ICMEESA news

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THE INSTITUTION OF CERTIFICATED MECHANICAL AND ELECTRICAL ENGINEERS, SOUTH AFRICA

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Member Feedback – Letter from Peter S Knopp

RE: Repeal of 2.13.1 appointment – June 2005

Dear Sirs,

My copy arrived yesterday, and I feel compelled to reply to the article.

Yes the headline of the article did grab my immediate attention. If it is successful in the Mines and Works, the next step will be the Factories. That being said, you do raise a pertinent point by asking "do we add value". The origin of the Competent Person was (an attempt) to raise standards of safety in the mines, works and factories. Has it worked? Probably not. By consequence we can expect to be asked why we are needed.

I would challenge the ICMEESA and ECSA, by asking are we are equipping the Certificated Engineer with the correct tools to add value?

Safety legislation has changed significantly in the last twenty odd years. It has moved from being directive to risk-assessment based. The European Community, like it or not, is leading safety legislation. In fact the 1985 OHS Act followed the principles of the UK's 1974 *Health and Safety at Work Act* and The EC's *Introduction of Measures to Encourage Improvements in the Health & Safety of Workers Directive (89/391EEC)*. The principle being that the employer must identify the risks and actively reduce risks using a hierarchy of control.

Modern thinking is that legal compliance is not enough. Businesses need effective management systems to reduce their business risks. Therefore it is not be enough to pass an exam on the Act and machinery regulations. The Certificated Engineer need to be qualified to develop management systems, reduce the risk of loss to people, equipment, materials and the environment, challenge the opinion that safety costs money, and present business cases as to why these systems add value.

Should the GCC be the first part of the licensing system and development toward Professional status and include the systems and management criteria? Or should it be that the management and systems knowledge be a prerequisite to award of the GCC?

If we want the Certificated Engineer to survive, we need to evolve with the changing environment, or be like the dinosaurs and become extinct.

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So what about the small 2500kw operation?

Just as we read the previous article and doubt the future of the engineer, it was encouraging to read the following communication which appears to have transpired between the DME and employers. It relates specifically to the need to appointment of an engineer on a "small" mine.

The intent of the article is undoubtedly to stimulate debate on the issue. Although the specific article is mining related, similar problems must exist in the broader factory environment. We therefore encourage members to address any comments to the President who can correlate responses and respond formally as the issue arises.

With respect to the small operation, there is a need to examine the requirement of the Minerals Act, regulations 2.13.1. This requires that at any mine or works where the designated rating of machinery used in the generation of power, together with the power supplied from outside sources, exceed the equivalent of 2500 KW all machinery must be under the general charge of an engineer. In a small mine or works with a borderline power rating of 2500KW, the need for an appointed engineer could depend on the interpretation by the local principal inspectors as to how the KW rating is derived.

In considering the designed rating of machinery used for power generation, engineers erroneously and instinctively limit the calculation to include only electrical equipment or electrical generating machinery. However, one needs to consider the following definitions from Mine Health and Safety Act 1996:

*'**machinery**' means any engine, boiler or appliance or any combination of them, which is situated at a mine and used or intended to be used-*

(a) for generating, developing, receiving, storing, converting, transforming, transmitting, or distributing any form of power or energy; or

(b) for conveying persons, material or minerals;

The same Act defines an engine as:

*'**engine**' means any appliance or combination of appliances by which power, other than human or animal power, can be applied to do mechanical work;*

The above definition means that the calculation must include diesel engines and other possible forms of power such and hydro or wind driven machinery.

Interesting is the fact that the SA OHSAct does not define an engine, while machinery is defined as:

***"Machinery**" Any article or combination of articles assembled, arranged or connected and which is used or intended to be used for converting any form of energy to performing work, or which is used or intended to be used, whether incidental thereto or not, for developing, receiving, storing, containing, confining, transforming, transmitting, transferring or controlling any form of energy.*

The reference to "any article" instead of the reference to "engine" precludes the need for a definition of machinery.

The following is a direct extract from the document and appears to be an opening proposal to be used as a chopping block for comment:

How to determine the 2 500 kW at a Mine

In order to determine the electrical and mechanical power for purposes of regulation 2.13, the totals of paragraphs 1, 2 and 3 below should be added together.

1. *Average maximum demand in kilo-Watts (kW) of the three highest demand readings from the ESKOM/power suppliers account for the immediately preceding 6 months.*
2. *The total of all self propelled mobile machines' (used for mining and mineral processing operations) designed kilowatt rating (as specified by the Original Equipment Manufacturer).*
3. *The total designed kilowatt rating (as specified by the Original Equipment Manufacturer) of all other equipment (not included in 1 and 2 above and used for mining and mineral processing operations) that is not fed from electricity or a vehicle eg. Gas boiler, petrol or diesel driven machinery in kilowatts.*

If the total power does not exceed 2 500 kW and includes any electrical power-

- *The employer must engage the part time or full time services of a person qualified as an electrical artisan and who must be aware of the dangers of electricity to be in charge of electricity.*
- *The electrical artisan may also be in charge of mechanical equipment if trained in the dangers related to mechanical equipment or the employer may, in addition to the electrical artisan, appoint a person in charge of mechanical equipment.*

If the total power does not exceed 2 500 kW and includes only Mechanical power the employer need not appoint an electrical artisan but need only engage the part time or full time services of a person to be in charge of such mechanical equipment.

Perhaps those engineers more familiar with the OHS Act would like to comment as the borderline case for appointing an engineer must be more prevalent here than in a mine.

Lockout /Tagout/Blockout

I have recently taken up employment, north of the Limpopo, with an international company which is undergoing major capital expenditure. The highly qualified professional personnel managing those projects are of varying global nationalities.

It was a surprising to find a small sulphuric acid pump with no local field lockout facility at the pump itself, only the plain stop and start push buttons, which are not lockable. When challenging this situation, I never quite expected the debate and exchange of emails that followed. The varying views were enlightening and informative, hence my desire to share some of the viewpoints that percolated the debate.

I have deliberately refrained from specific reference to local legislation as the debate considered international views, with some definitions extracted from an American OSH website.

Due to my South African pedigree and familiarity with the MHSA, my view on a lockout concurs with the following:

"This requires, in part, that a designated individual turns off and disconnects the machinery or equipment from its energy source(s) before performing service or maintenance and that the authorized employee(s) either lock or tag the energy-isolating device(s) to prevent the release of hazardous energy and take steps to verify that the energy has been isolated effectively."

In the case in question, the repairer is required to walk a fair distance to the isolator which is positioned in the substation. This fact makes it more onerous to

perform the task, which increases the possibility that the unit will be worked on without being locked out.
Although the resident international experts state that all drives will only have a lockable isolator in the substation, this creates two further practical considerations, which are:

- all operating and maintenance personnel must now have access to the substation, or;
- an electrician will be required every time a unit needs to be isolated.

The former option poses practical problems with untrained personnel having access to areas that should preferably be restricted to competent persons. The latter option, which is strongly supported by the international view, encroaches on the productivity of the electrical staff. Also, in my view, if the operator or repairer needs to perform a quick adjustment, and cannot locate an electrician easily, the probability will increase that the task will be performed without locking the unit out at all.
The international view is that the remote stop button is unacceptable as a lockout, as they consider the more elaborate definition of a "lockout" as:
"Lockout/tagout/blockout means that any energy source, be it electrical, hydraulic, mechanical or any other source that may cause unexpected movement, must be disengaged or blocked, and electrical sources must be de-energized and locked in the off position. There is a difference between turning off a machine and actually disengaging a piece of equipment. When turning off a control switch, you are opening a circuit; however, there is still electrical energy at the switch and a short in the switch or someone turning on the machine may start it running again.
The confusion stems from the way in which we consider the difference between a stop button and an isolator. A stop button, including an emergency stop button, is only a control button. It should not be used for personal protection because it does not effectively isolate power from the drive. For this reason, no lockable stop or lockable emergency stop buttons should be installed, as doing so would create a false sense of security for the person locking out at the field stop button. By comparison, an isolator is in the main electrical power circuit and effectively isolates power from the drive.
Considering past experiences, certain procedures insist that certain HT equipment is isolated by an electrician racking down the breaker prior to work commencing. While on the other hand, for normal production operations, such as during routine cleaning operations on conveyor belts, using normal remote button locking mechanisms are considered to provide effective protection and acceptable.
Does the degree of the risk change depending on voltage or the size of the machine being isolated?
As the responsible Certificated Engineer, and considering the above, how does your COP for lockouts, recently submitted to the DME, comply with the above accepted practice?

Safety Harness – how hazardous are they?

It was sad to read that a worker had died after his fall had been arrested by the safety harness in which he remained suspended for a period of time.
To place the wearing of safety devices in perspective, you just need to "Google" search the internet to realise that many more deaths occur as a result of persons not having worn a safety belt or harness, as opposed to the exception where death is caused by being suspended in the harness itself.
Every engineer should be aware that any incident where a person has fallen and is suspended in a full body harness constitutes an emergency.
I have attempted to summarise the various reports and articles on the subject and translate them into language that an engineer can understand.
When suspended vertically the victim suffers from suspension trauma. This occurs when the body is at rest in a vertical state with the lower body motionless. With the muscles in the legs not contracting on the veins and helping the blood back to the heart, unconsciousness follows. This is similar to a person feinting and is common in soldiers standing to attention for long periods of time. In these cases the person collapses and falls down, with the resulting horizontal position assisting to restore normality to the blood flow. In the harness, the vertical position is maintained which results in death. It is the individual's tolerance to this suspension trauma that makes the situation unpredictable. Reports record successful retrievals after an hour of suspension with others reporting that death occurred after only fifteen minutes. The key to survival is for the suspended person to keep moving his legs and the rescuers performing a speedy retrieval of the suspended person.
What the reports ignore is the practical problem that exists in having to retrieve the person from the suspended position. It is practically an impossible task to physically raise a suspended person back onto the platform by manually pulling him up by the lanyard from which he is suspended.
I was always convinced that engineers working in factories fabricating milk jugs never use the product they manufacture. If they did, then they would be aware that they spill on the table when pouring into a tea cup. Personally doing a practical lift in a harness using a crane I deduced that the same applies to the manufacturer of full body harnesses. Having worn a harness frequently for shaft work I appreciate that they can be adjusted to a reasonable level of comfort while working normally. However, the situation changes dramatically when suspended. All harnesses support the body weight with straps passing through the groin area. The likelihood of the family jewels being pinched is high, which may be a life saver, because you are bound to be wriggling actively for quite a while. The strap also tightens severely which must exacerbate the blood flow

problem as it pushes on the pressure points we were taught about in the first aid class. The upper body also suffers with horizontal straps catching under the arms, or the vertical straps pinching of the neck as they narrow towards the single suspension point attached to the lanyard. This practical test for a few brief moments was an eye opener and gave me a good idea of what a suspended person would be going through.

Training of persons required to work at heights should perhaps include:

- a few moment of practical suspension with trained help readily available so that they understand what will occur should a fall be arrested.
- Some course of action as how best to assist or retrieve a suspended colleague.

The Electricity Bill – where are we going?

The distribution of electricity is in the news again with the introduction to parliament of the Electricity Regulations Bill. The problem goes further than just the distribution of electricity, as we are all aware of the failure of municipal services in most municipalities. The origin of the debate starts with the Municipal Structures Act of 1998. These regulations require that the municipality provide infrastructural services like roads, water and sanitation, health services, and electricity. The division of the country into the new municipal boundaries has resulted in even remote areas now falling under the responsibility of a municipality. With the law requiring the municipality to supply the services, bulk suppliers of electricity and water will be required to supply only to the municipality who will then legally be the sole supplier to the end user.

Taking water as the example, a "water services authority" in the Water Services Act of 1997 is defined as any municipality responsible for ensuring access to “water services”. A water services authority carries responsibility "to all consumers or potential consumers in its area of jurisdiction to progressively ensure efficient, affordable, economical, and sustainable access to water services". The definition of "water services" in the Act is "water supply services and sanitation services," which indicates that one service authority is responsible for all services.

Considering electricity, few municipalities generate their own power, or maintain and manage the water purification and supply facility. The majority of them purchase power and water for resale to consumers within their boundaries.

Previously the major industrial consumers, such as the mines, had contractual supply agreements with the suppliers which excluded the municipal middle man. When considering the volumes of units consumed, the municipalities realise the opportunity of having access to a potentially lucrative revenue source. Unfortunately the recent television coverage of poor sanitary services bears testimony to the standard of municipal service delivery. The financial implications of taking over the additional supply services in question will exacerbate the existing financial constraints that are the common factor to most municipalities. This will entail the transfers of staff and assets from the existing owner.

The Electricity Regulations Bill defines some of the Powers and duties of municipalities as follows:

1. Every municipality has the executive authority over and the duty to administer the reticulation of electricity within its area of jurisdiction.
2. A municipality must exercise its executive authority and perform its duty by—
    a. progressively ensuring access to at least basic reticulation services through appropriate investments in electricity infrastructure;
    b. ensuring affordable reticulation services through the setting and structuring of tariffs within the framework of national norms and standards and, within available resources, providing basic reticulation services free of charge or at minimum cost to all consumers or certain classes of consumers;
    c. ensuring sustainable reticulation services through effective and efficient management and adherence to national norms and standards;
    d. providing reticulation services through appropriate service delivery mechanisms as provided for in the Municipal Systems Act;
    e. monitoring and regulating the provision of reticulation services within its area of jurisdiction through monitoring and information systems, internal performance management systems, business plans, by-laws and service delivery agreements, where relevant;
    f. preparing, implementing and requiring relevant plans and budgets;
    g. regularly reporting and providing information to the Regulator and customers or consumers;

Although the intent is that the systems be effectively managed, the track record of the municipalities speaks volumes as to the probability of that success. As for us engineers, the challenge will be to ensure that we do whatever needs to be done to ensure that those standards of “accepted practice” remain something that we are proud to be associated with. It may be a case of speak now or forever hold your peace. Please forward any comment you may have on the on the Electricity Regulations Bill, please forward them to ICMEESA.