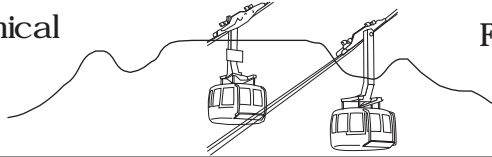


WCB ENGINEERING BULLETIN

The Institution of Certificated Mechanical
and Electrical Engineers
Western Cape Branch (WCB)

P.O. Box 504, Rondebosch 7700



February 2001
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MISSION STATEMENT: 1. To uphold the image & status of the Certified Engineer. 2. To represent the Certified Engineer at ECSA and other decision-making bodies concerning legislation, safety & health standards, the environment and machinery regulations. 3. To promote continued education & training of its members and future engineers. 4. Promote fellowship in the engineering profession

EDITORIAL

In Defence of the Labour Department: Division of Occupational Health & Safety

The Labour Department has recently come under severe criticism for not being out there on the industrial front preventing incidents involving risk to the lives and limbs of workers. The Occupational Health & Safety (OH&S) division is manned by inspectors who are well trained to administer the Occupational Health & Safety Act (No 83 of 1993). The department provides in-service training in this Act so that inspectors whatever their technical background are able to apply the regulations in the giving of advice and where necessary recommending prosecution. The inspectors are continually being upgraded on the latest amendments to the Act and Regulations. Their expertise is available to the public at the price of a telephone call or a visit.

Information on other acts which fall under the Department is also readily available. These include: the Labour Relations Act, the Basic Conditions of Employment Act, the Skills Development Act, the Unemployment Insurance Fund Act and the Workman's Compensation Act. So why not make use of the department and interact with the inspectors.

The Council for the Built Environment Bill

This Council would be representative of several professions including the engineering profession. The built-environment professions are seen as a national asset which must be nurtured and standards, educational and ethical, must be maintained. More representation from the side of the State and the public will also be provided for. The bill, which may only come into law by the end of 2001, will be administered by the Department of Public Works.

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PATRON MEMBERS

Schneider SA (Pty) Ltd	Tel: 531-1722
Globe Engineering Works (Pty) Ltd	Tel: 448-4640
Cape Automation Systems CC	Tel: 511-2382
Improvair (WP) (Pty) Ltd	Tel: 797-9131
Dorbyl Marine (Pty) Ltd Ship Repairs	Tel: 47-5170

Local Branch News

Hello once again everybody.

We are well into the New Year now, already at the end of January! Can you believe it?

Our next scheduled meeting is our AGM and a talk on "Pebble Bed Modular Reactors" (100MW packaged nuclear power units) to be held on Thursday 22 February 2001 at 18h00 at Eskom Test and Demonstration Center, Edgemead. The speaker will be Mr. Piet Pretorius, Project Manager of the PBMR Project at Koeberg. We would like to see as many of you there as possible!

We DESPERATELY need to have some new blood on the committee! How about a volunteer or two? Ever ask yourself what you can do for your fellow Certificated Engineers? Well, this is the opportunity you have been waiting for!

Please contact me at the number or email address below so that we can make the necessary arrangements.

Should you wish to nominate someone please do so too.

Our proposed programme for the next 6 months is as follows:

22 February	AGM & talk on the "Pebble Bed Modular Reactor"
15 March	Visit to the Newlands Brewery (SAB)
19 April	Talk on Unicity
17 May	Visit to Grand West Casino
21 June	Talk on Occupational Health and Safety

Please diaries these dates!

Regards to all and Ciao for now.

Chris Schnehage

Tel: 082 954 9608 email: icmeewc@netactive.co.za

PATRON MEMBERS (continued)

Drake & Scull (Pty) Ltd	Tel: 683-7056 Fax: 683-7088
Circuit Breaker Industries Ltd	Tel: 931-3125 Fax: 931-3120
African Products (Pty) Ltd, Bellville	Tel: 951-2151 Fax: 951-5627
Sappi Cape Craft (Pty) Ltd, Milnerton	Tel: 52-2127
John Thompson Africa (Pty) Ltd, Bellville	Tel: 951-2271

Stevedore work dangers

An accident occurred on 19 August 1974 at about 21:30 in the Cape Town harbour in the course of a stevedoring operation. For the purpose of loading canned fruit into the holds of a ship, a forklift truck was lowered into the No 7 hold of a Castle Line ship by means of a crane. The truck was lowered until about 1 m from the deck of the lower hold. Six men were holding on to the truck in attempting to turn it round. There was a slight movement in the ship due to the swell in the docks. The worker concerned was standing with his back near a stanchion, 200 mm in diameter, which supported the deck above. The fork lift truck moved towards the worker and forced his head against the stanchion. When the truck swung back the worker collapsed. The foreman stevedore was also holding the truck. He immediately informed the officer on duty, who informed the medical staff. He then went ashore and called the ambulance and police. The Asst Manager of the stevedoring company went to the scene. The medical staff attended the injured person. Cardiac massage was performed but the patient was not breathing. He was then lifted on a board in a net by crane. Two medical staff with a worker were also in the net. Another worker was standing on the top deck directing the crane driver. The IP was taken to the Somerset Hospital. He died in the ambulance shortly before arrival at the hospital. The post mortem revealed that he had died of a skull fracture and brain damage. The deceased was 36 years old.

Comment

The loading and unloading of ships by crane and forklift will always be a risk for the workers who have to steady heavy loads while the crane driver high up in his crane follows signals from a foreman. Added to the difficulties is the unpredictable movement of the ship in the water. The limited space in ships' holds is a further danger. A stevedore in an open hold on board ship must always be aware of the fact that a load lowered down by crane can swing and that he must stand clear of any stanchion or partition against which he can be caught.

Pebble Bed Modular Reactor

In the 1930's Dr Rudolf Schulten (later Prof Dr Schulten, "father" of the pebble bed reactor) had an idea. The idea was to compact silicon carbide coated uranium granules into hard billiard-ball-like spheres to be used as fuel for a new high temperature, helium cooled type of reactor. The idea took root and in due course the AVR, a 15 MW demonstration pebble bed reactor was built in Germany. It operated successfully for 21 years. In the intense wave of post-Chernobyl anti-nuclear sentiment that swept Europe, particularly Germany, the idea almost submerged.

It is resurfacing in South Africa. It is small, clean, cost efficient, inexpensive and adaptable. In a nutshell, these are the features of the Pebble Bed Modular Reactor (PBMR).

In 1996 Eskom purchased the licence from HTR, a joint venture of Siemens and ABB.

The PBMR project team believes that it has improved the design concepts of the THTR-300 plant. Some technical design concepts which were not successful have been specifically addressed by the PBMR, such as a steel pressure vessel instead of a concrete pressure vessel and control rods in the reflector instead of in the core.

The PBMR concept also includes the technological advances made in gas turbine technology since the 1980's and provides a plant configuration with the most robust safety case of any HTR yet designed. The small plant size and the elimination of a steam cycle allows the achievement of the robust safety case of the PBMR.

IMPORTANT

The topic for the AGM of the Western Cape Branch of ICMEE on 22 February 2001 will be a presentation on the proposed PBMR by Piet Pretorius, the PBMR project manager.

Legal Knowledge

JUNE 2000

Question 3(a)

In terms of the environmental regulations for workplaces state the regulation requirements on lighting in respect of:

- (i) Schedule of illuminance values
- (ii) Average illuminance at any floor level
- (iii) Glare in any workplace
- (iv) Lighting on rotating machinery
- (v) Luminaires and lamps
- (vi) When emergency sources of lighting must be provided
- (vii) FOUR requirements with which emergency sources of lighting must comply (10)

Answer 3(a)

- (i) ER 3(1): Every workplace to be lighted as per schedule of illuminance values.
Specialised lighting for particular type of work must be provided and used even though not in the schedule.
- (ii) ER 3(3)(a): Average illuminance within 5 metres of task must not be less than one fifth of average luminance.
- (iii) ER 3(3)(b): Glare must not impede vision.
- (iv) ER 3(3)(c): Hazard of stroboscopic effects must be eliminated.
- (v) ER 3(3)(d): Kept clean and repaired or replaced if defective.
- (vi) ER 3(4): Without natural lighting at indoor work or for night work, provide not less than 0,3 lux. In exceptional conditions not less than 20 lux.
- (vii) ER 3(5): To be activated within 15 seconds of lighting failure;

Last long enough for safe evacuation;

Kept in good working order and tested 3 monthly;

Directional luminaires mounted not less than 2 metres above floor level and aimed between 10 degrees above and 45 degrees below horizontal plane of luminaire.

Maintenance Management

QUESTION

Industry has to recognise and take into account the accounting concepts of inflation and depreciation, with regard to budgeting and operations. Discuss and explain the significance of these two accounting concepts, in the context of a managed maintenance environment. Provide calculated examples of each concept to illustrate the significance as discussed in the answer.

ANSWER

Inflation has the effect of reducing the value or purchasing power of money with the passage of time. The more time that passes the less value a given sum of money has. As a result of this money has to be regarded as having a present and a future value. The significance of the future value, in other words how much can be done with the money, of the money has to be taken into account when planning future activities. The planner has present value wherewith to work. He must then project these values into the future so as to determine how much actual 'cash in hand' will be needed at that time to implement the plan.

As an example of this: if a boiler is to be installed in four years' time and the present value of such a boiler is R200 000 and the inflation rate for the forthcoming period is reliably predicted to be 15% p.a. then a sum of money = $200(1,15)^4 \times 10^3 = R350\ 000$ will be needed in four years' time to purchase such a unit. Equally, if a company sees itself as having say R3 000 000 available in five year's time then the actual value of that money is $3 \times 10^6 / (1,15)^5 = R1\ 500\ 000$ (for an inflation rate of 15%). This means that in 5 years' time the R3 000 000 will be able to do what R1 500 000 can, at the time that the planning or evaluation is undertaken.

A 'defence' against this and numerous other exigencies of the business world is the accounting mechanism of depreciation. This is the practice of 'writing off' the value of certain assets over a period time. This means that the monetary value of the asset is progressively reduced, either to a small residual value or to zero value. The period of time in which this is done is reasonably short, in the range of three to six years, depending on a number of factors. The maximum amount that may be deducted in any period, as well as the minimum period over which the article may be 'written off' is determined by tax law.

One of the purposes of 'depreciation' is to recognise the fact that working assets, such as machinery, cannot last forever and will become of less and less value to the company and, in due course, have to be replaced. The loss in value of the asset, as calculated in the depreciation determination is deducted from the company earnings for the budget period in question before tax.

Consider a printing press with a value of R1 000 000, depreciated at 20% p.a. over six years. At the start of the seventh year the press will have a value of $R1\ 000\ 000 / (1,2)^6 = R350\ 000$. It has not been discounted however, as such an action would be unreasonable - it still functions and produces output. However, it is at 35% of its purchase price, and if an inflation rate of 15% is applied to this equipment, making the replacement cost some $106 \times (1,15)^6$ i.e. R2 300 000, it is at 15% of the value of a new unit.

If an 'expendable' asset, such as a diesel light delivery vehicle working in an agricultural context, is considered, a purchase

price of say R100 000 may be discounted to zero, over four years in four equal deductions, as follows:

Purchase R100 000
year one - R25000
"book" value R75000 in year 2

year two - R25000
"book" value R50000 in year 3

year three - R25000
"book" value R25000 in year 4

year four - R25000
"book" value R00000 in year five.

(Thanks are due to Ian Noble-Jack of the Cape Technikon for providing this material)

Occupational Health & Safety Act (No 85 of 1993)

Issue No 25 VESSELS UNDER PRESSURE REGULATIONS (VuPR)

VuPR 14 Record Keeping

This regulation requires the user to keep a record of the following:

- z inspections and tests
 - z modifications and repairs
- These records must be dated and signed by the competent person.

The definition of 'vessel under pressure' includes:

- z boiler
- z pressure vessel
- z pressurised system
- z portable gas container

Inspections and tests

- z on boilers and pressure vessels are carried out 3 yearly
- z on pressurised systems - unknown
- z on portable gas containers - as per SABS code

Modifications and repairs

- z variation from approved codes and repairs must be authorised and supervised by approved inspection authorities (AIA).

Competent person

It is not clear whether this 'competent person' is the one appointed to supervise all machinery on the premises or one who by reason of knowledge, experience and training is considered to be competent.

Record

There is no statutory format for this record. The user may draw up his own system of records. It may be in the form of logsheets, inspection registers, logbooks, card index systems or computer disc. Anything which can be examined by an inspector.

(The editor can supply suitable registers)

VuPR 15 Maintenance

Vessels must be maintained

- z in safe working condition
- z efficient - proved by regular testing
- z clean
- z free from ignitable substances, corrosive substances and dangerous chemical reactions.

Continued on Page 4 col 2

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- (vii) FOUR requirements with which emergency sources of lighting must comply

(10)

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- (vii) *ER 3(5): To be activated within 15 seconds of lighting failure
Last long enough for safe evacuation
Kept in good working order and tested 3 monthly
Directional luminaires mounted not less than 2 metres above floor level and aimed between 10 degrees above and 45 degrees below horizontal plane of luminaire.*

Question 3(b)

Indicate whether the following statements are 'TRUE' or 'FALSE' in respect of the environmental regulations for workplaces. If your answer is 'false' give a reason by writing down the exclusion.

- (i) The time weighted average concentration of carbon dioxide in the air inhaled by persons in a workplace is prescribed.
TRUE: ERW 5(1)(b)
- (ii) The exposure limit for airborne substances in the air inhaled by persons in the workplace is prescribed.
TRUE: ERW 5(1)(d)
- (iii) All openings in floors through which or from which persons may fall must be fenced or enclosed at all times, no exclusions.
*FALSE: ERW 6(2)(f)
EXCLUSION: Unless removed for access of persons or materials.*
- (iv) No article may be disposed of from a high place except by hoist or chute, no exclusions.

FALSE: ERW 6(3)

EXCLUSION: Unless safety of persons secured.

- (v) People are at times prohibited from entering a noise zone, no exclusions.
*FALSE: ERW 7(4)(b)
EXCLUSION: Unless such person wears hearing protectors.*
- (vi) Demarcation of the boundaries of noise zones can only be done by the services of an approved inspection authority.
*FALSE: ERW 7(4)(a)
EMPLOYER demarcates by posting up notices at entrances, exits and boundaries. The inspection authority determines the noise zones as per SABS 083.*
- (vii) Hearing protectors provided by the employer shall be for the sole use of a specific person, no exclusions.
*FALSE: ERW 7(8)(a)
EXCLUSION: Unless inspector satisfied diseases cannot be spread.*
- (viii) Emergency fire escape doors must at all times be hung so as to open outwards, no other provisions.
*FALSE: ERW 9(1)(a)&(c)
PROVISION: Also applies to outer escape exit.*
- (ix) All workplaces, in case of fire, must at all times be provided with at least two means of exit as far apart as is practicable.
TRUE: ERW 9(1)(g)
- (x) For contravention of the provisions of the environmental regulations for workplaces cumulative daily penalties are prescribe for continuous offences.
TRUE: ERW 10 up to 90 days.

OHSA: Continued from page 3

VuPR 16 Modification and repair

- z modification or repair of boilers, pressure vessels and portable gas containers to be carried out under supervision of AIA.
- z the persons doing the work must issue a certificate
 - z describing the work
 - z that work complies with approved safety standard.
 - z AIA to countersign certificate
- z reduction in pressure of boilers and pressure vessels due to needed repairs, to be fixed by AIA and not exceeded.
- z reduced mpop to be marked by AIA duly identified on manufacturer's plate.
- z AIA's report and Registration Certificate to be sent to provincial director of Labour for correction.

Young blood needed!

The Western Cape branch of ICMEE would like to see younger members of the fraternity taking an interest in committee work and offer their services. The present members have worked hard and sacrificially over many years to provide interesting talks and visits and information to members but they are not immortal and youth means young ideas. So who would like to give it a go?