

Fuel Trial & Equipment Benefits Report

Trial Date	9 th August 2016
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Customer Evaluation – STILL RX7025T vs Linde H25T



Introduction

A long time STILL Customer was recently considering their 60 quantity fleet replacement options, and following evaluations of a number of makes including STILL, Linde, Jungheinrich and Doosan, the STILL & Linde equipment was shortlisted for a fuel trial to verify fuel consumption performance.

The Doosan and Jungheinrich models were evaluated and discounted due to “being unsuitable for this very busy hub operation and not being liked by the drivers”.

Fuel Trial

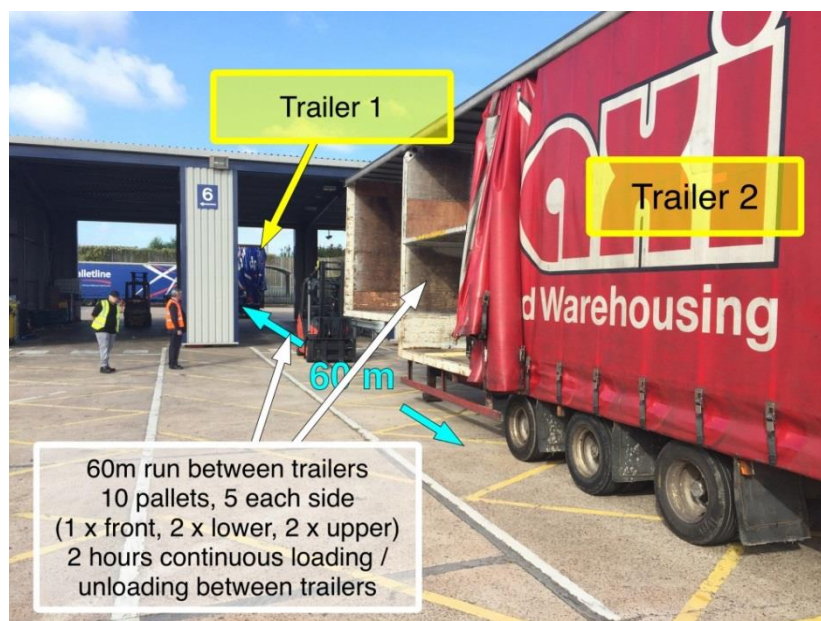
To ensure a fair and accurate fuel usage trial it was agreed that Linde and STILL would provide new equipment and that a predefined and controlled circuit and pallet movement scenario would be created.

STILL provided a new RX70-25T, Linde Provided a new H25T

The fuel trial test consisted of the following: -

- Two curtain sided double deck trailers were parked approx. 60m apart.
- One trailer was loaded with 10 pallets - 5 each side with 2 on the upper, 2 on the lower deck level and 1 at the front of the trailer. The other trailer was empty.
- The driver was required to fully load / unloaded from each trailer in-turn all 10 pallets in the same sequence over a period of 2 hours, continuously, without a break.
- To ensure consistency, the driver's objective was to move as many pallets as possible in the 2 hour time of the trial, all pallet movements were counted and logged.
- To ensure consistency prior to the trial, the trucks' performance was compared and the Still was reprogrammed to mimic how the Linde had been set up.
- The same driver was used to operate both trucks.
- Refillable LPG cylinders were used for the trial and their weight was accurately measured and recorded immediately before and after each test period
- Both STILL and the customer attended and witnessed the trial. The measurements were verified and agreed by both parties.

The test area is shown below, the driver travelling only in the direction of the arrow whilst transferring the pallets between the two trailers.



Fuel Trial Test Results

The following table details the recorded results of the fuel test trial.

Truck	Test Duration (hrs)	LPG bottle weight at start (kg)	LPG bottle weight at end (kg)	Total LPG used (kg)	Total LPG used (L)	Recorded fuel consumption (Litres/hr)
STILL RX70-25T	2	35.3	29.5	5.8	10.7	5.37
Linde H25T	2	26.8	19.9	6.9	12.8	6.38

The test was carried out on the STILL RX70.25T model first, with the Linde H25T test taking place afterwards.

The fuel consumption savings achieved with the STILL RX70-25T model were significant.

- The Linde H25T model **consumed nearly 19% more fuel** over the duration of the trial.
- Using the above consumption figures and the fleet usage, the fuel costs compared to the Linde H25T a STILL RX70 fleet would provide, over the duration of the contract, a **£121,200 saving** in fuel spend.
 - Which equates to **757,000 fewer litres** of fuel used.
 - And over **1.3million kg lower CO2 emissions**, which is a considerable added environmental benefit of a STILL RX70 fleet

Equipment Benefits Report

During the fuel trial there was an ideal opportunity to evaluate the two truck models side by side and also to obtain some direct comparison feedback from the driver.

There were a number of key areas that were identified and these can be summarised into three main areas: -

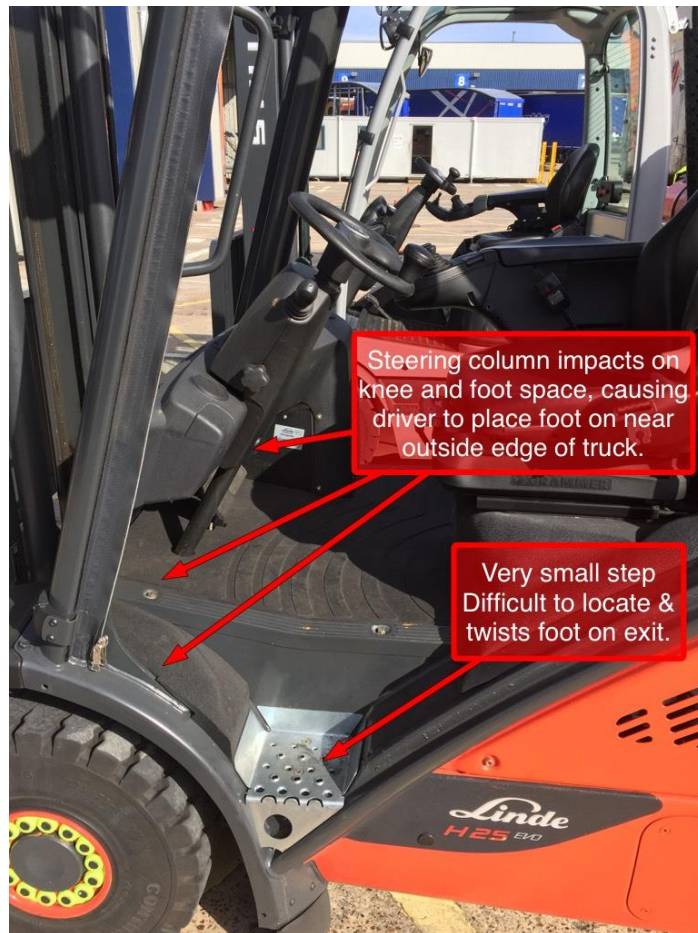
1. Cabin design – access, comfort and visibility
2. Hydraulic hoses – location and potential for damage
3. Drive characteristics - Performance, load security and tyre wear

1. Cabin Design

Linde Cabin design issues..

The following pictures detail the restricted foot well space and restricted rear view vision due to the Linde cabin design.





Steering column impacts on knee and foot space, causing driver to place foot on near outside edge of truck.

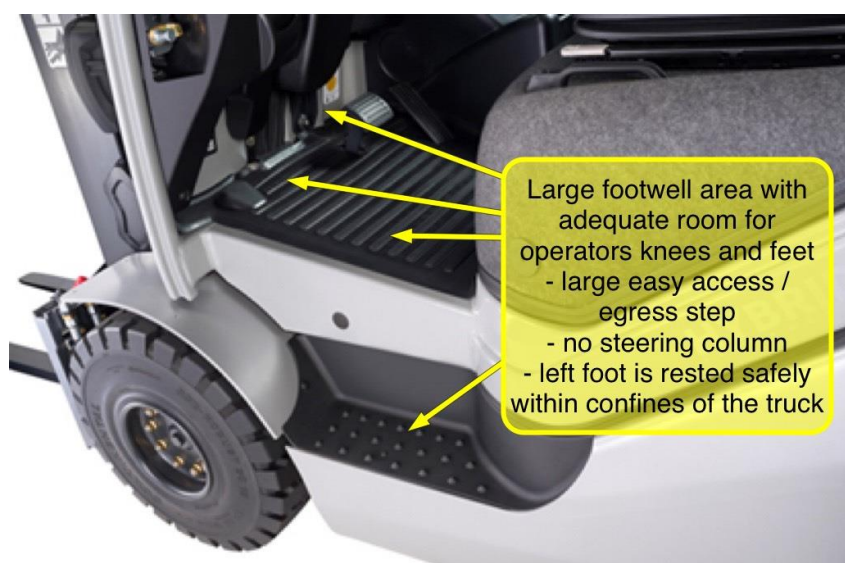
Very small step
Difficult to locate & twists foot on exit.

STILL Fully floating cab design benefits..

The STILL RX70 OHG is designed to maximise operator comfort, the OHG is designed to ensure minimum disruption to the driver's field of view, and also the optional upswept exhaust is mounted on the left hand side away from the driver's field of view.

The operator's cabin is mounted on shock absorbing mounts, providing reduced whole body vibrations and increased driver comfort.

Mast tilt rams attach to the chassis at low level and are not attached to the OHG; the OHG is therefore not a load bearing part, plus there is no hydraulic hosing above the driver's head.

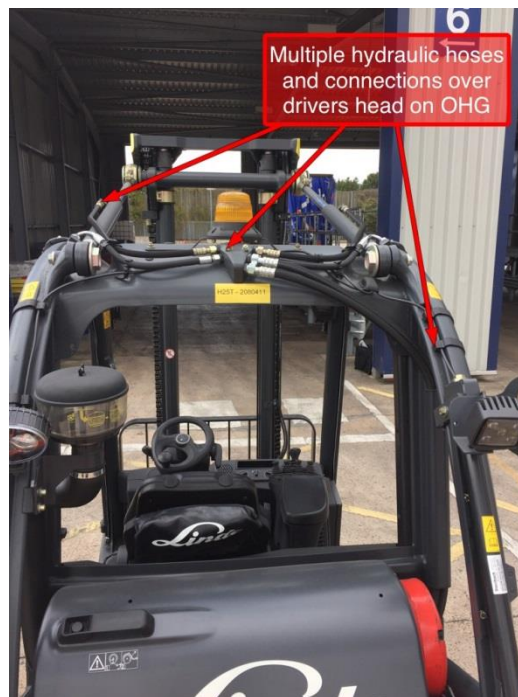


2. Hydraulic Hoses

Linde Hydraulic Hosing issue..

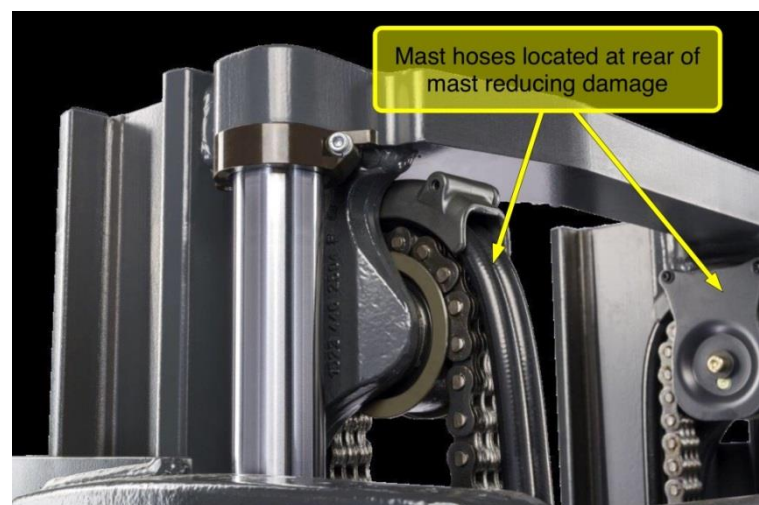
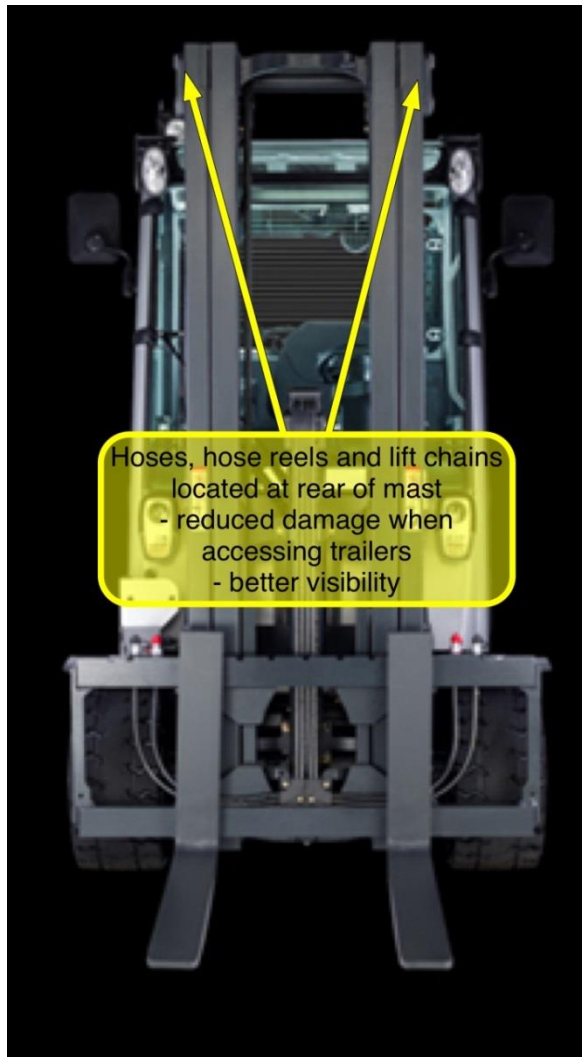
There are a number of potential issues with the hydraulic hosing used on the Linde H25T trucks.

On this truck the mast tilt rams are attached to the top of the OHG assembly and all the hydraulic hose connections for these rams are on top of the OHG, just above the driver's head. Should there be any failure in this area then hot, high pressure hydraulic fluid could be sprayed onto the driver. Mast hoses pass over the top of the mast and pass down the front of the mast creating potential hose damage while accessing trailers, etc.



STILL Hydraulic Hosing Benefits..

The STILL has the hoses mounted on the rear of the mast, protected by the mast structure, also providing better visibility. The mast tilt rams are located at low level, with all their hydraulic hose connections at low level away from the driver's cabin area.



3. Drive Characteristics & Tyre Wear

Linde H25T Tyre Wear Issue..

Although the Linde truck had been set up to mimic a STILL, it still spun its drive wheels during the fuel trial, this spin was significant and resulted in a large amount of tyre rubber being left on the ground.

Over the lifetime of the contract this would clearly result in increased fleet tyre costs, and result in increased air bound rubber dust in the intensive indoor operational areas.

The hydrostatic drive used on the Linde H25T truck, provides a harsh drive characteristic that can as shown result in increased tyre wear.

A video clip is available from the trial that shows the tyre spin occurring, and the following picture shows the tyre marked floor immediately following the completion of the 2 hour trial.



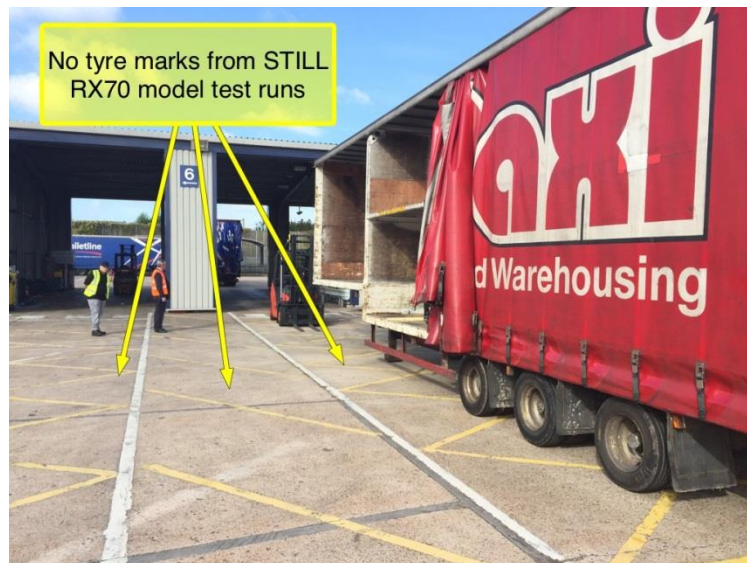
STILL Tyre Spin Control..

The Hybrid Technology Drive on the STILL RX70 is fully programmable and can be set to mimic a hydrostatic or torque converter drive truck to exactly meet any Customer's requirements.

Due to this electronic control, tyre spin can be prevented. During the fuel trial there was no wheel spin on the STILL RX70-25T and, as the picture below showing the test area floor following the 2 hour test, there was no tyre rubber left on the ground.

This customer also liked the fact that with the STILL RX 7025T that maximum efficiency can be achieved in different areas of the operation with up to 5 drive programmes that are easily adjustable to suit every task including speed, acceleration, auto braking and plugging.

Please also note that the customers current fleet of RX70 trucks also supports this point in that tyre wear has been very low, indeed there are many RX70s that still have their original tyres fitted after some 11,000 hours of use to date.



Summary

The fuel trial provided a fair and reasonable customer controlled test environment that ensured as much as possible a consistent continuous use of both truck models for the duration of the trial.

The trial results supported the STILL fuel efficiency claims and the **Linde H25T** was **shown to use 19% more fuel.**

The customer's driver used for the test was undoubtedly an advocate of the Linde model at the start of the trial, however, when asked his opinion at the conclusion, his **preference** had changed to **the STILL RX70 due to improved comfort and ride, improved load stability and the improved fuel and tyre efficiency** provided by the STILL truck.