### 4IGPU RAIL HANDLING BEAM Specifications



Hydraulic Rail Handling Beam for Grooved Rails including those fitted with Insulating Boot

Issue 3

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#### Introduction

#### Grooved rails are commonly used for tramways and is frequently wrapped in an insulating polymer 'boot' to reduce corrosion and to help isolate the running rails and damp vibration.

Rail lengths must be handled with the resilient boot in place and this document outlines a range of hydraulic rail beams designed specifically for this purpose.

The design of these beam build on the established RLB20 and TRLB20 rail beams which have been in common use on Network Rail infrastructure since 2006. The key difference between the existing beams and the 41GPU handlers is the design of the rail grab system.

Designing this beam system presented a number of technical challenges centred around providing a safe, secure grip on the rail section without risk of damage to the delicate polymer 'boot'. This is a key concern because of the high dynamic forces which can be applied by an excavator.

Calculations show that 18.2m (60ft) rail lengths require a 5m long beam to avoid the risk of damage whilst 9.1m lengths (30ft) can be handled safely with a 1.8m beam.

This document describes two suitable beams and introduces the various options which may be added to the basic specification.

As with all our rail handling hydraulic beams these designs are equipped with pressure reducing valves to control the system pressure regardless of the host machine setting and parachute valves to prevent the jaws releasing the rail during the lifting operation.



4IGPU Rail with Boot

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#### Gripping the Rail

### n order to securely grip the rail each of the grab jaws must exert a force of around 2 tonnes on the web of the rail.

The resilient boot around the rail must be preserved and to ensure that no damage occurs, the grip force will be spread over a long, 40mm deep soft polyurethane pad. The surface area of the pad spreads the load so that a pressure of only 1.25N/mm<sup>2</sup> is exerted on the boot.

The urethane pads will be a consumable item however experience has shown that in similar applications the grade of urethane used should have a life of many thousands of lifts if carefully operated.

Because the rail is asymmetrical, the beams are designed to fit one way round onto the rail section and will be marked with stickers to clearly identify the correct orientation.

As well as the grab jaws the rail is also restrained by bars which rest in the rail groove, this prevents any risk of misalignment of the jaws and also eliminates the risk of the rail rolling in the jaws and upsetting the spread of the load on the soft pads.







The jaws of the beam open much wider that the rail to make alignment easier and to reduce the risk of the jaws hitting the corners of the boot when lowering onto the rail.

The beam is lowered onto the rail and the bars sit in the groove. The beam is now properly aligned with the rail.



From the cab of the host machine the hydraulic system is energised to close the jaws and grip the rail. The grip force is controlled by the pressure reducing valve which is precisely set at the factory to ensure a safe grip without overloading the pads or damaging the boot.

### GPU4I-I7-OI Beam (I.8m)

# For rails up to 9.1m (30ft) in length the 1.8m beam is an ideal solution. With a typical rotator and adapter head it has a tare weight of around 625kg with a safe working load of 1,250kg.

Key dimensions are shown on the general arrangement drawing on page 7. Either side of the adapter head mounting are channel section guides for lashing straps making it easy to secure the beam during transport and a transport / stowage stillage is also available.

The beam is fitted with our standard adapter head mount and may be equipped with any of a wide range of adapter systems including hydraulic rotators, swivel and low headroom shackle heads.

Minimum Hydraulic Pressure	90	Bar
Maximum Hydraulic Pressure	300	Bar
Maximum Peak Hydraulic Pressure	350	Bar





### GPU4I-I7-02 Beam (5m)

# For rail lengths from 6m to 18.2m (20ft to 20ft) the 5m beam should be used. With the extra length the risk of damage to the rail when lifting at up to 3g is eliminated making this beam suitable for use with excavators and lorry cranes alike.

The design incorporates the same features as the 1.8m version.

A general arrangement drawing of this beam is shown on page 9.

As with the 1.8m version a full range of adapter systems may be fitted to this beam.

Tare Weight (typical)	725	kg
Safe Working Load (WLL)	1,250	kg
Minimum Hydraulic Pressure	90	Bar
Maximum Hydraulic Pressure	300	Bar
Maximum Peak Hydraulic Pressure	350	Bar





#### Adapter Head Options

## The image below shows the most common arrangement for beams of this type: a hydraulic rotator and two-pin adapter head for direct mounting to an excavator quick coupler.

Many other options are available and for full details please download the adapter head guide from our website www.thomsonrail.com.

Some of the other popular options are shown on page 11.





A variety of adapter heads can be fitted to the rotator including single pin heads for direct connection to an excavator boom (left) and adapters for lorry cranes such as the Palfinger adapter (right





Our quick change system allows one rotator to be used with multiple attachments.

A square socket is fitted to the beam which engages with the square drive peg on the base of the rotator. Each new attachment only requires the socket in order to be fully integrated with the host machine.

Quick change system parts and rotator are rated to 10,000kg working load.



The low headroom adapter head (left) can be fitted instead of the rotator but must be suspended from a swivel hook on the host machine.

The swivel head (right) may be used with either a swivel or fixed hook.



#### **Further Options**

## The Thomson Engineering TRLB20 series of telescopic rail handling beams can also be fitted with the jaw system described above to give a range of beam lengths from 3.6m (12ft) to 6m (20ft).

Manual and hydraulic telescope options are available. Manual extension beams are hydraulically clamped at the set position, hydraulic extension beams include a load-levelling function as described on page 13.

A manual extension beam with the jaw system described above would have a tare weight of approximately 900kg and a working load limit of 1,250kg. A hydraulically extending beam would weigh approximately 1,100kg with a working load of 1,250kg.

Images of these two options can be provided if required.

As with the 41GPU Rail Beams already described, the TRLB20 series beams can be equipped with any of a full range of adapter heads and systems and include both pressure reducing valves and parachute valve protection.





A single hydraulic service is used to operate the jaws, the telescope function and the load levelling function on hydraulic extension versions of the TRLB20 series beams.

To extend or retract the beam it is raised above the ground and a control handle on the beam is depressed by the crane controller whilst the operator in the host machine operates the hydraulic control.

When the handle is released the same control now extends one end of the beam whilst simultaneously retracting the other end allowing the operator to compensate for an out of balance load.

When the beam is lowered to the ground the same control now opens and closes the grab jaws. This ensures that the rail cannot be released until it is resting on a firm surface.



The Load Levelling Function uses the same control in the cab of the host machine as is used to open and close the jaws and to extend and retract the beam.

When carrying a rail the operator can 'side shift' it to correct the balance of the beam and rail and help keep the rail level during the lifting operation.





#### **Contact Details**

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#### PLEASE NOTE

Whilst every care is taken to ensure that the contents of this document are true and accurate, the specifications of our products and the scope of our services are constantly changing as part of our policy of continuous improvement.

We strongly recommend contacting the factory to ensure that details given are still current.

More than half our business comes from special products designed and built as one-off's and we are always pleased to discuss amended specifications should the product detailed here not meet your exact requirements.

