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The Experience of Occupational Risk and the Handling of Incapacity Due to Ill Health and Injury

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ABSTRACT This paper is concerned with the assessment of risks in the manufacturing industry and the effects thereof on employee wellbeing, performance ability and consequently on the labour relationship between employee and employer. The centre of this paper relies on the interaction between the person and the machine and the design of the interface between the two. This can be described as the heart of Ergonomics, and it further includes the nature of the task, workload, the working environment, the design of displays and controls, and the role of procedures. Characteristics of strains on the human body, in terms of unsafe conditions and work-related stressors, are identified and discussed in order to explain human capabilities and limitations within his/her work environment. The frequency of occupational incidents and accidents, as a result from a high risk environment, is examined and discussed. Occupational hygiene surveys, medical reports, real incident statistics and annual reports, based on the empirically researched organisation, were collect and used to sustain the research objectives. The data was analysed and is summarised in this paper to support the conclusion of the effect of a high risk work environment in correlation with employee wellbeing, and subsequently on labour relations. The results indicate comparisons between unsafe conditions and employee incapacity due to injury or ill health and how it should be addressed out of a labour relations point of view.

INTRODUCTION

According to Guild et al. (2001), the interaction between human and technology always takes place in a certain workspace, which is located in a specific physical and psychological environment. The environment can be described in terms of temperature, lighting, noise and vibration, the presence and effect of chemical and biological agents, as well as in psychological terms such as teamwork, management structure, shift conditions and psychosocial factors. The working interface between human and technology is the configuration of equipment, facilities, systems, and behaviours that define the interactive *tasks* of the worker with technology (Behavioral Science Technology Inc. 2010). Strydom (2009) explains that the working interface concept is the place where behaviours and organisational conditions, systems and processes come together. He elaborates that this is also where accidents usually occur, in that loss incidents *only* occur *when an employee interacts with the condition in an unsafe way,* where unsafe conditions exist (Strydom 2009).

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The human-technology-workspace-environmental model found in, Guild et al. (2001) is useful in identifying the factors that will have an effect on comfort, task performance and safety. Strydom (2009) supports this view and explains that the interaction between workers and technology should be the focus of safety improvement efforts. Guild et al. (2001), elaborates that by identifying "ergonomic risk factors" rather than "ergonomic hazards" or "ergonomic problems" allows several techniques of proactive risk management (Strydom 2009).

Although there is little agreement over a definition of "risk", the notion of *probability* that injury or damage will occur (Guild et al. 2001) is central to all risk assessment techniques identified in literature, although the interpretation of probability depends on whether it is viewed objectively or subjectively (Aven and Reniers 2012; White 1995). Risk probability is known as the possibility that something unpleasant or unwelcome will happen, or a possibility of *harm or damage* against which something is insured (Oxford University Press 2013).

Within the context of occupational safety and health, *"harm"* generally describes the direct or indirect degradation, temporary or permanent, of the physical, mental, or social well-being of workers (Michaelson 2014). Therefore, factors that cause injuries, such as back and neck strains, shoulder injuries and strains, knee sprains and strains, elbow injuries and strains, carpal and tunnel syndrome and musculoskeletal disorders have become crucial for management to *identify and control real risks* (Scheel and Zimmermann 2009).

Therefore, in relation with the above, it can be sustained that the goal is to decrease the *risk* of injury and illnesses, to improve worker performance, to decrease worker discomfort, and to improve the quality of work life (Guild, et al. 2001; Mangone and Van Der Linden 2014). Human-system interactions have frequently been identified as major contributors to poor operator performance (Anon 2012; HSE 2012; Naderpour et al. 2014), while an ergonomically correct workplace provides many advantages that will improve productivity and product quality. *This statement will form the focus point of this paper as it suggests consequently an effect on the labour relationship between employee and employer.*

Individuals have a wide range of abilities and limitations within a working environment. Human factors (or Ergonomics) focus on how to make the best use of human capabilities by designing jobs and equipment that are fit for people (HSE 2012).

Finally, the problem derived from the above summary is that *the working interface between human and technology, existing in a demanding work environment, will have an adverse effect on the wellbeing of the employee, influencing the individual's ability to perform, subsequently affecting the labour relationship between employer and employee.*

Factors and exposures in the workplace, relating to accidents and injuries, are explored and summarised below. Real incident statistics gathered from the empirical researched organisation are analysed and discussed below (*statistical analyses*). Methods in terms of handling poor work performance and/or incapacity due to ill health or injury – as a result of human interaction with a high risk work environment – are stipulated below (*results and discussion*). The paper builds up to explore the effect of a high risk work environment on the labour relationship (*conclusion*).

Factors and Exposures Relating to Accidents and Injuries

Most common workplace accidents include *manual handling*, such as lifting, lowering, pulling, pushing, carrying, moving, or any other form of strenuous duties; *motorised vehicles* coming in and going out or even moving things from one side of the building to another; *electric shock*; and causes related to *hazardous chemicals, fire and water, slips and falls, and machinery* (Baker 2013; Smith 2010).

Cumulative Trauma Disorders (CTD) were identified as one of the fastest growing occupational injuries in the last decade in South Africa (Grobler et al. 2002), and are now considered to be the largest work-related health problem (Bacchi 2010). Cumulative Trauma Disorders are injuries of the musculoskeletal system – including the joints, muscles, tendons, ligaments, nerves, and blood vessels that are often grouped together as CTDs, Repetitive Stress Injury (RSI), overuse syndrome, and repetitive motion disorders (Melhorn et al. 2014).

Furthermore, Walder et al. (2007) explain that when ergonomic principles and guidelines are not being followed in the workplace, operator fatigue and stress, leading to potential work-related musculoskeletal and neurovascular disorders (MSDs), will be the end result. The risk factors of these disorders are *multifactorial* and present aspects that have not been clarified and explored fully (Alazab 2007).

The three major risk factors for the potential development of work-related MSDs are high-force, awkward posture and excessive repetition (Konz and Johnston 2004; Wilander et al. 2014). These health risks develop from muscular work, nervous control movements, and contact stressors (Granjean 1988; Phelan and O'Sullivan 2014). Muscular disorder injuries experienced by employees relating to overexertion or repetitive motion will subsequently lead to Repetitive Muscular Disorders (RMDs) (Kreitner and Kinicki 2008; Mithun Pai et al. 2014).

Work-related RMDs/MSDs are not specific to any type of job and affect workers in a wide variety of occupations (Alazab 2007). These usually take months or even years to develop and they are a major cause of lost time at work, worker disability and health care costs (Alazab 2007). Relating to the above, MSDs play a significant socioeconomic role as they represent one of the major causes of disability and consequent absence from work.

Many employers do not pay enough attention to the measurement and the effects of absenteeism and its control (Curwin et al. 2013;

Johnson 2007). Almost all employers understand that high absenteeism rates have a negative effect on their businesses, but the monetary effect of abnormally high absenteeism is very rarely quantified. Direct costs of absence are estimated by considering the employee's annual salary (assuming absences are paid) and output to pay ratio, multiplied by the amount of time missed within the year (Corporate Research Association 2011). Indirect costs, on the other hand, are 'hidden' costs, which include (among others) the cost of replacing the absent employee in critical positions, possible overtime payments to replacement workers, as well as the effects that absenteeism has on workforce levels, medical aid costs, group life and disability premiums (Curwin et al. 2013; Johnson 2007). Adding to the cost of absenteeism, the cost of musculoskeletal disorder is estimated based on medical costs, wage losses, and associated costs (Alazab 2007).

Subsequent to the above, the importance and necessity of job design and designing the work environment is increasing in light of the costs involved related to the number of employees who are suffering from injuries associated with RMDs/MSDs/CTDs. Furthermore, the quality of the workplace environment may determine the level of employee motivation, and subsequently performance and productivity (Leblebici 2012). Comfort issues such as improper lighting (artificial illumination), poor ventilation, excessive occupational noise, thermal (heat) conditions and emergency excess (Chandrasekar 2011; Leblebici 2012), which can be very stressful for a human being, will be discussed in more detail below.

Occupational Noise

Noise is conveniently and frequently defined as 'unwanted sound', a definition which in its looseness enables a sound source to be considered as 'noise' or 'not noise' solely on the basis of the listener's reaction to it (Oborne 1985; Paunoviæ et al. 2014).

Noise is one of the most common of all occupational hazards (Workplace Health and Safety Bulletin). According to the Occupational Health and Safety Act (85 of 1993), the South African noise exposure limit is no more than 85 dB(A). It also mandates that after December 2008, the hearing conservation programme implemented by industries must ensure that there is no deterioration in hearing greater than 10% among occupationally exposed individuals (Van Deventer 2011). In addition, by December 2013, the total noise emitted by all equipment installed in any workplace must not exceed a sound pressure level of 110 dB(A).

Loss of hearing is certainly the most well-known adverse effect of noise, and probably the most serious, while other detrimental effects include tinnitus (ringing in the ears), interference with speech, communication and with the perception of warning signals, disruption of job performance, annoyance and extra-auditory effects (Van der Heever 2012). Exposure to noise causes stress, anxiety and sleeping disorders and compromises the quality of all daily activities (performance), also resulting in use of sleep drugs and sedatives (Kim et al. 2014).

Thermal (Heat) Stress

The thermal environment has a special effect on the comfort of an individual. Serious deviations from the comfort experienced by an individual can have a detrimental effect on productivity, increase the possibility of making errors (and therefore the accident rate), and can also have a negative effect on the health of the individual (Van den Heever 2012).

Heat stress occurs when the body's means of controlling its internal temperature starts to fail and the body generates more heat than it can lose which highlights the vital role of an efficient sweating mechanism through thermoregulation (Alzeer and Otair 2014; Crockford 1999; HSE 2002). There are various types of heat-related illnesses, including heat cramps, heat exhaustion, heat rash, or heat stroke, each with its own symptoms and treatments (Iowa State University of Science and Technology 2013). These symptoms vary from an inability to concentrate, severe thirst, fainting, fatigue (*heat exhaustion*), giddiness, nausea, headaches, moist skin, or hot dry skin, confusion, convulsions and eventual loss of consciousness, commonly known as *heat stroke* (HSE 2002; Iowa State University of Science and Technology 2013).

Apart from heat illness, high temperatures in the workplace reduce worker morale and productivity, and increase absenteeism and mistakes (Tombling Ltd. 2006), which will be explained below.

In a study performed by ASHVE, it was proven that a typical manufacturing plant loses 1% efficiency per man hour for every degree the temperature rises above 27ÚC (ASHRAE, as cited by Tombling Ltd. 2006). In terms of the duration of exposure to heat, the graph below shows the temperature levels able to be tolerated before cognitive performance decrements become apparent (As cited by Oborne 1985: 222).

Figure 1 indicates the decreasing effects on performance in relation to higher temperatures over longer exposure times. Performance is further affected in terms of the relationship between the ability to carry out work at different intensities: Performance will decrease more rapidly, depending on the work rate level in correlation with an increase of temperatures (Kjellstrom and Dirks 2001; Kjellstrom et al. 2009).

Artificial Illumination

In any inhabited environment, safe conditions, including the measurement of light, are essential in the design and evaluation of workplaces. Because the eye adapts to light levels, automatically compensating for any changes in illumination, subjective estimates of the amount of light in a work area are likely to be misleading (Bridger 2003). It is therefore important to design lighting installations to compensate for human limitations, and to increase the probability that a person will detect a potential hazard and act to avoid it (Van den Heever 2012). *In many cases where illumination has been associated with accidents, factors such as glare, both direct and reflected, visual fatigue and harsh shadows were identified* (Van den Heever 2012).

The light levels listed in the OHS Act, 1993, are the absolute minimum statutory average light levels that may exist in a workplace at any time in the life of that workplace. Failure to comply with the OHS Act requirements is an offence committed by the employer. The employer is always responsible for providing and maintaining a safe, healthy and workable workplace (OHS Act, 85 of 1993, section 16).

The advantages available to industry by virtue of good lighting can be listed as follows (Anon 2013: 1):

"The quality of lighting in a workplace can have a significant effect on productivity. With adequate lighting workers can produce more products with fewer mistakes, which can lead to a 10 to 50% increase in productivity. Good lighting can decrease errors by 30 to 60 % as well as decrease eye-strain and the headaches, nausea, and neck pain which often accompany eyestrain."

Ergonomics and Safety

As emphasised above, the human body is part of the physical world and obeys the same physical laws as other living and non-living objects (Bridger 2003). Therefore, the goal of ergonomics is to optimise the interaction between the body and its physical surroundings. Bridger (2003) elaborates that "ergonomic problems often arise because, although the operator is able to carry out the task, the effort required overloads the sustaining and supportive process of the body and causes fatigue, injury or errors" (p. 6). Humans have limited capability for processing information (such as from displays, alarms, documentation and communications),

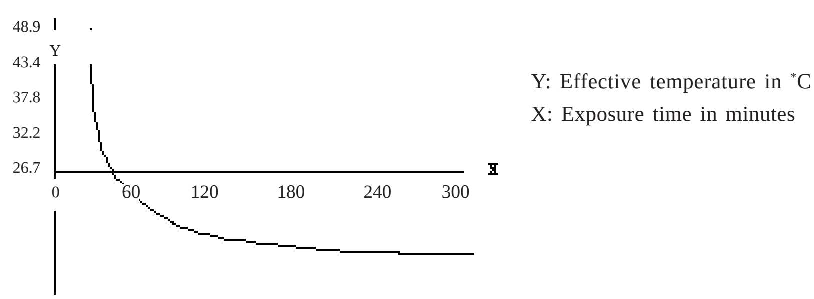

Fig. 1. Upper tolerance limit for impaired mental performance

holding items in memory, making decisions and performing tasks (HSE 2010). Experience of being driven to the margin of physical and psychological capability by strenuous exertion, hot climate, schedule pressure, unreasonable behaviour of superiors or colleagues, oncoming illness, or the feeling of useless efforts can cause "stress on the job" (Kroemer et al. 1994). Some of these stressors are physical, others are psychological; self-imposed or external; short-term or continual (Cox 1990; Chim 2006; Punnett 2014).

Workload is defined as the total amount of work that a person is expected to do in a specified time (Choi et al. 2014; Chim 2006). Job demands depend on type, quantity, and schedule of tasks; the task *environment* (in physical and technical terms); and the task conditions – referring to the psycho-social relations existing on the job (Kroemer et al. 1994; HSE 2010). Mental workload is defined primarily as the relationship between the worker's perceptions of the demands of the task and their *perceived coping capacity* (MacDonald 2004: 40). When the job demands exceed the person's capability, he/she is overloaded and would seek either to reduce the workload, or to increase capability (Kroemer et al. 1994). A high (or perceived high) workload not only adversely affects safety, but also negatively affects job satisfaction and, as a result, contributes to high turnover and staff shortages (HSE 2010). Furthermore, an *environment* demanding more of the operator than he is able to give can result in human performance issues such as slower task performance and errors such as slips, lapses or mistakes, and subsequently serious accidents (Oborne 1985; HSE 2010).

It should also be noted that '*underload'* can also lead to human performance issues, such as boredom, loss of situation awareness and reduced alertness (HSE 2010), as can be expected from repetitive work, or working in the same area, position, or posture with little human interaction. Accidents are unfortunate, unpredictable, unavoidable, and unintentional interactions with the environment. However, it is believed to be preventable, with reference to the old paradigm of HW Heinrich who first described the relationship between injury types (Boyd 2010):

- Lost time accident; non-lost time accident; damage accident

The safety triangle holds that an inverse relationship exists between frequency and severity: the more sever the injury, the less frequent it is (Boyd 2010). It is furthermore suggested that these three types occur in the ratio of approximately 1:60:400 (*lost time: non-lost time: damage accident*), so that for every lost time accident occurring in the industry, there will be approximately 400 damages to property/no-injury accidents (Oborne 1985). Boyd (2010) *explains that an environment that frequently generates low-severity events harbours systems, cultural and leadership issues that will generate high-severity events as well.*

METHODOLOGY

Sample

The data gathered at the manufacturing/production plant were obtained through real incident and accident records, documented over a period of 10 years. The data analysed reflects the frequency and severity ratios of types of accidents experienced within the researched manufacturing plant, where an average of *830 employees* are employed (participants), including machine operators, machine maintenance servicemen, line to top management, and office staff – all of whom are exposed to some sort of occupational hazards and risks through each normal day of work.

The occupational hygiene data gathered were conducted by an approved inspection authority in terms of the Occupational Health and Safety Act 85 of 1993 (as amended), on request from management and as part of legal compliance. *A random selection* of the most recent reports at certain departments was analysed and included in the study to sustain the research objectives. The occupational hygiene data includes occupational noise, thermal conditions, and artificial illumination.

Measuring Instrument

Dr DJ Van den Heever, a registered occupational hygienist, conducted all measurements at the premises of the manufacturing/production plant. Special permission was received to use the reports and results in this paper:

Assessment of noise in all areas was carried out with three Quest 1200 type 1 integrating sound-level meters. Measurement was conducted on site according to South African National Standard 10083 (2004) (The measurement and assessment of occupational noise for hearing conservation purposes). The measurements were taken at an average temperature of 22ÚC and the wind speed at the sound level meter never exceeded 0.02 m.s-1.

Measurements of artificial illumination were carried out during the day according to Appendix H of SANS 10114-1:2005. The standard method was used for the measurement of artificial illumination. The survey was performed under actual working conditions and from a specific work point location. Measurements were carried out with a calibrated cosine and colour corrected light meter (Extech S/N Q023267).

The monitoring of the thermal conditions was performed using a calibrated electronic direct reading heat stress monitor. The instrument was set up and used according to ISO method 7243 in combination with the method of the American Conference of Industrial Hygienists (ACGIH 2001; Schröder and Schoeman 1989; South Africa 1987). Measurements were made in the areas where workers were executing their normal duties.

The time-weighted average WBGT was calculated as follows:

WBGT1t1 + WBGT2t2 + WBGT3t3 +...+ WBGTntn

t1 + t2 + t3 + ... + tn

where, WBGT1, WBGT2, WBGT3, ... WBGTn = the calculated wet-bulb globe temperature index for the different work environments, and; t1, t2, t3, ... tn = the respective time periods in minutes over which the measurements were taken.

Statistical Analysis

Lost time accidents are divided into 'disabling' and 'non-disabling' accidents. Within this context, the disabling accidents refer to any accident that resulted in more than 14 days lost (*absenteeism*) due to the injury. Non-disabling accidents represent fewer than 14 days lost to the company due to injury. Non-lost days accidents are identified as 'first aid' cases, and represent minor injuries (Table 1).

It was found that a total of 127 non-lost day accidents (first aid cases) occurred during 2012, in relation with nine lost-day accidents (disabling and non-disabling). This indicates a ratio of 14:1 (non-lost day: lost day accidents). A total of 53 days were lost to the company, only for injuries on duty (IOD), during 2012.

The average frequency rate for first aid cases, calculated against man hours worked over 2012, is 17.51, while the severity of accidents, calculated in terms of lost days against man hours worked, is rated at 0.70, for 2012. Figure 2 shows the relationship between the types of injuries suffered in the manufacturing plant (study population).

During June 2012, the researched manufacturing plant experienced the highest level of first aid cases, as well as one serious disabling inci-

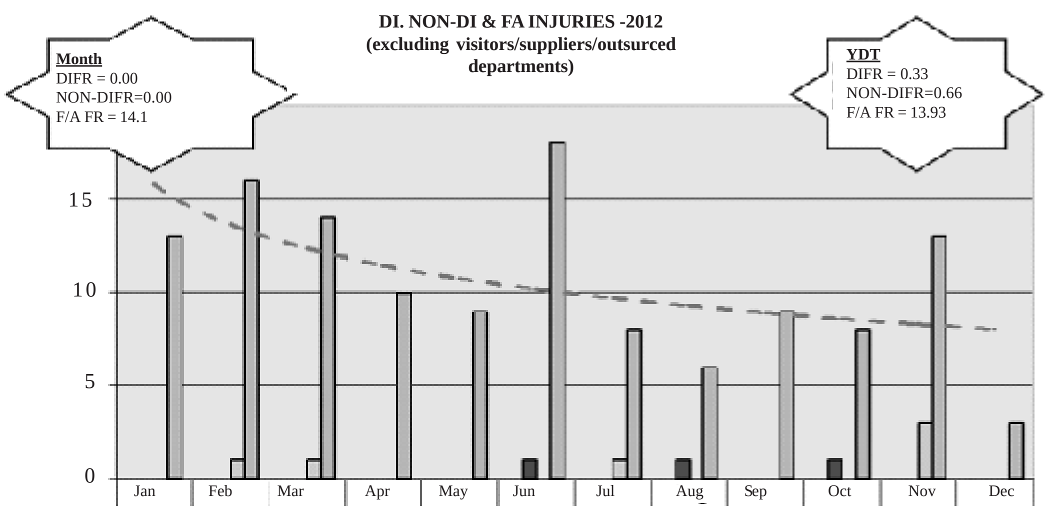

Fig. 2. Disabling, non-disabling and first aid injuries for 2012

Table 1: Accumulative statistics 2012

	QTR 1/4 473994.68			*QTR 2/4 465658.48*			*QTR 3/4 497270.48*			*QTR 4/4 386124.07*			
	JAN-12	FEB-12	MAR-12	APR-12	MAY-12	JUN-12	JUL-12	AUG-12	SEP-12	OCT-12	NOV-12	DEC-12	TOTALS
Employees	817	819	816	818	815	812	827	827	827	837	824	825	9864
Manhours	152480.58	163380.44	158133.66	127580.50	171130.26	166947.72	171966.03	167726.61	157577.84	175059.46	168530.25	42534.36	1823047.71
Fatal inj/illness	0	0	0	0	0	0	0	0	0	0	0	0	0
Disabling injuries	0	0	0	0	0	1	0	1	0	1	0	0	3
Non-disabling injuries	0	1	1	0	0	0	1	0	0	0	3	0	6
Disabling illness	0	0	0	0	0	0	0	0	0	0	3	0	0
Di frequency rate	0.00	0.00	0.00	0.00	0.00	1.20	0.00	1.19	0.00	1.14	0.00	0.00	0.00
Non-di frequency rate	0.00	1.22	1.26	0.00	0.00	0.00	1.16	0.00	0.00	0.00	3.56	0.00	0.62
Lost workdays	0	1	1	0	0	1	23	0.00	1.0	21	5	0	53
Severity rate	0.00	1.22	1.57	0.00	0.00	0.60	26.75	0.00	1.27	23.99	5.93	0.00	0.70
First aid cases	13	16	14	10	9	18	8	6	9	8	13	3	127
FA frequency rate	17.05	19.59	17.71	15.68	10.52	21.56	9.30	7.15	11.42	9.14	15.43	14.11	17.51
DI freq Percentage	0.00%	0.00%	0.00	0.00%	0.00%	1.20%	0.00%	1.19%	0.00%	1.14%	0.00%	0.00%	0.00
Accum M/H since last disabling	290821.00	178729.66	110856.31	238436.81	409567.07	17270.45	121896.40	5588.94	163011.56	163323.83	5617.68	219760.86	160406.71
Injury/Illness	290821.00	178729.66	110856.31	238436.81	409567.07	17270.45	121896.40	5588.94	163011.56	163323.83	5617.68	219760.86	160406.71

(Month-end Report, December 2012, R01)

Table 2: Accumulative statistics for the period 2004 to 2012

	2012 Total S	*2011 Total S*	*2010 Total S*	*1009 Total S*	*2008 Total S*	*2007 Total S*	*2006 Total S*	*2005 Total S*	*2004 Total S*
Employees	9864	9785	9054	9025	9930	10646	10877	11190	11274
Manhours	1823047.71	1736702	1647956.7	1602466.1	1791901.5	1998441.1	2025434.8	1981399.9	1996202.47
Fatal inj/illness	0	0	0	0	0	0	0	0	0
Disabling injuries	3	2	0	4	2	0	0	3	6
Non-disabling injuries	6	3	3	6	3	6	6	6	15
Disabling illness	0	0	0	0	0	0	0	0	0
Di frequency rate	0.00	0.75	0.00	0.34	0.00	0.00	0.00	0.00	0.70
Non-Di frequency rate	0.62	0.00	0.36	1.13	0.00	1.28	0.61	0.92	1.52
Lost workdays	53	39	19	60	71	28	43	84	304
Severity rate	0.70	2.15	3.38	16.22	0.00	3.91	10.24	15.66	35.98
First aid cases	127	120	125	149	145	91	91	128	188
FA frequency rate	17.51	15.02	15.81	22.01	14.80	10.13	8.81	14.17	19.13
Di freq percentage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Accum M/H since last disabling injury/illness	160406.71	357663.81	718854.55	265080.67	760126.30	503658.36	364931.51	195004.62	93470.58

(Month-end report, December 2012, R01)

dent. The disabling incident suffered in June 2012 (Table 2) is known as the worst incident experienced by the manufacturing company during the last 10 years. This incident will be discussed in more detail below.

Over a period of nine in years, the researched organisation had a total of 1 164 non-lost day accidents (first aid cases), and a total of 74 lost day accidents (disabling and non-disabling cases). This indicates a ratio at 15:1 (non-lost day: lost day accidents), which correlates with the ratio experienced in 2012 (as explained in Table 2). A total of 701 days were lost to the company due to injuries on duty (IOD) from 2004 to 2012. It was found that the most common injuries sustained per department were finger and hand injuries: 55 minor hand injuries and 23 minor finger injuries were recorded in 2012 alone.

Occupation Hygiene

Noise: An assessment of the noise exposure of the workers was conducted on request from management at the researched manufacturing plant, for the following purposes:

- To determine the individual noise exposure for personnel with or without fixed work locations.
- Verification of the noise levels according to SANS 10083 (2004) and to demarcate noise zones where necessary.
- Compliance with the requirements of the Noise-Induced Hearing Loss Regulations, 2003.

Results indicated that the maximum continuous exposure time at one department was 1.9 hours per day, with a maximum dBA noise level at 106.3. Furthermore, it was found that the majority of areas or departments of the researched manufacturing plant (factory) were classified as noise zone areas with eight-hour rating levels (*L*Ar, 8h) of more than 85dBA (Occupational Hygiene Survey CI 030 OH VDHIH 114/12, 2012).

Thermal Conditions*:* Heat monitoring was conducted on request from management at the researched manufacturing plant, for the following purposes:

- Assessment of the heat exposure of the workers in various working areas;
- Compliance with the requirements of the Environmental Regulations for Workplaces, 1987 (as amended); and
- Determination of the exposure of the workers to excessive heat in their workplaces.

Heat stress measurement results at selected workplaces of the researched manufacturing plant indicated the following:

The outdoor ambient temperature was 28ÚC and the relative humidity inside the factory ranged from 29 to 38%.

The outdoor ambient temperature was 32ÚC and the relative humidity inside the plant ranged from 28 to 32%.

As stipulated above, the WBGT-index was not exceeded during the measurement periods mentioned (Table 3, 4).

Artificial Illumination*:* Artificial illumination was measured at selected workplaces of the re-

Table 3: Occupational hygiene survey CI 030

Area / Dept	*Wet bulb temp. (CÚ)*	*Dry bulb temp. (CÚ)*	*Globe temp.*	*(CÚ) WBGT index*
"A"	21.6	**31.2**	33.1	25
"B"	22.6	**33.2**	35.3	26.4
"C"	20.7	28.6	30.4	23.6

(Occupational Hygiene Survey CI 030 OH VDHIH 446/12)

Table 4: Occupational hygiene survey CI 030

Area / Dept	*Wet bulb temp. (CÚ)*	*Dry bulb temp. (CÚ)*	*Globe temp.*	*(CÚ) WBGT index*
"D"	20.8	**33.1**	35.7	26
"E"	21.7	**34.0**	35.7	26.0
"F"	22.7	**37.7**	38.2	27.4
"G"	22.4	**35.2**	37.1	26.8

(Occupational Hygiene Survey CI 030 OH VDHIH 050/12) searched manufacturing plant on request from management for the following purposes:

- Assessment of artificial lighting levels in order to promote productivity, safety, health, welfare and congenial working conditions at an economic cost and to provide data to management for the implementation of the Occupational Health and Safety Act, Act 85 of 1993 (as amended) standards.
- Verification of artificial illumination levels according to the requirements of the Environmental Regulations for Workplaces, 1987 (as amended).
- Compliance with the requirements of the Environmental Regulations for Workplaces, 1987 (as amended).

Results indicated that in some cases the average luminance of the building and premises do not comply with the minimum requirements as prescribed by the Environmental Regulations for Workplaces, 1987 (as amended).

The results at one specific high accident area at the researched manufacturing plant were found to be as given in Table 5.

Occupational Diseases

The highest number of visits made to the medical station on the premises of the researched manufacturing plant by employees during 2012 was a daunting total of *1 292 visits* for *ear, nose and throat infections* only. The highest *occupational disease* for 2012 was related to the musco-skeletal system. A total of *703 visits* were made to the medical station relating to *musco-skeletal disorders* (MSD's).

As a result of the above, absenteeism becomes a concern in relation with poor health and/or injuries (work days lost to the company). The absenteeism rate was found to be high above the objective target for the period 2011/2012, meaning that the employer suffered a financial burden. The ability to prevent accidents has become more important in terms of cost effectiveness, considering direct (known) and indirect costs. Furthermore, managing cases of absenteeism, where a high rate or pattern of absenteeism is evident, may result in disciplinary actions against the employee involved, leading to dismissals.

RESULTS AND DISCUSSION

With reference to the above, the researched manufacturing plant experienced the risk of hidden and unknown costs with a real accident that occurred during late June 2012:

The injured worker was working night shift on the day of the incident, performing his normal duties at his area of work. The injured worker came in undesirable contact with the machine, which resulted in the amputation of fingers 2,3,4,5 at level of MP joint (knuckles) of both hands, as well as de-gloving of skin from level of wrists of both hands (as stated in the final medical report, received from the hospital). The suspected cause of injury was found and stated in the investigation report as "Human Error – Unsafe Act/Practice". The evidence indicated that the injured worker wore the incorrect gloves (artisan hand protection), and furthermore ignored the safety rule to stay behind the safety bars of the ma-

Table 5: Area/machine: "X"

Workplace	*Illumination (Lux)*	*OHS Act*	*Compliance*
Let-off	105	200	No
Let-off control panel (v)	93	200	No
Water pumps	85	100	No
Staircase to platform (f)	97	100	No
Platform	123	75	Yes
EMG No. 2 control panel (v)	40	200	No
X350 control panel (v)	32	200	No
Mill	143	200	No
Gum gauge control panel (v)	72	200	No
Winding	135	200	No
Winding control panel (v)	109	200	No
Machine	77	200	No
Control panel (v)	106	200	No

(Occupational Hygiene Survey CI 030 OH VDHIH 151/12) chine. Consequently, the injured worker came in contact with moving machinery, which resulted in the accident. The injured worker was placed on 'long-term illness', and has been absent from work since the date of the injury in June 2012. The injured worker has remained in the employment of the company.

According to the Basic Conditions of Employment Act (75 of 1997, as amended), an employee is entitled to an amount of paid sick leave during every sick leave cycle (*ss 22 (2)*). A sick leave cycle means a period of 36 months' employment (three-year cycle) with the same employer, immediately following an employee's commencement of employment or the completion of that employee's prior sick leave cycle. However, during the employees first six (6) months of employment, an employee is entitled to one day's paid sick leave for every 26 days worked *(ss 22(3))*.

It should be noted that the injured worker in this case was only employed for three months prior to the incident, subsequently only had approximately three (3) days paid sick leave available. However, the employer accepted the responsibility to compensate the employee to the amount of 75% of his normal salary per month since the injury occurred, which the company may claim back in terms of the Compensation for Occupational Injuries and Diseases Act (130 of 1993). The risk that the employer may never be refunded is a reality that the company has to face.

Furthermore, as the employee has been classified as permanently disabled the employer is obligated to investigate alternatives to accommodate the employee in his employment. Ultimately, one cannot ignore the significant effect on human resource management and the battle it will bring forth in terms of maintaining and controlling labour relations, relating to pre-dismissal procedures when dealing with incapacity and poor work performance, disability, and dismissal arising from ill health or injuries and high absenteeism rates.

Handling Incapacity Due to Ill Health or Injury as a Result of Human Interaction with a High Risk Work Environment

In this section, 'unfit', 'incapacity' and 'disabled' will be regarded as synonymous (Guild et al. 2001):

Unfit for Work: Failure to meet the specific requirements of an occupation. A person can be declared unfit because of a medical condition that excludes him/her from the relevant occupation, or because of demonstrable lack of capacity to perform the work.

Impairment: Deviation from the functional capabilities expected of a healthy individual. Loss of hearing, visual acuity, lung function or joint motion is impairments.

Disability: An impairment that prevents a person from performing a task or occupation or limits the performance of the occupation or task

A common mistake made by employers when handling a case of incapacity is that most employers follow the same disciplinary procedure as would have been appropriate in a matter of misconduct. However, poor performance or an inability to perform due to incapacity is not a form of misconduct and may never be treated as such. The procedure for poor work performance or incapacity due to ill health or injury is very specific in that it is the employer's responsibility to investigate and consider all alternatives to accommodate the injured, as far as reasonably practicable. The Code of Good Practice, schedule 8 of the Labour Relations Act (85 of 1995), provides a basic guide in terms of dealing with a case of incapacity due to ill health or injury. An employer that ignores the basic guide or refuses or fails to follow the correct procedure will be found guilty on procedural unfairness in a dispute resolution council (CCMA or appropriate bargaining council). The second most common mistake made by employers is the assumption that a matter of incapacity is a quick and easy way out to terminate an employee's contract of employment. There are no shortcuts when dealing with incapacity, and employers should accept the responsibility to do everything in their power to support the employee involved. The procedure requires full commitment from the beginning to the end.

When investigating the extent of the incapacity or the injury the following factors should be considered, as summarised by SA Labour Guide (2011):

- If the employee is likely to be absent for a time that is unreasonably long in the circumstances, the employer should investigate all the possible alternatives short of dismissal.
- When alternatives are considered, relevant factors might include the nature of the job,

the period of absence, the seriousness of the illness or injury and the possibility of securing a temporary replacement for the ill or injured employee.

- In cases of permanent incapacity, the employer should ascertain the possibility of securing alternative employment, or adapting the duties or work circumstances of the employee to accommodate the employee's disability.
- In the process of the investigation, the employee should be allowed the opportunity to state a case in response and to be assisted by a trade union representative or fellow employee.
- The degree and the cause of incapacity are relevant to the fairness of any dismissal.

True impossibility of performance can constitute grounds for terminating the employment relationship, when all alternatives had been considered and reasonable accommodations to assist the employee had failed. Venter (2007) explains the reason being that, under certain conditions, a company can neither be reasonably expected to keep an employee's job open for an indefinite period, nor be expected to accept losses as a result of such accommodation.

As an alternative measure to the above, the employer may implement a poor work performance management programme, to counsel, evaluate and measure performance with the intent to improve performance up to desired standards.

The performance management programme: poor work performance or ill health/injury consists of:

- Minimum of three (3) consecutive poor work performance counselling interviews;
- Identification of desired standards versus actual performance;
- New goal setting of minimum requirements and measuring batteries;
- Follow-up and continuous evaluation of performance.

The performance assessment and evaluation consist of four stages: The aim of the first stage is to determine the reason for poor performance, whether the non-conformance is as a result of incapacity to perform or is it related to misconduct such as attitude to work, management shortcomings or insubordination.

The second stage of the evaluation will be more formal and constructive in order to examine all direct and indirect factors that influence performance. The employee must carry full knowledge of the inherent requirements of his/her job, and must be fully aware of the minimum standards that must be reached. The employee must furthermore carry knowledge of consequences that may follow if performance is not enhanced and must be aware of the seriousness of the matter. During stage three, the employer may seriously start considering alternative measures in order to address poor work performance, including (but not limited to) further training and/or counselling, demotion or transfer alternatives short of dismissal. The fourth stage is the final stage. The employer may consider dismissals if the employee failed to improve performance after all reasonable steps were taken, and other alternative measures were considered.

CONCLUSION

The employer has the responsibility to provide a safe and healthy working environment, which includes the duty to identify and assess all possible hazards and risks involved Furthermore, *appropriate precautionary measures* should be considered and implemented to minimise, reduce or eliminate potential risks in the workplace. Risks take various forms, namely *strategic, operational, financial, non-financial* and *compliance* (complying with laws and regulations). The necessity of planning, job design and designing the work environment, when managing health and safety in the workplace, has increased in light of the costs involved in workplace accidents and incidents Ergonomics seeks to maximise safety, efficiency and comfort by matching the requirements of the operator's work environment to his capabilities – to design the workplace to fit the worker; or fitting the task to the man. Discomfort in the workplace, including improper lighting, poor ventilation, excessive noise, extreme thermal conditions and emergency excess places a great deal of strain on the individuals working under such conditions, adding stress and anxiety to their jobs. Operator fatigue and stress lead to potential work-related disorders (MSDs) and increase the risk of workplace incidents and accidents. As fragile as the human body is, the thought process is just as complex. Humans have limited capability for processing information, and the experience of being driven to the margin of physical and psychological capability can add stress to the job.

When becoming incapable or unfit to perform the desired standard and specifications of the job, the employee faces the possibility of termination of services, which places a great deal of strain on the employment relationship between employer and employee. A person can be declared unfit because of a medical condition that excludes him/her from the relevant occupation, or because of demonstrable lack of capacity to perform the work. Disability due to ill health or injury is defined as an impairment that prevents a person from performing a task or occupation or limits the performance of the occupation or task. When the employer is faced with a situation where the employee is incapable of performing a work task, it is necessary to follow the reasonable steps before considering dismissal. The employer is expected to consider as far as reasonably practicable all other alternatives to accommodate the disability of the employee. When accommodations should be made for an injured employee, it would be useful to follow ergonomic procedures to make the workplace more workable. When taking an employer's point of view, the evaluation procedure may appear superfluous and the easiest way out would be to simply terminate the employment relationship. Fortunately for the employee, the Labour Relations Act (66 of 1995) and other legislations protect the rights of the employee, and require that fair procedures should take place before any dismissal can occur. It is necessary that employers have health and safety policies in place, procedures to follow with occupational injuries and diseases, and more importantly, ergonomic principles to create a healthy, safe and favourable workplace. An ergonomically correct workplace provides many advantages that will improve productivity and product quality and reduces the risk of workplace discomfort, leading to unwanted incidents. Therefore, it is sustained that *the working interface between human and technology, existing in a demanding work environment, will have an adverse effect on the wellbeing of the employee, influencing the individual's ability to perform, subsequently affecting the labour relationship between employer and employee.*

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