

“ Merely driving along a flat surface and slamming on the brakes with the trailer empty will simply not do. ”

Make or brake for trailers

Machinery Trailers

It's only when you have to make a sudden stop that you realise the life-saving potential of good trailer brakes. *CPM* looks at how to avoid making that moment a gamble.

By Peter Hill

Fading trailer brake performance is easily overlooked in the hustle and bustle of a busy season but one that really needs to be addressed in timely fashion. Not only because of the safety implications, but also because of the hefty costs that can be incurred from relying too heavily on tractor brakes to bring outfits to a stop.

The issue of trailer braking performance has been brought to the fore again with the prosecution of a farming business for inadequate brake maintenance after a young farm worker died following a tractor crash.

It comes as a timely reminder to farmers and contractors that silage and grain trailers standing idle for much of the year will soon be pressed into service again, travelling along farm tracks and on public roads carrying heavy loads of grass and grain.

At stake here are worker and public welfare issues, machinery maintenance

and repair costs and the public image of farming.

Yet making sure the braking performance of trailed farm equipment is fit for purpose need not be an expensive or time-consuming affair.

Up to scratch

Only regular inspection and adjustment to compensate for brake shoe wear, as well as formal testing of older trailers to see if they can adequately cope with current farm transport expectations, will ensure that trailer brakes are up to scratch.

But what does 'up to scratch' mean in this context?

According to agricultural engineering consultant Dr Andy Scarlett, it means achieving a balanced braking effort from a tractor and trailer combination, with both the tractor and the trailer contributing the same braking effort relative to their weight.

"If the trailer doesn't make its due contribution, the tractor brakes have to work harder to slow the outfit," he explains. "At best, that will result in additional wear and higher servicing costs and at its worst an outfit that is less stable and could be prone to jack-knifing under heavy braking."

Yet regular inspection and occasional performance testing can help avoid such issues.

"In many cases, it will just be a case of adjusting the existing set-up to achieve optimum performance," says Andy.

"In others, it may require upgraded components that, at most, would cost around £400 per tandem axle trailer, which is a minuscule proportion of the trailer's value to the farm business."

As an illustration of 'balanced braking' performance, he cites the example of a typical 16t tandem-axle trailer with suspension, flotation tyres and a roll-over sheet weighing-in at around 6t empty.

With a full load on board, the trailer shares about 3t of its gross weight with the ▶

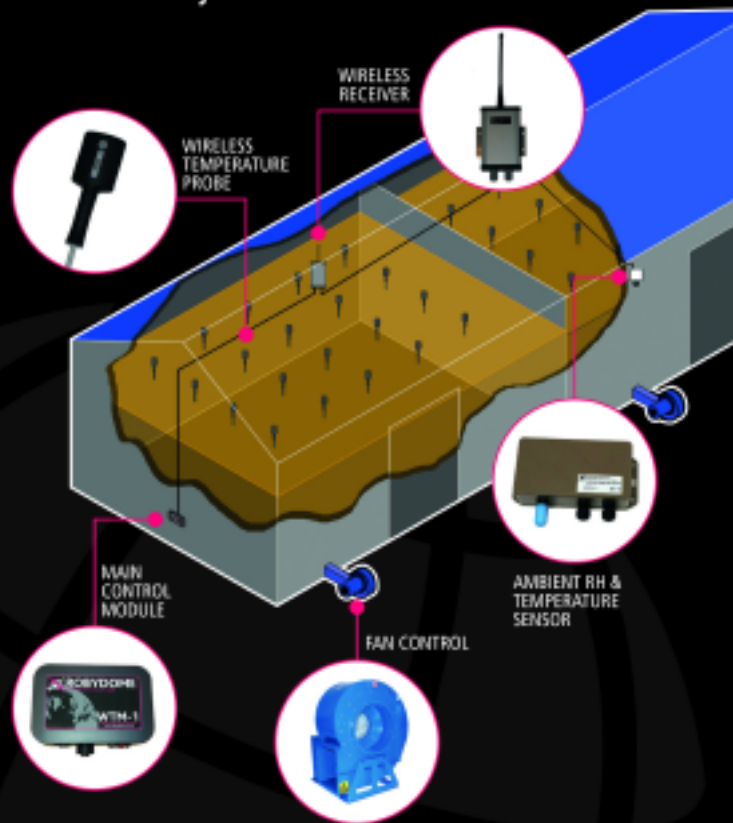


Agricultural engineering consultant Andy Scarlett with the BrakeSafe device that machinery dealers use to test tractor and trailer braking performance.

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Trailer braking equipment may simply need adjusting to keep performance up to scratch.

▶ tractor via the drawbar, which leaves 19t on the axles.

"The accepted norm for any vehicle capable of 40km/h or more is that it should achieve 45-50% braking efficiency," Andy points out.

"So the trailer's brakes need to achieve a braking force equivalent to 45-50% of the weight on its axles to deliver braking performance that matches the tractor's capabilities."

While new and other trailers just a few years old should be equipped to achieve that standard, older units may not, or may have been modified in a way that diminishes their braking performance.

"In some instances, older trailers won't have brake actuators of sufficient size and this is the component that translates hydraulic or air pressure into movement at the brake shoes," he explains.

"Some will also lack a load-sensing mechanism to prevent wheels locking up by moderating the braking effort when the trailer is running empty or partially laden."

He also highlights the negative effect on braking of replacing original tyres with taller ones to achieve increased flotation and/or greater ground clearance.

"A taller tyre generates more rotational torque, which can only be compensated to maintain braking performance by adjusting the actuating

mechanism to deliver more shove at the brake shoe," Andy emphasises.

Establishing for sure whether trailer brakes are, indeed, "up to scratch" requires a properly structured dynamic braking test — merely driving along a flat surface and slamming on the brakes with the trailer empty will simply not do.

Machinery dealers throughout the country can carry out such a test to measure the capabilities of both service and parking brakes on tractors and trailers, as well as other heavy trailed equipment such as manure spreaders and slurry tankers, big seed drills and trailed cultivators.

Dealers offering this service use the agricultural version of BrakeSafe, a device produced by Turnkey Instruments that was originally developed in association with BAGMA, the dealer trade organisation, the Department for Transport and the Health & Safety Executive (HSE).

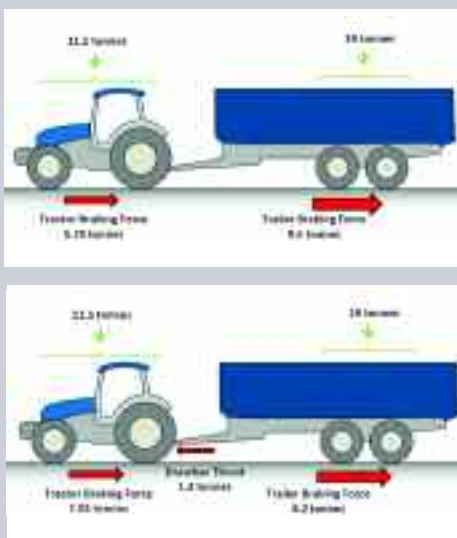
This purpose-built test kit provides an informed measure of whether brake mechanisms need to be adjusted or upgraded by recording various parameters during a dynamic test.

Once positioned securely in the tractor cab, the BrakeSafe unit uses an accelerometer to measure peak and mean deceleration, while also recording the test speed, stopping distance and time

The right balance to brake even

A balanced outfit (top) a 200hp tractor weighing 8.5t and carrying 3t of the trailer's gross weight via the drawbar. The tractor's braking system generates 5.75t braking effort — 50% of its gross weight. A 16t capacity trailer places 19t in total on the axles when carrying a full load, so the braking system needs to generate 9.5t of braking force to meet the 45-50% braking effort norm for vehicles capable of more than 40km/h.

An unbalanced outfit (bottom) — with the trailer generating only 8.2t of braking force due to incorrect brake actuator/lever arm geometry or an actuator too small for the job, applies 1.3t of thrust through the drawbar so the tractor must try to make up the difference to achieve 50% braking effort for the outfit as a whole.



The size of the brake actuator (in this case a combined air and hydraulic unit), and the geometry of the connecting rod relative to the perforated brake operating lever influence a trailer's braking performance.

dealers can have their BrakeSafe calibrated annually to ensure it consistently delivers accurate results.

There's no standard charge for such a test but BAGMA's Keith Christian indicates that dealers are unlikely to charge more than £100 per trailer; and some will do it for less, especially if they are asked to also carry out any chargeable remedial work on trailers found to under-perform.

Trailer brakes that do not come up to standard may simply need adjusting, ►

taken to stop from the point the brakes are applied.

A pedal force transducer or switching unit connection to the tractor's hydraulic or air brake system records the brake pedal force applied and any slope in the test course can be taken into account to ensure a 'true' result.

A built-in printer provides an instant hard copy of the results, which can also be transferred to a computer for the farm records.

BAGMA provides training of experienced agricultural technicians in the use of the system, including refresher training, which is considered advisable every five years, and

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TILLY keeps trailers in check

The TILLY Your Trailer campaign aims to encourage farmers and contractors to voluntarily have their trailers regularly serviced and inspected, and to get operators into the routine of making daily checks before they operate a tractor and trailer combination.

The family behind the campaign urge farmers to ensure that trailers are in best possible shape for hauling seed and fertilisers in the drilling season and grain, oilseeds and straw at harvest.

Machinery dealers supporting the campaign provide a certificate and apply a sticker to certify that a trailer or any other heavy trailed equipment used on the road has been serviced by a qualified mechanic.

A list of 18 routine checks for operators to carry out is recommended before the equipment is used; they include checking that proximity and brake lights are in good working order, that the hand-brake performs as it should, and inspecting tyres for condition and correct inflation.

Campaign supporters say this process not only acts as a reminder to check that equipment is up to scratch, rather than simply



The TILLY Your Trailer campaign aims to encourage farmers and contractors to have heavy trailed equipment professionally inspected and serviced regularly.

jumping on and driving away, while providing a paper trail as evidence of a farm business taking a responsible approach to the issue.

The TILLY acronym (Trailer Inspection, Life-Saving Legislation Yearly) comes from the name of a pet Beagle whose 19-year old owner died following an accident with the tractor and trailer he was driving, which was attributed to poor brake condition and performance.

► which is why there are spare holes in the brake-operating lever arm — assuming the uppermost hole is not already providing the connection, that is.

The lever arm turns a cam to push the friction shoes against the brake drum, so moving the connecting rod from the actuator unit up a hole results an increase in the force generated through greater leverage.

“Just remember to also reposition the actuator on its axle mounting bracket if necessary to keep the connecting rod at the optimum right-angle to the operating lever arm,” advises Andy.

When adjustments do not produce the desired results, the next option is to upgrade the actuators to a larger size.

It's advisable to get professional advice at this stage because it's important to have a set-up that is neither under- nor over-specified for the trailer.

Air-only actuators are available for around £20 apiece, while combined air/hydraulic actuators cost £50-£60 each.

Both are relatively straight-forward to fit for someone savvy with spanners, says Andy, but he recommends leaving the installation of components such as trailer load-sensing and safety break-away valves to professionals. ■

