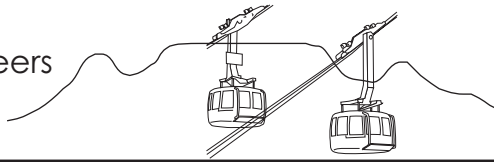


WCB ENGINEERING BULLETIN

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

P.O. Box 504, Rondebosch 7700



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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

There is a new animal scratching at the door of industry and commerce. It introduces himself as Project Manager and wants to assure anyone who is willing to take it on board that the ship will sail better and with more fulfillment.

In this issue we are introducing a series on Project Management with the kind permission of one Caesar Alexandre, MTechBA, Chief Engineer, Provincial Administration, Department of Health, Western Cape Province. He has been lecturing for five years to Technikon Masters students on the subject of Project Management and we are fortunate to be able to publish some of his material. He is one of us, a Professional Certificated Engineer, speaks our language and is prepared to share his in-depth knowledge and experience of this and associated subjects. It is hoped that many of our readers will try out the novel approaches recommended in these extracts.

Mr Alexandre is available for talks on the above subject and such related titles as: The New Era Leadership, The Cancer of Our Work Practices, Team Leadership, Management of Change, Management vs Leadership and Reward Management. His talks come over with humour and telling parables but underneath is a deadly seriousness to point to a more promising even compassionate way of managing an enterprise.

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Last year the Institution awarded the annual prize for best student in Government Certificate of Competency subjects at the WP Technical College, to Mr. Enrico Anelli.

We are pleased to announce that he has passed both Law and Factory Plant examinations earlier this year! What a feat! Well done to Enrico.

Local Branch News

Hello once again everybody.

On 18 June we had a most interesting talk on the "East Fort Gate Project" by Dave Cowley, the Chairman of the Hout Bay & Llandudno Heritage Trust. He explained to the members present the process that is being fought to get funding for cleaning up and rebuilding some of the canon sites dating back to 1781 on Chapman's Peak drive. It was a most enlightening talk.

Due to unforeseen circumstances we could not stage a talk for July.

NOTE!!

WE ARE CALLING ALL MEMBERS! OUR DINNER DANCE WILL BE HELD ON FRIDAY 25 OCTOBER 2002 AT THE RIVER CLUB IN OBSERVATORY, CAPE TOWN. PLEASE MAKE A NOTE IN YOUR DIARIES AS WE WOULD LIKE AS MANY MEMBERS AS POSSIBLE TO SUPPORT THE FUNCTION. INVITATIONS WILL FOLLOW SHORTLY.

The programme for the next few months is as follows (Please note that the subject and dates are subject to confirmation in the normal manner of invitation):

August: Talk on Canal system at Waterfront & CBD
September: Wind electrification project talk
October: Dinner dance has been booked for 25 October!

Best regards to you all!

Chris Schnehage

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Most recent OH&SA gazettes

Government Notice No R 10 of 11/01/2002: Diving Regulations.

Government Notice No R 1390 of 27/12/200: Regulations for Hazardous Biological Agents.

Government Notice No R 155 of 10/02/2002: Asbestos Regulations.

NOTE: As from 1 July 2002 Certificates of Compliance must comply with latest SABS 0142.

A bi-monthly column on project management

1. A WORD OF WELCOME

Welcome to the Project Management world. May you gain ample knowledge and enjoy getting to know more about the management of projects.

Project Management is an art and a science. To be effective it requires both powerful interpersonal and leadership skills (soft skills) and structural management skills (hard skills).

The majority of projects are not completed within time and within budget and rarely do they deliver the degree of quality prescribed. The objective of this column on Project Management is to provide managers of projects with greater insight to address these problem areas.

This 2 monthly column offers you the opportunity to acquire more skills and competence to structure, organise, manage and lead your projects more effectively and in such a way as to increase the efficient and effective utilisation of resources.

The presenter, Mr C Alexandre, is available to answer any questions from the readers on this issue on tel. (021) 918-1582.

2. INTRODUCTION

The Role of the Project Manager

Organisations throughout the world are discovering the impact of "PROJECTS" on the success of the enterprise, and have acknowledged "PROJECT MANAGEMENT" as a distinct and invaluable critical discipline.

Large companies are being forced by market pressures to fragment into smaller business units.

Layers of hierarchical management structures have to be eliminated to reduce the decision-making chain in order to improve corporate responsiveness to rapidly changing markets.

Just-in-time human skills management has had to be implemented to reduce bloated and unproductive personnel overheads.

The best managed organisations throughout the world recognise "Project Management" as one of the core processes and competencies, to be implemented and nurtured, and that comprehensive retraining for Project Management is critical.

Growth in Project Management is becoming exponential. More and more organisations are enhancing Professional Project Management as the best way to achieve their goals in an area of stiff competition and rapid change.

Why is this so?

- Companies want to stay or become more competitive at home and globally.
- There is increasing demand for low-cost, high quality products and services.
- Associated with this demand are greater competitive pressures to transform ideas to products and services quickly.

- In turn, this leads to enormous pressures on analysis, planning, and decision processes.
- Governments seek or are forced to deliver services and perform an array of functions more efficiently and effectively.
- Citizens in more and more countries demand this.

In the past, concepts of work were dominated by linear processes. Functions and operations were the terms most often used to capture the essence of work.

Today, however, newer representations of work are likely to be seen involving a complex set of interactions and interrelationships of Gilbreth "unique, temporary, results-oriented work packages". For these we use the newer terms – projects and systems.

Projects are strategic management tools, and you ignore Project management at your peril.

It is a competence that most organisations require their employees and leaders to have.

It is no longer the preserve of specialists and the engineering sector, but a discipline for everyone in the organisation.

- In future, most of the projects will be of a much less concrete nature (e.g. a project to change the culture of an organisation).
- The results, and therefore the objectives, are more difficult to define and at a lower level of certainty.
- Some knowledge areas considered necessary in the Engineering Industry are hardly applicable, or of little relevance, if at all (e.g. ISO standards or what quality assurance).
- Future SA projects will be in the areas with no bearing on either building or other engineering (e.g. school feeding projects).
- The future of Project Management in SA does not lie mainly in the technical or natural sciences as in the past.
- Today Project Management must include the treatment of unpredictable systems such as biological, agricultural, medical, human development and social, and the application of the Project management way of goal achievement, to render them planable and controllable to a reasonable level of certainty.
- The need for integration of the efforts of various disciplines transfunctionally under a singular leadership.

With the advent of the change from functional organisation structures to "functional teamwork structures", organisation become organised as cross-functional teams assembled around activity centres to develop a "horizontal" orientation. Project Management has become a relationship driven technique.

It covers topics and areas outside the scope of a (specific) industry, and becomes applicable to many.

It is "Industry Independent".

why use project management?

In Project Management we sell:

ASSURANCE

- Statements like: "I feel", "I think", "I assume" are not very convincing.

Continued on page 3 col 1

Continued from page 2 col 2

- To ASS-U-ME can make an “ASS of YOU and ME”.
- With PROJECT MANAGEMENT I can say: “I have the facts and alternatives, I can recommend.” I know what I need, when I need it and for how long I need it.
- Alternative actions are based on reliable data rather than subjective emotions.

COMMITMENT to Time, Cost, Quality and Performance. Always remember the distinction between contribution and commitment. The chicken makes a contribution. The pig makes a commitment.

- Promotes profitability, effectiveness, efficiency & RESULTS.

Never confuse activity with results and accomplishment.

- Quality and control are built in. Quality is what the customer says it is. Period.

DEFINITION & PREPARATION

It requires a concise project definition with specific deliverables.

There is nothing as useless as doing efficiently that which should not be done at all.

- Project Management is a discipline that requires discipline.
- Can turn a reactive style of management into a proactive one.

English as it should be spoke

The European Union commissioners have announced that agreement has been reached to adopt English as the preferred language for European communications, rather than German, which was the other possibility.

As part of the negotiations, Her Majesty's Government conceded that English spelling had some room for improvement and has accepted a five-year phased plan for what will be known as EuroEnglish (Euro for short).

In the first year, 's' will be used instead of the soft 'c'. Certainly, sivil servants will resieve this news with joy. Also, the hard 'c' will be replaced with 'k.' Not only will this klear up konfusion, but typewriters kan have one less letter. There will be growing publik enthusiasm in the sekond year, when the troublesome 'ph' will be replaced by 'f'. This will make words like 'fotograf' 20 per sent shorter.

In the third year, publik akseptanse of the new spelling kan be expekted to reach the stage where more komplikated changes are possible. Governments will enkourage the removal of double letters, which have always ben a deterrent to akurate speling. Also, al wil agre that the horrible mes of silent 'e's in the languag is disgrasful, and they would go.

By the fourth year, peopl wil be reseptiv to steps such as replasing 'th' by 'z' and 'W' by 'V'.

During ze fifz year, ze unesenary 'o' kan be dropd from vords kontaining 'ou', and similar changes vud of kors be aplid to ozer kombinations of leters.

After zis fifz yer, ve vil hav a reli sensibl riten styl. Zer vil b no mor trubls or difikultis and evrivun vil find it ezi tu understand ech ozer. Ze drem vil finali kum tru.

A dangerous ride

A 10 ton flat bed truck was transporting a load of 24 concrete street lighting poles. Two workers were sleeping on top of the load. The truck negotiated a left hand 90 degree bend on a gravel road and then the load started to shift because of the negative camber of the road. The truck was in first gear when it came to a stop on a slanted part of the road and the load rolled off the truck to the right. The shifting of the load was due to the slipping of wedges on the sleepers and then the 19 mm nylon rope securing the poles broke. One worker landed under the main mass of poles and was fatally injured whilst the other had an arm trapped which was fractured.

The 24 poles were in three layers of eight each. Each layer rested on two transverse timbers which spanned the width of the truck. Wooden wedges were nailed to the timbers on each side. Each pole had a mass of about 450 kg. Two 19 mm nylon ropes were lashed around the poles. The loading was supervised by the truck driver and carried out by his passenger in the cab and the two workers. The driver had been working in this way for 6 years. He said the ropes lasted a year or 18 months and he had them replaced when necessary. The director stated that that method of securing had gone on for 20 years without mishap.

This tragic incident reveals a number of issues which responsible management should take note of.

1. The loading of heavy, round and tapered poles requires close supervision. The area foreman, who was also a safety representative, was not present at the loading and the full responsibility was placed on the driver of the truck. Equipment to tighten the ropes was also not available - this had to be done manually. The shifting of the load indicates that the rope was insufficiently tightened for all conditions of the road.
2. It was left to the driver to assess the remaining strength of the ropes. And with only two ropes in use the condition of the ropes was vital.
3. Using only two ropes on that type of load was a great risk but a still greater risk on a public road.
4. No consideration was given to the safety of the workers because they were allowed to travel on top of the load. Other provision should have been made (such as a separate enclosure) if they were needed to off-load.
5. One wonders if the CEO of a company ever comes to the areas of activity of the company to see if the systems which have been put in place are actually practised.

Section 8 of the Occupational Health & Safety Act No 85 of 1993 places a legal duty on employers to ensure the safety of employees. In this episode section 8(2)(d) and (i) are particularly relevant.

Joke

A visiting minister was disappointed to find that his 'congregation' consisted of just one farmer. Wondering whether he should hold the service, he decided to ask the man's opinion.

"If I take a bucket of food to my hens," said the farmer, "and only one turns up, I don't send it away hungry."

Moved by this simple analogy, the minister climbed to the pulpit and delivered a powerful and lengthy sermon. Afterwards, he asked the farmer, "Did you enjoy the service?"

"When only one hen turns up," the farmer replied testily, "I don't give it the whole bucket."

Readers Digest December 1998
'Laughter the best medicine'

Plant Engineering

Exam Paper (Mines and Works) November 2001, Question (8) (b)

A vibrating screen is modified and will now be suspended from four closely coiled extension springs. The total loaded mass of the screen is 3,54 t. Calculate suitable dimensions for the manufacture of such springs. The D/d is 5,88, the maximum torsional stress 450 Mpa and the modulus of rigidity 80 Gpa. The extension under load must not exceed 155 mm. There is no initial tension in the wire.

Calculate:

- the diameter of the wire
 - the mean coil diameter
 - the number of coils
- (15)

Given Formula:

$$\tau_{\max} = 8FD^3n/Gd^4$$
$$\Delta = 8FD^3n/Gd^4$$

Given:

Please note that the examiner gives two formulas, but only one is correct and that is the axial deflection (Δ) and since the other is exactly the same as the axial deflection, it could be a printing mistake.

(τ_{\max}) should be: $\tau_{\max} = (k)FD8/\pi d^3$
which is equal to 450 Mpa, and (k) is the Wahl Factor.
Also given is: $D/d = C = 5,88$ which is called the spring index.

$G = \text{Modulus of Rigidity} = 80 \text{ Gpa}$
Also the extension or axial deflection = $\Delta = 155 \text{ mm}$
Total mass = 3.54 t

The examiner says that "the extension under load must not exceed 155 mm". So, if the load is the total load on top of the four springs, I assume the extension is 155 mm for each of the four springs.

Therefore:

$$\text{Load per spring} = F = 3,54/4 \times 1000 \times 9,81 = \underline{\underline{8,682 \text{ KN}}}$$

(a) To find dia. of the wire = (d) = ?

First we have to find the Wahl Factor (k) = $4C-1/4C-4 + 0,165/C$. This factor corrects for the transverse shear effect and for the curvature effect and is used on the torsional stress formula. The use of the full value of (k) for static loading, meaning using both parts of the equation, which would result in a good conservative design.

$$k = 4 \times 5,88 - 1 / 4 \times 5,88 - 4 + 0,165 / 5,88 = 1,258$$

$$\text{and } C = D/d = 5,88$$

Therefore:

$$= 1,258 \times 8 \times 8682 \times 5,88 / \pi \times d^3$$

$$\text{then: } \underline{\underline{d = 19 \text{ mm}}}$$

(b) To find the mean coil dia. = (D) = ?

$$C = D/d = 5,88$$

$$\underline{\underline{D = 5,88 \times 19 = 112 \text{ mm}}}$$

(c) To find the number of coils = (n) = ?

From the deflection formula given, (n) is extracted and we get:

$$n = \Delta G d^4 / 8 F D^3 \text{ and substituting the value we get:}$$

$$\underline{\underline{n = 17 \text{ coils or spirals.}}}$$

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Cert Eng (Mech & Elect)

PATRON MEMBERS

Schneider SA (Pty) Ltd	Tel: (021) 464 4240
Globe Engineering Works (Pty) Ltd	Tel: (021) 448-4640
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Sappi Cape Craft (Pty) Ltd, Milnerton	Tel: (021) 552-2127
John Thompson Africa (Pty) Ltd, Bellville	Tel: (021) 951-2271

Occupational Health & Safety Act

(no 85 of 1993)

Issue no 26: Electrical Installation Regulations (EIR)

Definitions

There are three categories of "accredited person":

- electrical tester for single phase
- installation electrician
- master installation

The master installation electrician has to pass additional examinations on:

- electrical hazards in hospitals
- electrical equipment in explosive atmospheres
- conditions in the petroleum industry
- classification of hazardous locations

"Point of supply" is the point on the premises to which the local electricity department connects its supply. It is the end of the overhead service wires or underground cable to the premises from the power line or distribution kiosk in the road. The switches here are normally inaccessible to the house occupier.

"Point of control" is the point inside the premises where the occupier can switch off the electricity supply.

"Point of outlet" is the plug socket outlet or light point outlet.

"Point of consumption" is the point of outlet or the supply terminals of machinery.

"Electrical installation" is from point of control to point of consumption.

"Installation work" is work on the electrical installation as defined and includes the connection to the supply terminals of machinery. This machinery could be a complex of machinery which has a single set of supply terminals serving all the parts of the whole machinery.

"Certificate of compliance" is required to be in the possession of the owner of an installation except for premises purchased before 1 March 1994. Change of ownership or wiring work done after that date requires a certificate of compliance. So a premises sold today requires the seller to provide a certificate of compliance for the new owner.

An electrical contractor must register with the Electrical Contracting Board of SA annually. An accredited person who does electrical work as defined for himself need not be registered as a contractor.