Safety Lines

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Forklift Wheel Explosion

A tyre fitter sustained serious arm injuries while removing a wheel from a 40 tonne container lifter. The container lifter, which looks like a large forklift (see Figure 1), was fitted with dual load-bearing wheels, and single steering wheels.

The load-bearing wheels had steel 13 x 25 rims, marked “Made in India, batch 9809 WIL”, and these were fitted with 18 x 25 industrial, smooth treaded tyres inflated to 138 psi (cold). They are centred onto the axle hubs by a ‘spade’ or wedge. The wheels have a split rim with a locking ring that sits into a groove in the outer flange of the rim (see figures 2 and 3). The whole assembly is attached to the wheel hub by a series of clamps and locking nuts. Tyres are regularly rotated so that they wear evenly.

In this incident the axle on the container lifter was chocked up and the tyre fitter had removed the retaining bolts and clamps. He had not deflated the tyre. Another worker was waiting with a 4 tonne forklift ready to lift the wheel off the axle hub. In order to break any rust cohesion between the rim and the spade and the hub, the tyre fitter delivered a blow to the assembly with a small hammer. The wheel assembly shattered under the pressure of the compressed air, striking the fitter’s arm before striking the mast on the 4 tonne forklift. The force of the assembly striking the forklift snapped the mast and caused other damage.

Figure 1: Forklift has dual load bearing wheels at the front, single steering wheels at the back.

Wheels under pressure are always at risk of explosion while they are being disassembled. All steel rims used in industrial applications will ultimately fail depending on the level of stressing. The “Wheels of India” in this incident, used in port operations, have an estimated finite life of about 6000 hours. These rims had been in service for 9500 hours. All of the rims were crack tested after the event and found to have cracks that were not visible to the eye.

Other brands of wheel used on large forklifts are also at risk of cracking. A combination of heavy loads and high tyre pressure means wheel cracks are inevitable. The likelihood of failure must be managed to minimise the hazard of sudden failure.

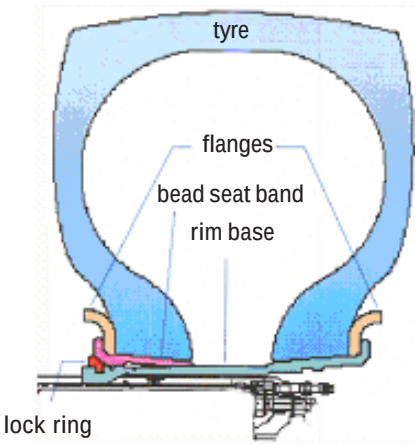

Figure 2: Section through tyre and wheel assembly showing rim components.

Points of note

- Tyres must be deflated to no more than 35 kPa before wheels are removed from vehicles, or disassembled.
- AS 4457: 1997 *Earth-moving machinery - Off-highway rims and wheels - Maintenance and repair*, provides useful guidance.
- Titan Wheels Australia Pty Ltd, who supplied the "Wheels of India" rims, provide standard operating procedures for tyre and rim safety.
- Manufacturers and suppliers of equipment must supply safety information.
- All large rims should be registered in a scheduled maintenance programme.
- All wheel components should be subject to visual inspections for cracks, wear and corrosion.
- It is recommended that large rims be crack tested at 2 years of age and re-tested each time a tyre is replaced.
- All wheels must have external access to valves so that tyres can be deflated prior to any work.
- All tyre workers must be fully trained in safe working procedures with comprehensive, documented training procedures.
- Take heed of manufacturer's recommended maximum operating life.

Figure 3: Assembly of wheel components. Rim base and flange on the ground; second flange being fitted; bead seat band between feet of fitter.

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Exemption—Trainee Equipment Inspectors

The following Notice of Exemption was published in the *New Zealand Gazette*, 3/2/2005, No. 32, p. 773:

'Notice of Exemption

Pursuant to Regulation 6 of the Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999, I, Keith Stewart, Acting Manager National Operations (for Secretary of Labour), hereby give notice of the exemption of all equipment from the requirements of the Regulations that the certificate of inspection must be issued or renewed on the recommendation of, and bearing the name of, the equipment inspector who inspected the equipment, subject to the following conditions:

1. The certificate of inspection is issued or renewed on the recommendation of, and bearing the name of an equipment inspector;
2. The inspection was carried out by a trainee equipment inspector employed or engaged by the issuing inspection body;
3. The trainee equipment inspector was, at the time of the inspection, under the effective supervision of the equipment inspector named on the certificate;
4. The inspection body maintains procedures relating to the training and effective supervision of trainee equipment inspectors, and keeps full training and inspection records, including a summary record of all inspections clearly indicating which were carried out under the terms of this exemption;
5. The inspection body has obtained the written approval of the Secretary to operate under the terms of this exemption, that approval being subject to satisfactory initial examination by the Secretary of the inspection body's records and procedures relevant to training and effective supervision;
6. The written approval in 5 above is for a stated time period and may contain additional conditions;
7. The Secretary is provided with access, at times of his or her choosing, to carry out periodic examinations of the inspection body's records and procedures relevant to training and effective supervision;
8. The Secretary may cancel the approval in writing at any time;
9. The stated time period for the written approval in 5 above is not exceeded;
10. Any additional conditions of the written approval in 5 above are complied with; and
11. The written approval in 5 above has not been cancelled.

Dated at Wellington this 1st day of February 2005.
KEITH STEWART, for Secretary of Labour'

The purpose of this exemption is to permit a supervising equipment inspector to recommend the issue of a certificate of inspection, bearing that inspector's name, where the inspection was carried out by a trainee equipment inspector under the effective supervision of the supervising equipment inspector.

It is important to note that the inspection body concerned must meet conditions, including having obtained written approval of the Secretary to operate under the exemption.

Scope of Inspection

An inspection body recently enquired about the scope of inspection as covered by a certificate of inspection for pressure equipment (excluding boilers) issued under the PECPR Regulations. At the heart of the enquiry was the need to establish whether or not the full system into which the equipment was installed should be complete and functional, and the subject to the inspection leading to the issue of a certificate of inspection.

A certificate of inspection for pressure equipment certifies that equipment will be safe, with respect to its pressure containment capability, for those aspects of equipment operation specified or implied by the PECPR Regulations and the equipment manufacturing standard(s). In general a certificate of inspection does not cover other aspects of installation such as fencing, signage, fire protection, etc.

An inspection body may perform inspection work that is outside the scope of the PECPR Regulations such as fencing, etc., but this work would not be covered by the certificate of inspection and should be reported separately to the client.

Equipment coming within the scope of the PECPR Regulations must not be certified for service until all aspects of the equipment covered by the regulations and its manufacturing standard(s) have been completed, inspected and tested. Ideally, inspection should be carried out following completion of construction of the system containing the equipment, but this is not an essential requirement for the issue of a certificate of inspection.

Stationary container systems (See HSNO definition) such as LPG installations are also covered by controls and regulations made under the Hazardous Substances and New Organisms Act and are subject to test certification by test certifiers appointed under this Act.

In general, the relevant HSNO regulations and controls treat certification of PECPR pressure equipment as a subset of and a prerequisite for overall HSNO test certification of a system. Hence, a HSNO test certifier would require a certificate of inspection to be issued for any pressure equipment in a stationary container system before issuing a test certificate for that system.

HSNO test certification for stationary container systems is covered by "Controls for stationary container systems" in Schedule 8 of the *New Zealand Gazette*, Issue No 25, dated 25 March 2004. These controls specify requirements for design, installation, maintenance and test certification for complete stationary container systems.

A PECPR certificate of inspection will generally satisfy HSNO requirements for test certification of the corresponding aspects of a stationary container system. However, reference should be made to Schedule 8 of the New Zealand Gazette, Issue No 25, for precise information on the relationship between HSNO test certification and PECPR certificates of inspection.

Operation of Unattended Boilers

The PECPR Regulations give the following definition of an unattended boiler:

> "Unattended boiler" means a boiler that can start up, operate, and shut down only under–
>
> (a) The control of the boiler management system; and
>
> (b) The monitoring of the safety system.

Note: The *Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*, Revised April 2000 and incorporating Amendment No. 1 of December 2004, uses the term "boiler control system" in place of "boiler management system". It is proposed that a future amendment to the PECPR Regulations will bring them into line with the code of practice regarding this new term.

The requirement that unattended boilers can only run in this automatic mode is reinforced in the code of practice in the following section:

> 5.1.2 Unattended boilers may only be run in unattended mode; they may not be run attended even for brief periods. Failure of the boiler control system shall result in the boiler being shut down until the boiler control system has been repaired.

Table 1.3 in the code of practice designates a responsible person for operational supervision of unattended boilers, whereas for attended and limited attendance boilers a qualified operator is required. This important concession is the principal reason that manual operation of unattended boilers is prohibited.

5.1.3 of the code of practice permits some operator surveillance of solid fuel boilers. Operational supervision is limited to starting and stopping the boiler and activities specified in 5.14 of the code of practice. Under no circumstances may an unattended boiler be permitted to be manually operated.

HERA Courses and Seminars

HERA Training Centre is offering the following courses and seminars during 2005:

Activity	Dates
Surface methods	4-8 April 22-26 August
Welding Supervisor Course	
Module 1	18-28 April
Module 2	13-18 June
Module 3	22 August-2 September
Module 4	31 October-4 November
Radiographic theory and Interpretation of weld radiographs	9-13 May 5-9 September
Ultrasonic testing theory and Ultrasonic weld testing	23-27 May
Ultrasonic wall thickness	1-2 June
Welding inspection	20-24 June 19-23 September 28 November-2 December
Management appreciation in non-destructive testing	29 June 5 October

The venue for the above courses and seminars is:

HERA House
17-19 Gladding Place
MANUKAU CITY (South Auckland)

Note: Enrolment closes 7 days before start of course.

For further details contact:

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PO Box 76134
Manukau City
Phone: (09) 262 2885
Fax: (09) 262 2856
Email: admin@hera.org.nz

CE Marking Article Withdrawn

An article entitled 'CE Marking of Pressure Equipment', which appeared in the June 2004 issue of *Safety Lines* (issue 62), has been withdrawn. This was prompted by a re-evaluation of policy in this area, and it is intended that a new item explaining Engineering Safety's CE Marking policy will be available in a future issue.

Please delete this article from any printed copy, replace any electronically saved copy with a new version downloaded from our website:

www.osh.dol.govt.nz/services/eng-safety

and make no further reference to the original article.

Index Update

The *Safety Lines* index has been updated and now covers issues 1 to 65. The index, which should be available at about the time you read this, can be downloaded in Word and pdf formats.

It can be reached from the Engineering Safety webpage:

www.osh.dol.govt.nz/services/eng-safety

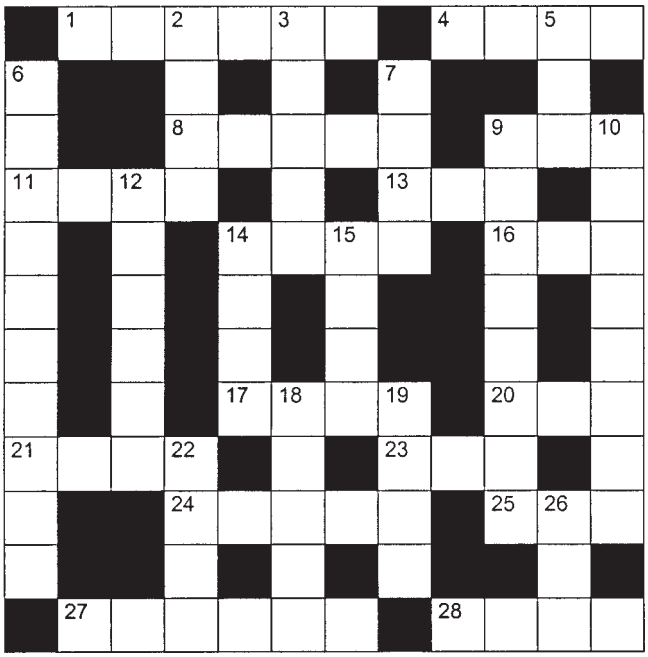
via 'Safety Lines' on the menu at the left of the page.

Alternatively it can be reached from the OSH webpage:

www.osh.dol.govt.nz

via 'Publications', 'SeriesBulletins etc', and 'Safety Lines (series)'.

Puzzle Place



Answers include abbreviations and acronyms.

	ACROSS		DOWN
1	Stick together	2	Not there
4	Clock sound	3	Cowboy show
8	Half diameters	5	Indoor sport item
9	Bird	6	Bed covers
11	Time of event	7	Get up
13	Outdoor sport item	9	Unit of mass
14	Front part	10	Book end stuff
16	Chop off	12	Belief in God
17	- Law	14	Opposite of FILO
20	Bar	15	Wander
21	Peak of perfection	18	Cycle per second
23	Also known as	19	Secure
24	Unit (electrical)	22	Border
25	Greatest amount	26	Fuss
27	Gentle wind		
28	The common supply, wind		

Answers can be obtained by email from:

robin.bain@dol.govt.nz

Answers to *Safety Lines* Issue 64 Crossword

Across		Down	
1	Sheave	2	Hoist
5	Fuss	3	At
8	Ova	4	Eon
10	NZIW	5	Fat
11	Unite	6	Seed
13	End	7	Unattended
15	Tit	9	Viewed
16	Inward	11	Units
17	Let	12	Eerie
18	Its	14	NDT
20	Ease	17	Leo
22	Sidle	19	Stowed
24	Hot	21	Shop
26	Do	23	Irk
27	Ask	25	Tan
30	Pink	28	Skin
31	Purge	29	Gram
32	Reconfirms	31	Psi

Safety Lines is a publication of the Engineering Safety Unit of the Workplace Group, Department of Labour, PO Box 3705, Wellington.

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