

Safety Lines



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Inspection of Wire Ropes

The results of an investigation of wire ropes on high utilisation/high load factor cranes have been given to Engineering Safety.

This report from the United States has not been tested by research in New Zealand but there has been sufficient anecdotal evidence, supporting its findings, to cause Engineering Safety to bring it to the attention of readers.

In the US investigation, 70 ropes from nine plants were examined and 39 were found to have significant core breaks. Most of these ropes had had a service life of 31 to 180 days.

The factors reported as generally being common to these installations were:

- The ropes were of 6x37 cross lay construction rope.
- There was a low bending ratio (sheave diameter to rope diameter (D/d) ratio).
- The cranes had high utilisation and load factors.

Anecdotal evidence from a local operator of cranes with similar characteristics suggests that a pattern of wire rope failures, which is consistent with the US findings, is occurring in at least one New Zealand plant. This operator reports that cross lay ropes on his high utilisation/high load factor cranes are lasting about three

to four months while 9x17 compacted wire ropes, on the same cranes, under the same operating conditions, are lasting over 19 months.

The operator reports core strand failure causing ropes to be discarded even though their external condition appears to indicate they are still usable. (The criteria used for discard at this plant are based on ISO 4309.)

Aside from initiating work to optimise rope life, this experience has caused the operator to upgrade inspection procedures. He is convinced that ropes must be internally and externally examined for their true condition to be determined. He strongly advises against the practice of inspecting a wire rope externally only and then assuming this result is an accurate indicator of the ropes overall condition.

Recommendations

Engineering Safety recommends that:

- Controllers of cranes should ensure that the ropes and in particular, 6x37 cross lay ropes, are being regularly inspected.
- Ropes for cranes and other lifting appliances are inspected in accordance with the ISO 4309: *Cranes - wire ropes - Code of practice for examination and discard.*



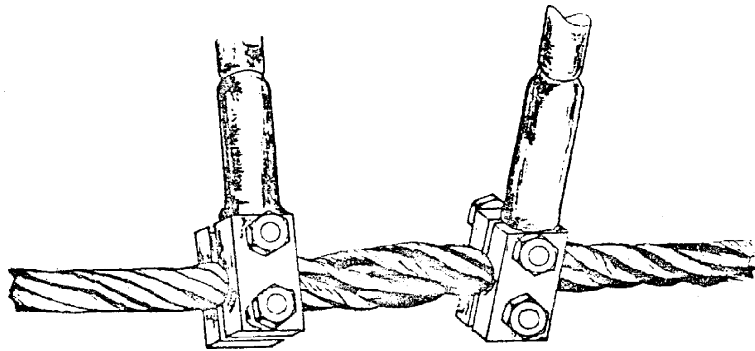
Inspection Procedure - ISO 4309

The following diagrams and notes are derived from ISO 4309. They comment on internal inspection of wire ropes and describe, for more general inspections, the main areas of a crane rope that should be examined and the defects that may be found.

These extracts are provided for background information only. The complete standard must be consulted when preparing an inspection procedure for wire ropes.

Internal examination of wire rope (Based on Annex D of ISO 4309)

1. Experience of examining wire rope and discarding it from service shows that internal deterioration, mainly as a result of corrosion and the normal progress of fatigue, is the prime cause of many rope failures. A normal external examination may not reveal the extent of internal deterioration, even to the point where fracture is imminent.
2. The majority of ropes fitted to lifting appliances can be examined internally provided that they are at zero tension.
3. The method requires clamps to be attached firmly to the rope as shown in the following diagram.



Internal examination of a continuous portion of rope (zero tension)

4. Apply a force and when the wire ropes slightly open, a small probe, such as a screwdriver, may be used to remove grease or debris which could hinder observation of the interior of the rope.

The essential points, which should be observed, are:

- The state of the internal lubrication.
- The degree of corrosion.
- Indentation of wires caused by pressure or wear.
- Presence of wire breaks (these are not necessarily easily visible).

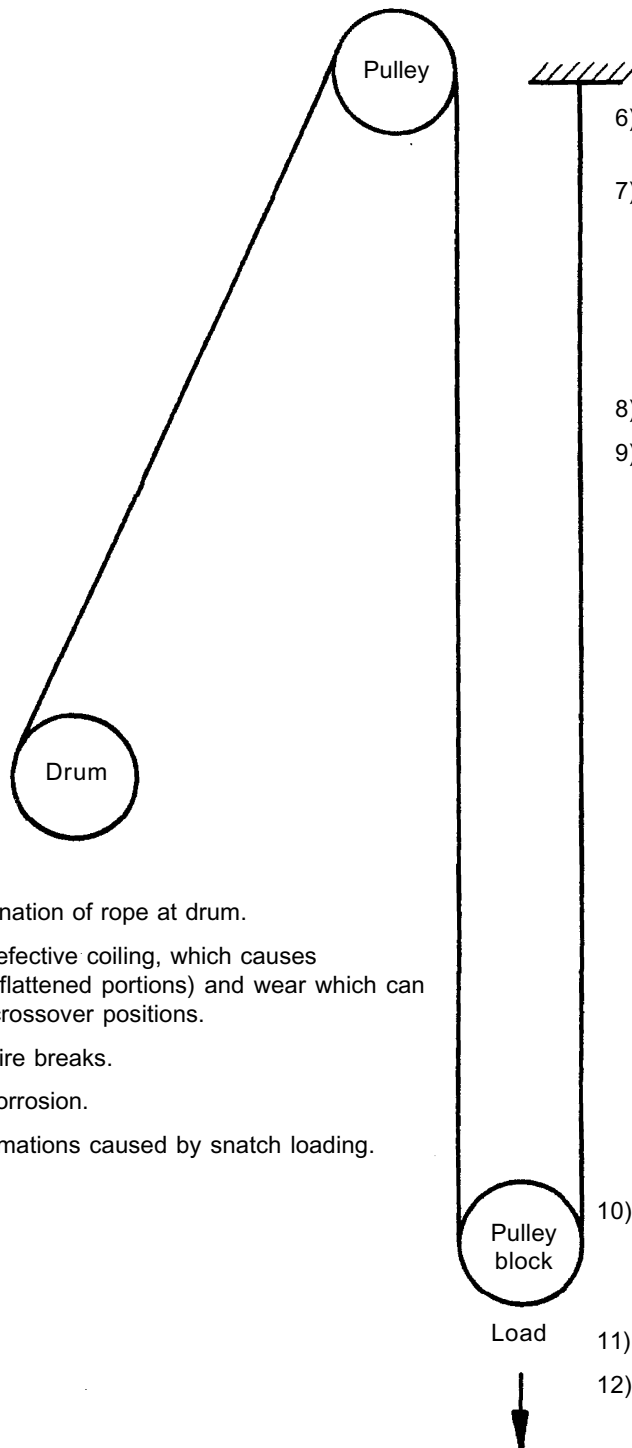
After examination, introduce a service dressing into the opened part and rotate the clamps with moderate force to ensure correct replacement of the strands around the core. After removal of the clamps, the outer surface of the rope is to be greased.

5. Since it is impossible to examine the interior of the wire rope over the whole of its length, suitable sections must be selected.

In the case of wire ropes, which wind onto a drum or pass over pulleys or rollers, it is recommended that the lengths, which engage the pulley grooves when the appliance is in a loaded condition, should be examined. Those localised areas in which shock forces are arrested (i.e. adjacent to drum and jib head pulleys) and those lengths, which are particularly exposed to the weather for long periods, should also be examined.

Attention should be given to the area of rope close to its termination; this being particularly important in the case of fixed ropes, such as stays or pendants.

Possible defects to be considered during an inspection of wire rope on a crane (Based on Annex A of ISO 4309)



- 1) Examine termination of rope at drum.
- 2) Examine for defective coiling, which causes deformations (flattened portions) and wear which can be severe at crossover positions.
- 3) Examine for wire breaks.
- 4) Examine for corrosion.
- 5) Look for deformations caused by snatch loading.

- 6) Examine portion which winds over pulley for wire breaks and wear.
- 7) Points of attachment:
 - check for wire breaks and corrosion;
 - similarly, check section of rope which lies on or adjacent to compensating pulleys.
- 8) Look for deformation.
- 9) Check rope diameter.

- 10) Examine carefully the length which runs through pulley block, particularly that length which lies on the pulley when the appliance is in a loaded condition.
- 11) Examine for wire breaks or surface wear.
- 12) Examine for corrosion.

These extracts from ISO 4309 were reproduced with the permission of the International Organisation for Standardisation.

ISO 4309 - *Cranes - wire ropes - Code of practice for examination and discard* is available from:

Standards New Zealand
Ph 04 498 5991
Fax 04 498 5994
Email: www.standards.co.nz

Swift Survey and *Safety Lines* Readership Survey 2000

This year we received 131 responses evaluating Engineering Safety's performance and 181 responses evaluating *Safety Lines*. This is a similar level of response to other years.

Our thanks to all who took the time to complete our survey; it appears that the majority of respondents appreciated the service provided by Engineering Safety and *Safety Lines*.

The ratings given in the survey for both Engineering Safety and *Safety Lines* match quite closely those from previous years. Respondents did not appear to perceive any significant improvement or deterioration, since last year's survey.

Eight supplementary comments were received on the performance of Engineering Safety. Two were very complimentary. Two related to organisational changes at OSH and inspection bodies; one expressing concern about administrative staff changes and the other concern about the experience of staff employed by inspection bodies. (Engineering Safety has only limited influence on these matters; they will be referred to those directly responsible for consideration and action.) Four were critical of Engineering Safety's performance with respect to the quality of the information provided. Of these, one commented on a perceived lack of information about high-pressure hot water systems and the other three were critical of advice received on technical and legislative detail. These comments are noted and we will be taking action to rectify any shortcomings in our performance.

Twenty-nine supplementary comments were received on *Safety Lines*. Twelve were very complimentary

about the newsletter. Fourteen commented on articles which readers would like to see in *Safety Lines*, e.g. more on cranes, case histories of accidents with PECPR equipment, reports on boiler incidents, asbestos in pressure systems, etc. Three criticised aspects of *Safety Lines*; two commenting on the layout of articles. One expressing concern that *Safety Lines* preparation may take resources away from more important work by Engineering Safety, including providing timely answers to client's questions.

Many of the suggestions for alternative articles covered subjects that were outside of the scope of the PECPR Regulations, and probably the interests of most of our readers, e.g. the Building Act, civil construction, building ceilings, etc. (While we will publish more general information in *Safety Lines* we will also remain focused on matters associated with the PECPR Regulations.) As noted above, reader's comments also proposed subjects for articles that are within the scope of the Regulations. We will try to include as many as possible of these in future issues.

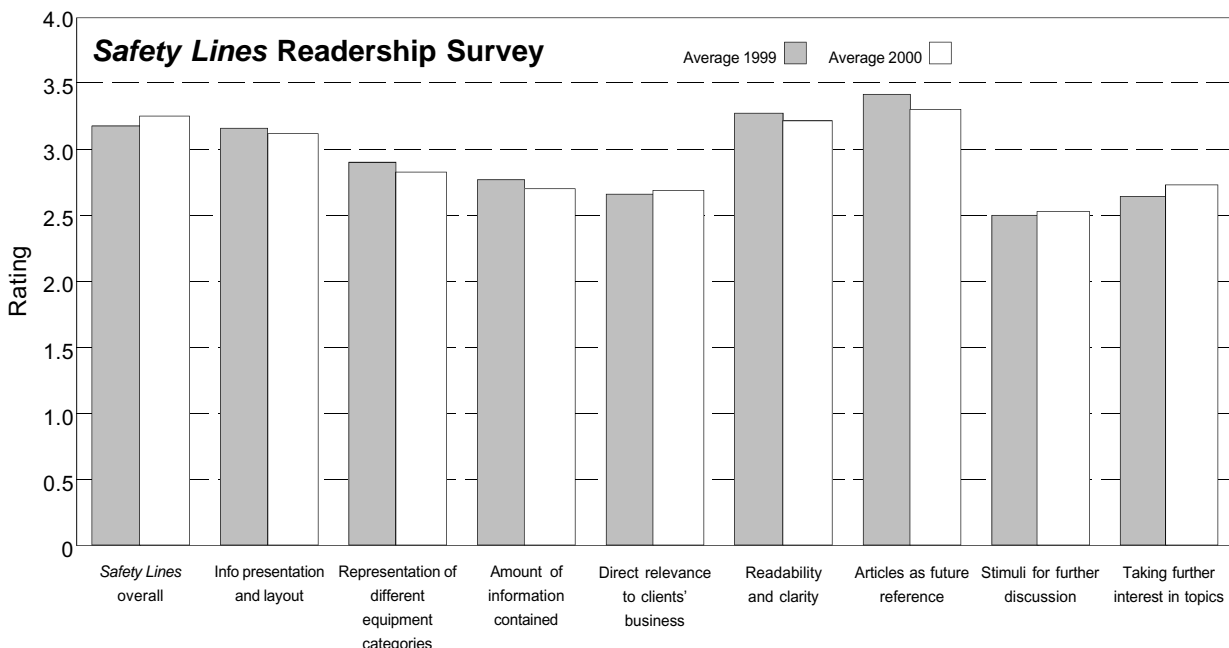
Readers who expressed an interest in a broader range of occupational safety and health issues are referred to publications such as *Safeguard* and *Safeguard Update*. Subscriptions to these magazines may be arranged by calling:

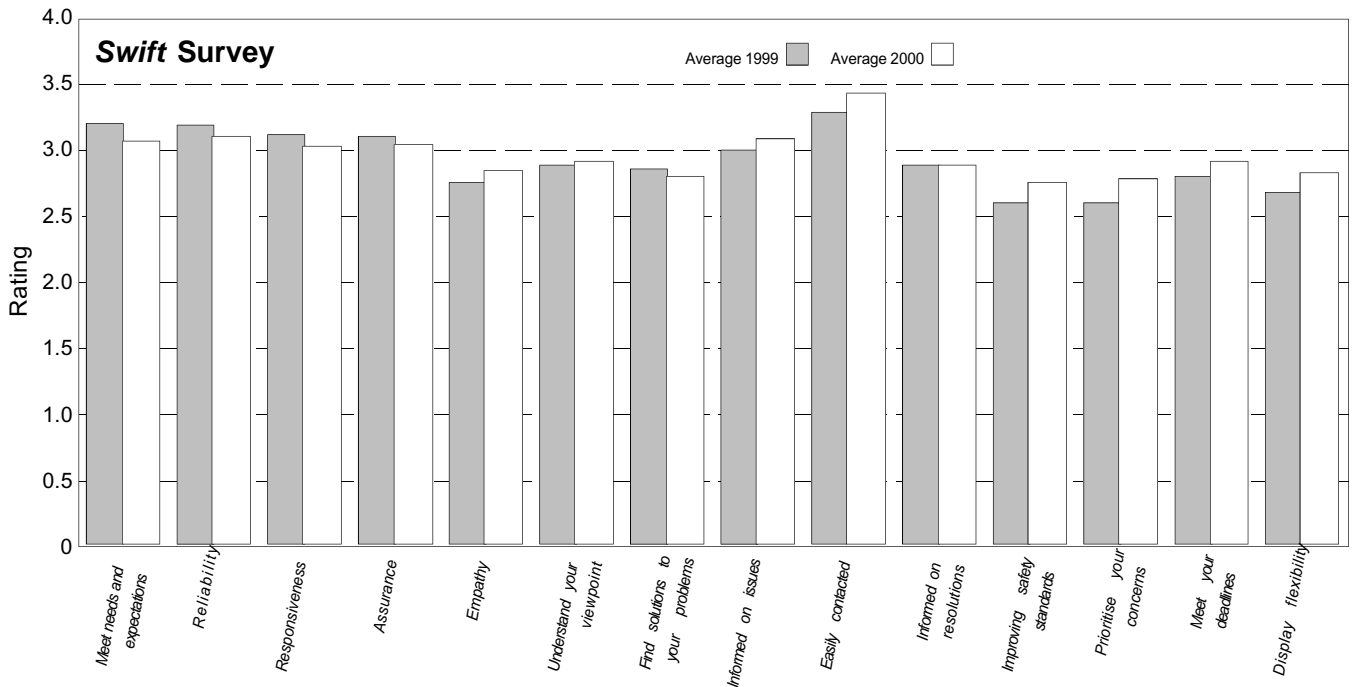
Colour Workshop Ltd, Ph: 0800 922 911

The website:

http://www.safetynews.com/bulletin/sb_54_00jun23.html

also gives coverage, albeit from an Australian perspective, of a wide range of health and safety issues.





Endorsed Certificates of Inspection and Inspection Bodies

IANZ have commented on the way in which reports and certificates issued by inspection bodies may be endorsed. These comments are intended to clarify the requirements of Appendix 1 of *Procedures and Conditions of Accreditation* and to a limited extent amend this appendix to suit the particular requirements of inspection bodies.

IANZ note that a report or certificate may be endorsed provided it meets the criteria for accreditation. To be endorsed, a report or certificate must contain accredited work. It may also contain unaccredited work provided this is clearly identified.

Where a report or certificate, issued by an inspection body, is based entirely on accredited work, then it may be endorsed by displaying the IANZ logo:



or, by adding the words: “Accredited by International Accreditation New Zealand” or “New Zealand Accredited Inspection Body”.

Where a report/certificate contains non-accredited results and/or statements of professional opinion then, as well as inclusion of the endorsement detail noted above, the nature and the extent of the non-accredited input must be identified. The manner of identification of such input may be arranged to suit the format of an inspection body’s report/certificate.

It is for the inspection body to propose a system for approval by IANZ.

IANZ further advises that while their preference is for their official name, International Accreditation New Zealand, to be used on endorsed documents, the use of the abbreviated-form, IANZ, would not affect the validity of an endorsement.

Further information on endorsement of reports and certificates may be obtained from:

International Accreditation New Zealand
Telephone (09) 525 6655 Fax (09) 525 2266
Email: info@ianz.govt.nz

Recognised Inspection Bodies

The following organisations have been recognised as inspection bodies under Regulation 25 of the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways Regulations) 1999. They are able to provide inspection and/or design verification services for equipment covered by the Regulations.

This schedule notes the main office(s) only of an inspection body. The inspection body may also have national or international branches, which are able to provide inspection services.

New Zealand or Australian branches of a local or overseas inspection body will be recognised only if IANZ or NATA has accredited them.

The recognition status of inspection body branches, operating in countries other than Australia or New Zealand, is available from Engineering Safety.

The scope of services that a recognised inspection body, operating in New Zealand or Australia may provide is obtained from its accreditation schedule or, by contacting the relevant accrediting organisation, IANZ or NATA.

The scope of services that other recognised inspection bodies may provide is available from Engineering Safety.

New Zealand Inspection Bodies Providing Design Verification Services

M & I Safety Inspection Services Ltd
PO Box 27 347
Wellington
Technical Manager: Bill Black
Phone (04) 382 9666
Fax (04) 385 9311

New Zealand Inspection Services Ltd
PO Box 58 134
Greenmount
Auckland
Technical Manager: Martin Beddows
Phone (09) 273 5224
Fax (09) 273 5441

SGS New Zealand Ltd
PO Box 8032
Riccarton
Christchurch
Technical Manager: John Phillips
Phone (03) 341 2282
Fax (03) 341 2283

Transfield Worley
PO Box 705
New Plymouth
Technical Manager: Grant Notley
Phone (06) 759 6300
Fax (06) 759 6301

New Zealand Inspection Bodies Providing Fabrication and In-Service Inspection Services

Donnellan & Associates Ltd
PO Box 40 100
Upper Hutt
Wellington
Technical Manager: Mike Donnellan
Phone (04) 528 8057
Fax (04) 528 6008

M&I Safety Inspection Services Ltd
PO Box 27 347
Wellington
Technical Manager: Bill Black
Phone (04) 382 9666
Fax (04) 385 9311

Nortel Ltd
PO Box 1271
Whangarei
Technical Manager: Steve Mabbett
Phone (09) 438 1512
Fax (09) 438 1234

Indespect Surveys Ltd
PO Box 6088
Invercargill
Technical Manager: John Leslie
Phone (03) 214 9283
Fax (03) 214 9284

New Zealand Inspection Services Ltd
PO Box 58 134
Greenmount
Auckland
Technical Manager: Martin Beddows
Phone (09) 273 5224
Fax (09) 273 5441

SGS New Zealand Ltd
PO Box 657
New Plymouth
Technical Manager: Mike Jack
Phone (06) 751 0141
Fax (06) 751 1651

Lloyds Register
66 Wyndham Street
Auckland
Technical Manager: Nigel Johns
Phone (09) 373 3311
Fax (09) 309 5786

Overseas Inspection Bodies Providing Design Verification Services

Lloyds Register Industry Division
Lloyds Register House
29 Wellesley Road
Croydon, CRO 2AJ
United Kingdom

Plant Safety Ltd
Parklands
Wilmslow Road
Didsbury
Manchester M20 2RE
United Kingdom

Royal & Sun Alliance Engineering Ltd
17 York Street
Manchester, M2 3RS
United Kingdom

Overseas Inspection Bodies Providing Fabrication Inspection Services

Australia

All Areas Inspection
PO Box 6404
Baulkham Hills
Sydney
NSW 2153
Australia

ETRS Pty Ltd
PO Box 4002
West Footscray
Victoria 3012
Australia

Japan

Nippon Kaii Kyokai
Class NK
4-7, Kio-Cho
Chiyoda-Ku
Tokyo 102-8567
Japan

Sweden

DNV Inspection AB
Box 49306
SE-100 29 Stockholm
Sweden

United States of America

Commercial Union Insurance
Contract Inspection Services
One Beacon Street
Boston
MA 02108-3100
United States of America

The Hartford Boiler Inspection and
Insurance Co.
PO Box 5024
Hartford,
CT 06102-5024
United States of America

Kemper Insurance Companies
Commercial Lines Group
1 Kemper Drive
Long Grove
Illinois, 60049-0001
United States of America

United Kingdom

Lloyds Register Industry Division
Lloyds Register House
29 Wellesley Road
Croydon, CRO 2AJ
United Kingdom

Plant Safety Ltd
Parklands
Wilmslow Road
Didsbury
Manchester M20 2RE
United Kingdom

Royal & Sun Alliance Engineering Ltd
17 York Street
Manchester, M2 3RS
United Kingdom

TUV UK Ltd
Surrey House
Surrey Street
Croydon, CR9 1XZ
United Kingdom

Zurich Certification Ltd
54 Hagley Road
Birmingham, B16 8QP
United Kingdom

Standards on the Web

Engineering Safety advises readers of the availability of websites provided by standards organisations. These sites will be of interest to those requiring up to date information on standards.

Standards New Zealand

Standards New Zealand has an online e-commerce shop using a secure connection, where drafts and standards can be bought. New Zealand Standards, Joint Australian and New Zealand Standards, some draft Standards, handbooks, and a range of other publications are available. Some publications can be purchased and downloaded electronically. Many drafts may be downloaded free of charge.

Also available is "Asset Plus", an automatic update service for organisations where maintenance of the most current collection of standards is essential. An organisation registers its list of standards with Standards New Zealand. These are then continuously monitored for any updates or amendments thus ensuring the collection is kept up-to-date.

Standards New Zealand also provides a free monthly update service "Keep me up-to-date". This advises subscribers of any changes to standards such as updates or amendments or, the issue of new or revised standards.

These services are accessed via website address:

<http://www.standards.co.nz/>

Standards Australia

Standards Australia has an e-commerce site through which Australian, ISO and most IEC standards may be ordered. These may be obtained as hard copy or downloaded as a PDF document. Many drafts may also be downloaded free of charge.

Standards Australia e-commerce site also features PowerSearch and StandardsWatch.

StandardsWatch is a self-service information update tool, which flags any standard or group of standards in which clients have an interest. Clients will then receive an email when any changes such as amendments or revisions occur or when a new or revised standard in a related category is published.

Powersearch is a search engine, which enables searches to be made into various databases.

These services are accessed via website address:

<http://www.standards.com.au/>

Standards Australia also has an electronic version of its standards catalogue available on CD-ROM.

British Standards Institution

BSi has an e-commerce site from which British Standards and many other countries standards may be ordered. British Standards also has PLUS-Private List Updating Service.

PLUS is a standards updating service offered to subscribing members. When joining the system, members submit a list of the standards they hold. PLUS validates this list and informs subscribers of the standards which need to be replaced to bring their holding up to date. This list is then monitored for revisions and amendments. When such changes occur, relevant updating documents are despatched to subscribers.

These services are accessed via website address:

<http://www.bsi.org.uk/>

American National Standards Institute

ANSI provides access to vendor e-commerce sites from which American National Standards may be purchased.

These vendors have available the standards developed by entities accredited by ANSI including the ASME codes currently recognised for use in New Zealand. Search facilities are available for the various databases.

These services are accessed via website address:

<http://web.ansi.org/>

Farewell: Mato Dugalic

Mato Dugalic, who had been employed in Engineering Safety for just over three years, has resigned to move to greener pastures in Australia.

He has taken up a position with *pndt* a non-destructive testing and engineering consultancy and will initially be based in Point Hedland, Western Australia.

Mato's input to Engineering Safety will be greatly missed; during his time with us he took part in many audits of inspection bodies, controllers and manufacturers, wrote a code of practice for passenger ropeways, revised the code of practice for boilers and in his spare time completed an MBA degree.

We wish him all the best in his future career.

Code of Practice for Cranes

The draft code of practice for cranes is on circulation at present and will now close for comments on 21 July 2000. The code will then be prepared for the Minister to fully approve and should be Gazetted, when it becomes legal, in September 2000.

Safety Lines is a publication of the Engineering Safety Unit of the Occupational Safety and Health Service, Department of Labour, PO Box 3705, Wellington.

Editor: Peter Williamson

Phone: (04) 915 4461

Fax: (04) 915-4370

Email: peter.williamson@osh.dol.govt.nz

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