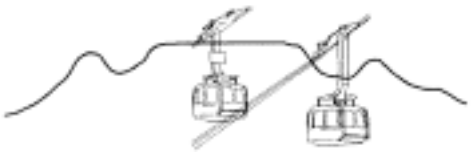
WCB ENGINEERING BULLETIN

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

P O Box 504, Rondebosch, 7700



JUNE 2008

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

EDITORIAL

Welcome to another edition of the Western Cape News Bulletin.

There is a new Built Environment Professions Bill (B53-2008) introduced in the National Assembly which is up for comment at present. It has far reaching effects on the engineering profession as it stands now, and comment is called for via an advert in the papers (copy in the edition). Any submissions are required to be lodged by 12 noon on 18 July 2008 and public hearings will be conducted at Parliament on Tuesday 12 August and Wednesday 13 August 2008. If anyone would like to see a copy of the Bill, please email me – at chris@boron.co.za and I will forward a copy to you. The Institution is intending to submit necessary comment by 18 July 2008.

Further we have a continuation of the article on the electrification of Cape Town part 5 which is the last information part and the normal question and answer for GCC preparation. Also a couple of articles courtesy of SafeNet which normally make interesting and thought provoking reading.

I trust that you will find the content of this news bulletin interesting enough to pass on to your colleagues and friends.

Chris Schnehage
Tel: 083 326 8023 Email: chris@boron.co.za
Editor: Henriette Venter email: vencon@netactive.co.za

LOCAL BRANCH NEWS

Activities of the branch since last news bulletin were as follows:

On 15 May a large group of us did a visit and a tour of the RMS St. Helena when she was in the harbour. It certainly was an enlightening visit.

On 24 June we presented a talk on the different methods available to engineers to save power and to reduce the cost of power in installations. Also a very interesting talk attended by 22 members and guests alike.

The line up for the next few months is as follows:
15 July 2008 – visit to Ankerlig OCGT
August 2008 – COATEC – hard chrome and metal covering.
September 2008 – talk on earth fault protection
October 2008 – visit to SAPPI plant in Montague Gardens
November 2008 – Visit to Syncorp in Epping

Should any member have an interesting visit at your factory or work place, please let us know so that we can arrange such a visit. Or alternatively, if you have an idea for a talk that we could arrange, please let us know and we will attempt to find someone to present.

Later on in the year we intend to host a 1 day seminar titled "Occupational Health and Safety – Where do you fit in?"
We would greatly like to hear from members whether you have something specific you would like to hear about or could contribute to the broad subject on the table.
This far we have heard nothing from members. Would there be an interest out there?

We look forward to seeing you at one of our functions.

Ciao for now!

Chris Schnehage
Tel: 083 326 8023
Email: chris@boron.co.za

VISIT TO RMS ST HELENA

This photo kindly provided by Mr Mike Jaffe, retired Inspector of Machinery (Dept. of Labour).

On the 15th May 2008, the Institution of Certificated Mechanical and Electrical Engineers was permitted to visit the *RMS St Helena* in Table Bay Harbour by courtesy of the ships agents Andrew Weir Shipping. The 6,767 gross tonnes vessel is part passenger, part cargo specially built for regular runs in the South Atlantic between Cape Town and the islands of St Helena and Ascension as well as occasional voyages to Tristan da Cunha, Tenerife and Great Britain.

Built in Aberdeen in 1989 for St Helena Line Ltd. of Sutton Surrey. UK. She entered service in 1990. Length 105 metres. Beam 19.2 metres. Maximum Draft 6.016 metres. Normal Maximum speed 14.5 knots. Passenger capacity 128 persons.

The visit, led by WC Branch Chairman Chris Schnehage, was enthusiastically supported and a full complement of visitors went aboard. We were delighted that Mike Jaffe was with us to add some comments along the way because he had travelled to St Helena Island on the vessel. Some visitors were contemplating a voyage on the ship and surely after this visit they have already signed up!

We were ushered down to the engine room by Engineer ? who was born on the island.

We had a comprehensive tour of the machinery spaces.

Main engine room - housing the twin six cylinder turbo-charged Mirrlees-Blackstone diesel engines, which run on Heavy Fuel Oil (HFO) when under power or gas-oil while idling. There are waste heat boilers attached to the engine exhausts.

Auxiliaries' room houses twin Ruston diesel alternators to provide electrical power. These can be synchronised if required. Twin Compair air compressors housed in acoustic enclosures, refrigeration equipment for both cargo and ship use, evaporators (to make potable water and sewage treatment equipment.

The aftermost machinery space houses the hydraulically operated steering gear mounted directly on the rudder pintle.

We spent time in the control room where there is comprehensive monitoring equipment and control gear. Generally the main engines run at constant speed and vessel speed and direction is controlled via variable pitch on the screws (propellers). In the event of a main engine being shut down for any reason with the ship under way, there is a clutch on each reduction gearbox which allows disconnection of the drive and by feathering the propeller pitch the affected propeller is then able to rotate freely and thus considerably reduce drag.

We then ascended to the uppermost level to visit the bridge from where we were able to see the navigation and communication equipment.

We were also able to look down on cargo loading into the two holds on the fore-deck. The ship has powerful derrick cranes because at her ports of call at St Helena and Ascension Islands she has to unload her cargo into barges for ferrying to the sea wall, because there are no harbours.

We returned via the accommodation spaces where we were shown the cabins for passengers, playroom, lounge which also has a library corner and the after-deck with swimming pool.

Those of us who have previously interacted with `*the Saints'* as the population of St Helena are affectionately known were once again charmed by their friendliness and by their unique accent.

Altogether a very instructive and enjoyable visit.
http://www.rms-st-helena.com/ This comprehensive web-site includes an excellent video of a journey on the ship and tour of St Helena island.

Help required!!!

There are two young aspiring engineers who are looking for assistance in practical training for writing the GCC. They are both student members of this Institution and are working in environments where the necessary training and exposure to various aspects of Plant Engineering is lacking. One has N6 Dip mechanical and the other has electrical power engineering subjects from the Vaal Triangle Technikon.

Is there anyone out there who may be able to assist these chaps at all?

If so, please contact Chris Schnehage and he will pass on the relevant CV.

PLANT ENG. JUNE 08 (2.1) (Compulsory)

A standby three-phase, 600 kVA alternator has a rated terminal voltage of 3 300 volts (line). The stator winding is star-connected and has a resistance of 0,37 Ω/phase and a synchronous impedance of 4,3 Ω/phase. Calculate the voltage regulation for a load having the following power factors:

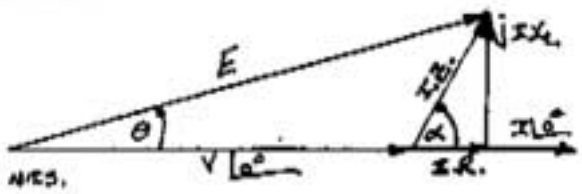
2.1.1 Unity

2.1.2 0,8 lagging (10)

This problem was asked in the previous exam paper of Nov. 2005 (6.1) and I happened to do it on the board for the students during my last semester classes. Question 6.1 of this paper is also a repeat from exam paper Nov. 2005 (6.2). So as I said before this exam paper is becoming much easier to pass because they are repeating the previous questions. This is a new method adopted by the examiners in an attempt to have a higher pass rate of Cert. Eng. in the country. All the candidates have to do is try to solve correctly, as many problems as possible from the previous exam papers and the chances are that the same or a similar question will be asked.

Answer:

The best way to tackle these type of problems is to solve them with the aid of a phasor diagram. So for a load of unity power factor the phasor diagram looks like this:



Referring to the phasor diagram:

$Vph = 1905 \angle 0^\circ$ volts and

$\alpha = Cos^{-1} \frac{0,37}{4,3} = 85,07^\circ$

$Iph = \frac{600\ 000}{\sqrt{3} \times 3\ 300} = 105$ amps

$I Z = 105 \angle 0^\circ \times 4,3 \angle 85,07^\circ$

$I Z = 451,5 \angle 85,07^\circ$ volts

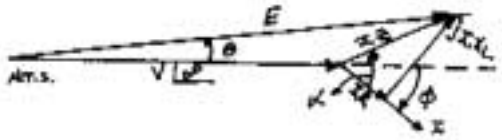
$E = Vph \angle 0^\circ + IZ = 1995 \angle 13^\circ$ volts

$\theta = 13^\circ$

$VR = 1995 - 1905 = 90$ Volts

and $\%VR = \frac{90}{1905} = 4,72\%$

For a load at 0,8 power factor lagging the phasor diagram looks like this:



Referring to the phasor diagram:

$I Z = 105 \angle -36,87^\circ \times 4,3 \angle 85,07^\circ$

$I Z = 451,5 \angle 48,2^\circ$ volts

$E = Vph \angle 0^\circ \times IZ = 2232 \angle 8,69^\circ$ volts

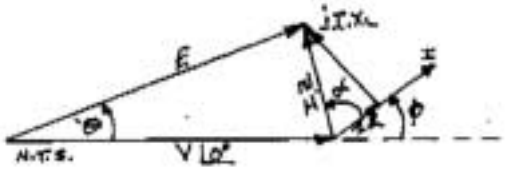
$\theta = 8,69^\circ$

$VR = 2232 - 1905 = 327$ volts

and $\%VR = 17,2\%$

What would the VR be for a load having a leading power factor of 0,8?

The phasor diagram looks like this:



Referring to the phasor diagram:

$IZ = 105 \angle 36,87^\circ \times 4,3 \angle 85,07^\circ$

$IZ = 451,5 \angle 122^\circ$ volts

$E = Vph \angle 0^\circ \times IZ = 1710 \angle 13^\circ$ volts

$\theta = 13^\circ$

$VR = 1710 - 1905 = -195$ volts

and $\%VR = -10,24\%$

Jorge Pereira (Cert Eng).

OHSACT JUNE 2008 (5) & (10)

5.1 In terms of the FR, every employer shall provide sanitary facilities at the workplace in accordance with the National Building Regulations, provided that where less than 11 persons are employed on one premises, the employer may make arrangements that the employees use closets and washbasins on an adjoining premises. Under what conditions may you make such an arrangement? (3)

Ans. 2(2)(a); 2(b)(i)(ii)

5.2 When must an employer prohibit smoking, eating and drinking at the workplace? (4)

Ans. 5(1)(a)(b)(c)(d); 6(a)(b)

5.3 In terms of the MH I R, an employer shall notify the chief Inspector, provincial director relevant local government in writing, of the erection of any installation which will be a major hazard installation, prior to commencement of the erection thereof. This notice shall include a risk assessment of the risks associated with the major hazard installation.
Name THREE items that must be included in the assessment. (3)

Ans. 5(b)(i)(ii)(iii) up to (xii)

10.2 In DMR, name FIVE design requirements for a lifting machine. (5)

Ans. 18(1)(a)(b)(c); 18(2)(a)(b)

10.3 What must be provided on a jib crane with a lifting capacity of 5 000 kg or more, at minimum jib radius?(4)

Ans. 18(11)

Jorge Pereira (Cert. Eng.)

Sunday Times June 29 2008

HAVE YOUR SAY

Submissions and Hearings

Built Environmental Professions Bill (B53-2008)

The Portfolio Committee on Public Works invites stakeholders and interested parties to submit written submissions on the above-mentioned Bill.

The purpose of the Bill is to: Establish the South African Council for the Built Environment ("the Council") and professional boards, regulate the Built Environment professions in order to promote growth and transformation; provide for the protection of the public against unprofessional conduct by registered persons; provide for registration of persons within the Built Environment professions; provide for the repeal of the laws establishing the current seven councils; and promote and maintain the standards of education and training in the Built Environment professions.

Public hearings will be conducted at Parliament on Tuesday, 12 August and Wednesday, 13 August 2008.

Submissions must be received by no later than **12:00 on Friday, 18 July 2008.** Please indicate your interest in making a verbal presentation.

Submissions must be directed to Ms Akhona Busakwe, Committee Secretary, Portfolio Committee on Public Works, 3rd Floor, 90 Plein Street, Cape Town 8000.

Copies of the Bill may be obtained from the parliament website: www.parliament.gov.za and enquiries directed to Ms Akhona Busakwe, tel (021) 403-3859, fax: 086 664 3859 or e-mail: abusakwe@parliament.gov.za

Issued by: Hon TV Tobias-Pokolo, MP and Chairperson of the Portfolio Committee on Public Works.

Parliament, Making Democracy Work

ELECTRICITY IN CAPE TOWN

ATHLONE POWER STATION

First Stage: Initial (1957)

2 - Turbo-alternator sets.
Oerlikon Engineering Company, Switzerland.
Twin cylinder, impulse type, with single exhaust.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
30 000 kW.

3 - Boilers.
Chain-grate stoker-fired type.
John Brown Land Boilers (Africa) (Pty) Ltd.
Stop valve steam pressure 635 psig at 915°F (490°C).

The first boiler underwent final inspection by the Inspector of Machinery on 26 October 1960, and a provisional permit was granted to raise pressure and steam the boiler. Soon afterwards, on 8 November 1960, the first turbo-alternator was run up and connected to the system for testing purposes, but because of balancing and adjustment problems this unit only became available for regular operation on 11 January 1961. The second turbo-alternator was placed in commercial operation soon after the first.

First Stage: Optional (1958)

1 - Turbo-alternator set.
Oerlikon Engineering Company, Switzerland.
Twin cylinder, impulse type, with single exhaust.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
30 000 kW.

1 - Boiler.
Chain-grate stoker-fired type.
John Brown Land Boilers (Africa) (Pty) Ltd.
Stop-valve steam pressure 635 psig at 915°F (490°C).

Station total installed generating capacity **90 000 kW**

This third turbo-alternator was placed in commercial operation later in the year, soon after the second, thereby making available a total of 90 MW of extra generating capacity on the Council system. Initially this plant was operated daily on a two-shift basis only, but the following year, 1962, it was run on a continuous three-shift basis throughout the year to meet the increased night-load on the Council's stations.

The power station was officially opened by the Mayor, Councillor A H Honikman, on 15 August 1962, and named the Athlone "A" power station.

Second Stage: Initial (1963)

1 - Turbo-alternator set.
Oerlikon Engineering Company, Switzerland
Twin cylinder, impulse type, with single exhaust
12 000 V, 50 Hz, three-phase, 3 000 rpm.
30 000 kW.

2 - Boilers.
Chain-grate stoker-fired type.
John Thompson Africa (Pty) Ltd.
Stop-valve steam pressure 635 psig at 915°F (490°C).

By the end of 1963 a fourth turbo-alternator and fifth boiler had been commissioned, further raising the available capacity of the station to 120 MW.

Second Stage: Optional (1964)

1 - Turbo-alternator set.
Oerlikon Engineering Company, Switzerland.
Twin cylinder, impulse type, with single exhaust.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
30 000 kW.

1 - Boiler.
Chain-grate stoker-fired type.
John Thompson Africa (Pty) Ltd.
Stop-valve steam pressure 635 psig at 915°F (490°C)>

Station total installed generating capacity **150 000 kW**

Third Stage (1965)

1 - Turbo-alternator set.
Single cylinder type.
Hitachi, Japan.
12 000 V, 50 Hz, three-phase, 3 000 rpm.
30 000 kW.

1 - Boiler.
Chain-grate stoker-fired type.
John Thompson Africa (Pty) Ltd.
Stop-valve steam pressure 635 psig at 915°F (490°C).

Station total installed generating capacity **180 000 kW**

This sixth turbo-alternator and eighth boiler went into commercial operation on 1 April 1967, some ten years after the first contracts were placed. The station was now fully equipped to its ultimate generating capacity of 180 MW.

STEENBRAS POWER STATION

4 - Reversible Pump-Turbine Motor-Generator sets.
Pump-Turbines: Francis type.
Escher Wyss Ltd, Switzerland.
Motor-Generators: Salient-pole, synchronous type.
Siemens Ltd, West Germany.
12 000 V, 50 Hz, three-phase.
45 000 kW.

Station total installed generating capacity **180 000 kW**

The station was formally opened by the Mayor, Alderman Ted Mauerberger, on 8 August 1979.

Among the distinguished guests present was Dr H Olivier, the President of the South African Institute of Civil Engineers, who unveiled a presentation plaque marking the Institute's recognition of the civil engineering works associated with the scheme as the most outstanding civil engineering project completed during 1978.

Steenbras power station has the distinction of being the first hydroelectric pumped-storage installation to be built and commissioned in South Africa, and probably also the very first on the African continent.