

Self-Tracking

A self-tracking axle is one that permits each wheel on that axle to rotate relatively freely around its own vertical axis; reducing wheel scrub but increasing load distribution capacity. Commonly, only one self-tracking rear axle would be required.

Positive Steer

A rotating axle/s; inversely governed by the relative rotation of the tractor unit vs the trailer. Commonly, a fixed front trailer axle would be supported by two rear steered axles.



The first consideration any operator needs to make before submitting an application to the DfT should be "Is it suitable for my operation?"

With a potential 8 extra UK pallets on a 15.650m long double deck (60 maximum total), the initial answer may be "Yes", but can you practically fit the extra payload weight on without going over your GVW rating? If you can, have you accounted for the additional unladen weight of the trailer and even then, have you considered the payback period and the risk if you VSO is revoked.

Facts You Need To Know

Pro's

- An extra 2 UK pallets on single decks (1m increase) or 4 extra UK pallets on LST double decks.
 - An Extra 4 UK pallets on single decks (2.050m increase) or 8 extra UK pallets on LST double decks.
 - 15% additional load potential (max), reducing delivery frequency and therefore fuel, CO2 emissions and related costs.
 - No overall height limit.
- If you are currently running at low GVW, it is possible you
- can retain a standard, economic fixed tri-axle bogie without risk of overloading the bogie of an LST.

Risks

- The DfT have the authority to revoke any issued VSO during the 10 year trial period.

Con's

- NO additional weight allowance.
- Increased unladen trailer weight.
- Trial stipulates 3 axles.
- Resources required for regular monitoring and reporting to the DfT (The 'Operator Undertaking').
- Additional unladen trailer weight reduces payload weight capacity.
- Commonplace to require a self steer or positive steer solution which increases trailer cost.
- Potentially dedicated tractor unit.

Understanding The Need For Steering Axles

A normal trailer bogie centre (centre of 3 axles) is set at 8.1m from the kingpin. This measurement enables the trailer to move within current turning circle regulations and cannot be moved further back as this will increase cut-in.

Using axle load calculations, you can determine that the load placed over a normal freighted tri-axle is circa 24 tonnes. (Fig. 1).

As trailer length increases, so too does the "waterline" load or UDL. As the load length only increases in a rearward direction, the shift in the centre of gravity puts additional strain on the bogie and proportionately less on the kingpin (Fig 2).

The simple solution would be to move the bogie rearward, which would then reduce the load on the bogie back to normal operating parameters. The problem is, you cannot move the bogie back as this would change the turning circle.

The solution then, is to retain the current effective turning wheelbase with a fixed axle bogie (Single or tandem) set at the 8.1m required distance, and add at least one steer axle set further back to elongate the effective load wheelbase. The purpose of the steer axle is to support the load without scrubbing or having a negative effect on the turning circle (Fig 3).

Axle Load Calculations

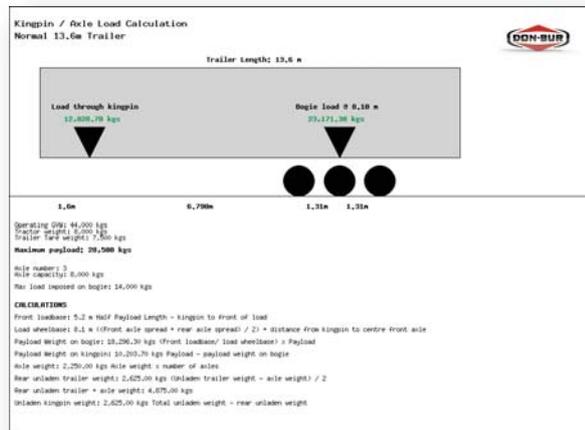


Fig 1: Standard 13.6m trailer with fixed tri-axle bogie: 23.2 tonnes imposed on bogie.

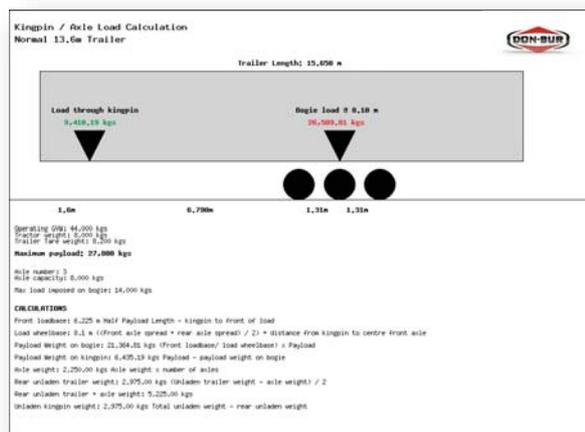


Fig 2: LST 15.650m trailer with standard tri-axle bogie: 26.6 tonnes imposed on bogie which will overload the axles.

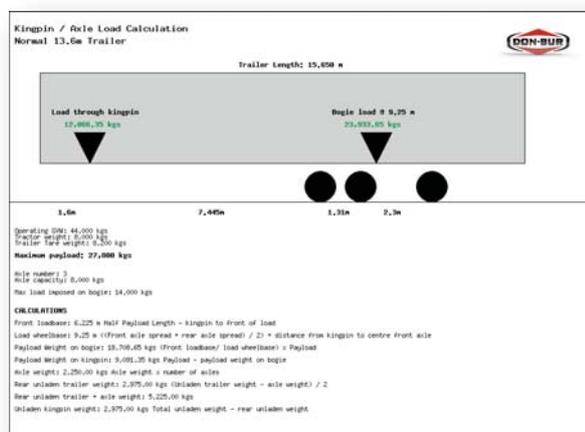
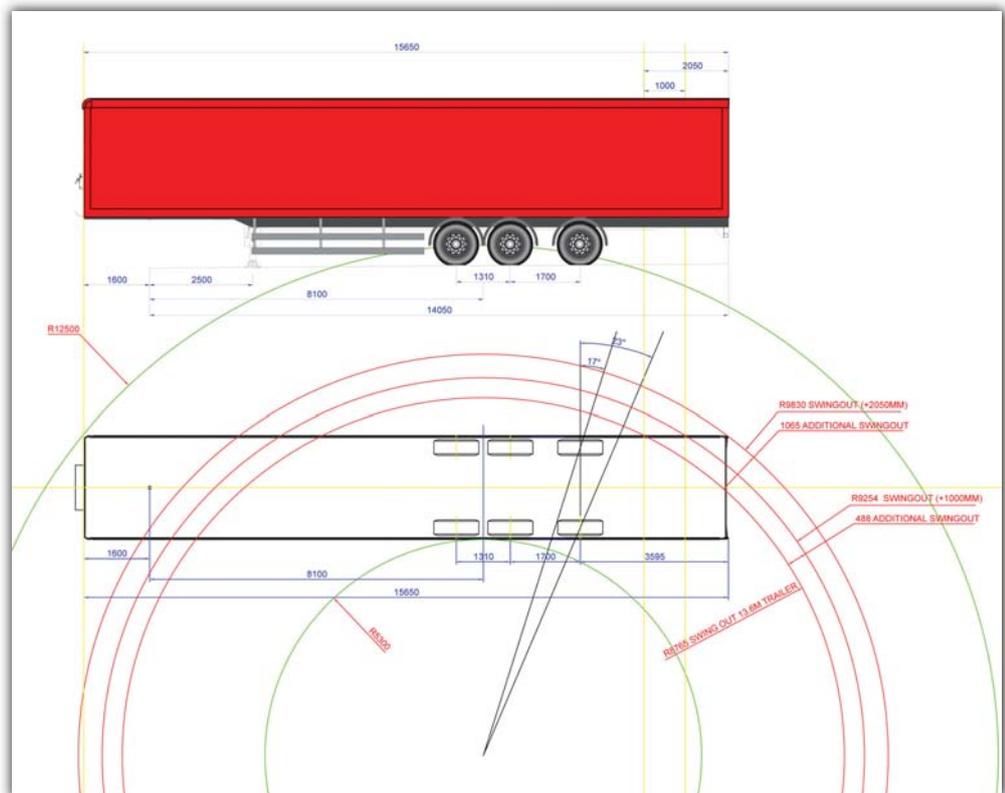


Fig 3: LST 15.650m trailer with fixed tandem axle bogie + rear self-steer axle: 23.9 tonnes imposed on bogie.

Self Steer Axles

Self-Tracking: Each tyre rotates freely on its own vertical axis, as the castor on a shopping trolley would. The distance the self tracking axle can be set back is dependent on the angle the tyre can turn. The further back the self-steer axle is set, the greater the degree of turn needs to be. Self tracking axles are considerably lighter and cheaper than their "positive steer" counterparts. In addition, it is also possible to retain low deck heights (ideal for double decks).

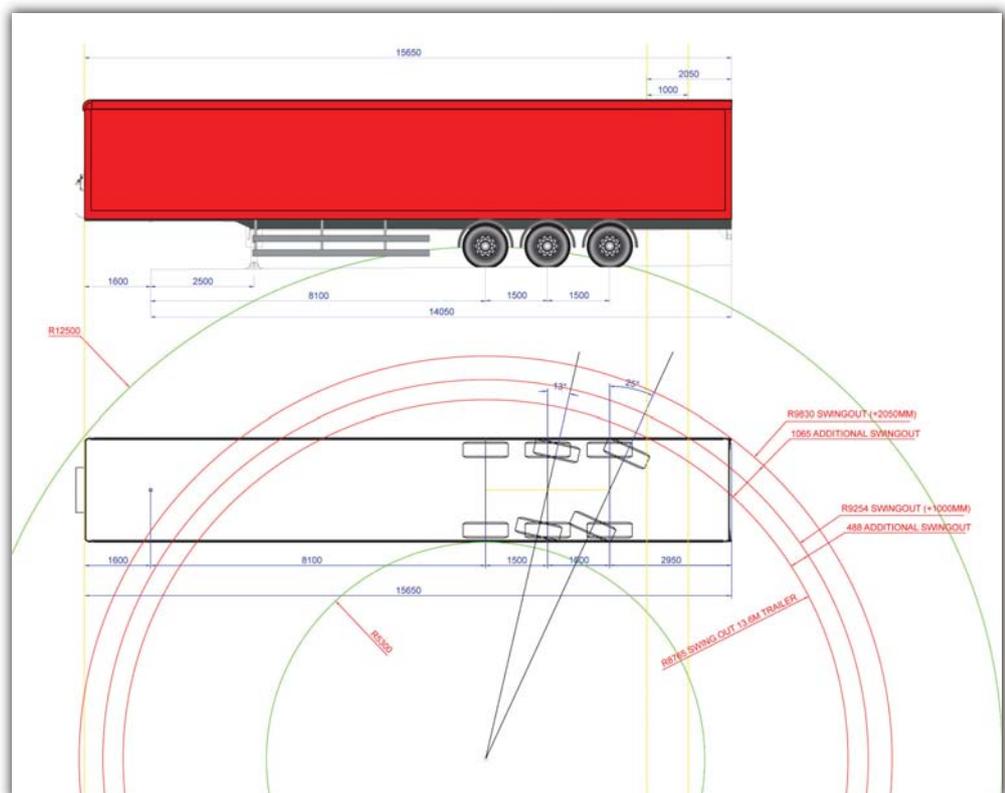


*Approximate Weight & Costs:	+Weight
15.650m with self-tracking axle.....	1 tonne
14.600m with self-tracking axle.....	0.7 tonnes

*All figures are estimates based on technology available at the time of publication. As this technology is changing rapidly, we will be happy to submit current information on demand.

Positive Steer Axles

Positive steer axles revolve around the axle's vertical centre and are inversely powered by the degree of tractor turn vs the trailer. To achieve this, a link is required from the kingpin to the axle system which can be either mechanical or electrical. Due to their complexity, positive steer axles are heavier and more expensive to produce. They do however offer greater flexibility when distributing load, as they positively affect the turning circle of the trailer.



*Approximate Weight & Costs:	+Weight
15.650m with single positive steer axle.....	1.5 tonnes
15.650m with twin positive steer axles.....	0.7 tonnes
14.600m with single positive steer axle.....	1.2 tonnes
14.600m with twin positive steer axles.....	1.7 tonnes

*All figures are estimates based on technology available at the time of publication. As this technology is changing rapidly, we will be happy to submit current information on demand.

Thank You

If you have any questions about this document or LST's, or would like to discuss your operational requirements, please call the Don-Bur sales department on 01782 599 666

For any other information please contact the marketing department at Don-Bur: Richard Owens: 07891 405 600 | richard.owens@donbur.co.uk



Established in 1981, the Don-Bur Group has become internationally recognised for its innovative development of trailers and rigid vehicle bodies, designed to minimise operational costs and increase efficiency.

Don-Bur has committed to research and develop solutions with primary focus on aerodynamics and optimum utilisation of available cubic capacity.

Based in Stoke-on-Trent in the West Midlands, Don-Bur has a 500 strong flexi workforce and generates a group annual turnover of £50 million. Vertically integrated divisions include an 18 acre primary manufacturing site, curtains and load restraint division, graphics house and two after-sales service sites (repair, servicing, refurbishment and ATF Station).

The comprehensive structure provides a complete and fully accountable solution for clientele, catering for all commercial vehicle needs throughout their lifespan.