A CASE STUDY ON OHS PRACTICES IN STEEL RE-ROLLING MILL, ISLAMABAD

Hira Amjad
PhD Scholar
Environmental Engineering

Zahiruddin Khan
PhD Scholar
Environmental Engineering

Institute of Environmental Science and Engineering (IESE)
School of Civil and Environmental Engineering (SCEE)
National University of Sciences and Technology ,Islamabad

1. INTRODUCTION

The large number of occupational accidents in developing countries has significant human cost and severely affects the economic potential and productivity of the country. Genuine safety culture requires a change of mentality and a reliable commitment from the top management, where every one participates and commits to occupational health and safety along with the stronger institutional pressure (Fernández-Muñiz *et al.,* 2009). Safe working conditions provide a plenty of benefits both to direct and indirect beneficiaries. Among the direct beneficiaries are the workers themselves and also the firm. Firms can cut down their losses and ultimately enhance their productivity. Generally consumers, contractor, insurers, families and society are the indirect beneficiaries of occupational safety (Mossink, 2002).

Managers of the firms are the key actors in the safety management systems of the firms as they can make the decisions to invest in the prevention or not. The workplace accident have not only financial costs (Bestratén et al., 2003) but also reduce both the quality and quantity of production and leads the firm with productivity loss (Hunter, 1999).

Employees' morale is severely damaged due to unsatisfactory industrial climate. Such conditions force them to leave the firm and consequently firm has to face the loss of their skilled and technical persons. Sometimes it is very difficult for the firm to replace such technical and experienced persons on very short notice of time. In addition to that firms can lose their image and reputation very adversely due to workplace accidents (Smallman and John, 2001), leading to poor public relationships. However, firms have to delay their delivery dates due to occupational accidents, consequently on one hand they have to face the financial lose due to delay in delivery and on the other they are creating a negative impact on the customers. These factors create the negative impact on firms' competitiveness and image in the market. So along with key business strategies occupational health and safety is very important for firms to survive in the market (Narocki, 1999; Rikhardsson and Impgaard, 2004).

1.1. OHS IN PAKISTAN

Due to the globalization of trade, several organizations are now involved in monitoring unfair labor practices and environmental health and safety conditions in developing countries. However, very few are concerned about training local personnel who could help to implement various codes of practices and international standards to improve working conditions and environment in these countries.

Pakistan is part of the World Trade Organization (WTO). According to the WTO requirements, foreign investors and importers would require agreement of the local industry with international standards, such as International Organization for Standardization (ISO). But in Pakistan the current government is still fail to establish a complete environmental health and safety law. An effort was initiated in 2001 and government announced a Labor Policy Initiative and proposed to develop a National Occupational Safety and Health Council (NOSHC) to review and update the existing laws. However, nothing has been come true. The country is losing billions in international trade due to the negligence of government and lack of realization by the local industry (Akram, 2004).

The main objective of this work was to analyze the occupational health and safety issues in the steel/iron re-rolling mills. The objectives are to identify the workplace accident risks and to certain the recommendations to evade these risks.

1.2. THE COMPANY (ITTEHAD STEEL MILL)

The Ittehad Group is a privately-held, diversified Pakistani Conglomerate with interests in Steel, Real-Estate, Logistics, Automobiles, Hospitality and General Trading. Ittehad Steel has a combined annual capacity of 120,000 TPY at its integrated steel plants located at Islamabad and Hattar Industrial Parks. Ittehad Steel is also one of the largest Pakistani exporters of re-bars to Afghanistan to cater to the re-building efforts in that country.

Ittehad Steel Mill's affiliation with the steel industry dates back to 1970 when they started a steel trading house in Rawalpindi. In 1978, they installed a steel manufacturing unit in Islamabad, becoming one of the pioneers in steel manufacturing in the region. Steel Mill's rapid growth and success in providing customers with quality and value soon made it a market leader in the supply of quality steel bars to the nation's construction industry, and one of the foremost steel companies in Pakistan.

2. METHODOLOGY

As mentioned earlier, this study was carried out in two phases. Exhaustive literature survey was carried out during the first phase which involved desktop study to collect the necessary information about the steel mill processes. National and international rules

and legislations were reviewed to have an idea of occupational health and safety rules and policies. A workplace OHS related checklist was designed prior to visiting the steel industry.

For this specific purpose a steel mill (Ittehad Steel Mills) was visited and occupational health and safety issues were observed and then the process of this native steel industry was compared with an international steel mill process. Finally the OHS issues were figured out and recommendations were listed to avoid such issues.

3. RESULTS AND DISCUSSION

3.1. OCCUPATIONAL HEALTH AND SAFETY ISSUES IN ITTEHAD RE-ROLLING STEEL MILL

Ittehad steel re-rolling mills is a well-managed unit. Two furnaces are present in this unit having their outlets in the opposite direction. Ready-made steel blocks (billets) are transported to this unit through trolleys. Then these steel blocks are molten in furnaces. To make steel bars, molten steel blocks pass through the rolling devices and rolled in to steel bars of different dia and strength. Manual cutting of these bars is carried out by workers and after that the bars are ready to transport in market. Figure 1 is showing the typical process route of steel re-rolling mill.

Although the unit is working well and producing a considerable amount of products but there are a number of occupational health and safety problems in this unit which can be easily figured out. Administration has a contract with some contractor about the production and dealing of workers. Contractor is dealing with workers according to his own needs. The only thing which is important for contractor is to meet the deadline of workload assigned and get the monitory benefit. The contractor provides some facilities to the workers but only to that extent that his business does not suffer. A cafeteria for the workers functions in the unit. Workers enjoy free meals and highly subsidised personal needs.

Steel mill involves a variety of labour intensive occupational tasks. Among these are machinery operation in hot environment, unfriendly equipment, chemical agents and also the harsh physical environment. However, little attention has been paid on the health and safety issues of steel mills (Douglas, 1995). According to our investigation, occupational health and safety hazard categories include work design, biological, chemical, physical and psychosocial hazards (Hamilton, 2008). For crews working in steel re-rolling plants, there are many hazards. The following points summarize the main hazard areas.

3.2. OUTCOMES OF DESKTOP STUDY

A comprehensive literature review and desktop study was done to sort out the key hazards in steel re-rolling mill. Here are some potential health hazards of steel re-rolling mills.

a. Work design hazards

Poorly designed workstations and workplaces that require awkward postures, heavy lifting, prolonged standing, and repetitive motions are considered to be the main cause of work-related musculoskeletal disorders (WMSDs). Both upper and lower limbs can be affected adversely by these disorders. Low back pain, shoulder and neck pain, tendonitis, bursitis, tenosynovitis and carpel tunnel syndrome are also include in this category (Moreau and Neis, 2009).

b. Physical hazards

A number of physical hazards to occupational health that are found in most industrial processes are those associated with slips and trips, falls from height, workplace transportation, dangerous machinery, electricity and fire safety, and exposure to heavy metals. Except the heavy metals all these occupational hazards are present in steel re-rolling mills. Physical agents those can cause risk include noise, vibration, heat and cold stress and lighting. All these types of risks can be found in steel re-rolling mills.

c. Slips, trips and falls

Potential sources of slip and trip in steel industry include greasy and slippery surfaces and in some cases messy walkways are also become a source of fall. Falls from height might be associated with construction and repair of steel re-rolling operations as well as with some of the processes.

d. Overhead cranes

Overhead cranes form an integral part of operating and maintenance practice throughout a steel mill. Many hazards are associated with their use, including overhead loads, hot metal splash, equipment failure, communication breakdown, and the fact that crane operators may not be aware of construction workers in unexpected locations.

e. Manual handling of heavy load

Workers have to handle and uplift the heavy metallic objects and steel blocks manually without the aid of mechanical equipment Ittehad Steel Mills re-rolling unit. As the steel blocks vary in weight from 60-90 Kg, workers are uplifting them manually and placing them at the inlet of furnace.

3.3. OUTCOMES OF PHYSICAL OBSERVATIONS

Multiple visits were carried out to Ittehad Steel Mill to sketch the real picture of OHS practices in our environment. Detailed information was extracted from question answer sessions with the administration of Ittehad Steel Mills.

a. No MSDS displayed

No “Material Safety Data Sheet” is displayed on workstation walls to guide the workers about the health and safety issues at the work place. The workers are performing their duties without any safety measures.

b. Fire extinguishers

Not a single fire extinguisher is present at the work station. According to administration they have water filled tanks in the working area so that in case of fire the water can be used to kill the fire. Fire extinguishers do present in store room but are not displayed on proper points even in the office areas.

c. Emergency exits

No emergency exits are marked or defined. No emergency training or drill has been carried out in near past. No emergency procedures have been defined. No warning alarm exists in case of fire.

d. Personal protective equipment (PPE)

Workers are working without personal protective equipments. Even those who are dealing with very hot and molten objects are performing their job without any precautionary measure. According to administration they have annual budget for PPE of workers. Special heat insulating uniforms are provided to workers but they are not interested in wearing the uniform and gloves. A few of them are wearing the heat insulating shoes.

e. Regular training and drill

Regular training is present only for some selected persons. Training held twice or sometimes thrice in a year. It’s a three days training about health and environmental issues at the workplace. Normally three to four persons attend the training and when they came back to their duties, they are not very keen to share the information with their colleagues. Most of the employees are unaware of OHS issues associated with their workplace environment as most of them feel themselves responsible for workplace accidents (Gardener *et al.,* 1999).

f. First aid

According to administration first aid facilities are present in the mill. A medical officer is present in unit. He takes care of workers in routine and in case of some emergency. Adequate stock of first aid material is present over here.

g. Machines are without guards and safety devices

Automatic machines and steel rollers are without safety guards. No heat insulating guard is placed near the hot areas of process. These automatic machines can cause injuries such as cuts, sprains, broken bones, amputation and in severe cases death can be occur due to crushing and entrapment. Workers those are working around and maintaining conveyor belts need to be appropriately trained. Moving parts of the automatic machines must be properly guarded and emergency stop buttons should be present to shut down the machines in emergency. Lockout/tagout procedures are required during maintenance of such machines.

h. Cooling fans

Heating furnace is creating high degrees of heat. The temperature of heating furnace is ranges from 1000-1300^{o}C. The only measure present here to reduce the heat and temperature around the furnace and at working place is the fans. These fans are adequately placed at different places in the unit. But the structure of these fans is painting a horrible picture. These fans are without safety guards. Any one can get injured adversely by these fans due to his little mistake.

i. Electrical and fire hazards

Usually electrical and fire hazards exists in all workplace environments and are of prior importance for safety concern. A few factors are present in steel re-rolling mills than can boost the hazards regarding electrical and fire appliances.

The re-rolling unit has its electricity meters in grid station. Only the panel box of electricity is installed in the unit. Grid station is providing 800 KBA load to the unit. In case of any accident as the load fluctuate, panel box trips automatically and electricity supply is disconnected to avoid hazards. But the electric boards are unattended and without any cover. Use of power boards and extension chords is pretty much high.

j. Bad housekeeping

Overall Layout of unit is representing bad housekeeping. No health and hygiene measures have been taken here. Different waste materials are placed on floors and walkways inattentively. Walkways are not free to move.

k. Excessive noise

Excessive noise exposure is one of the likely physical hazards present in steel industry. Occupationally-induced hearing loss has a very vast history in many industries (Palmer *et al.*, 2002). To avoid both short-term and long-term hearing loss and mental fatigue in some jobs auditory safety precautions are very important.

Noise level is very high at workplace in Ittehad Steel Mills re-rolling unit. Workers are not provided with ear mughs/plugs. It is difficult to hear a normal voice within 1 metre distance. Highly disturbing and disrupting noises are present here. No noise insulating system exists to reduce the noise.

l. Extreme heat hazard

In steel re-rolling mills heat is generated and used on high levels. Hot rolling furnace has a temperature of 1000-1300^{o}C which is quite a high temperature. Area surrounding the furnace has very high temperature. No insulating material is present around the furnace and in the working shed so that to reduce the heat. Workers those are working near the furnace and on rolling machines can suffer from heat stroke and eye irritation.

m. Explosion and burn hazards

A lot of explosive materials are present at the workplace and they can catch fire very easily. Workers are working very close to furnace without wearing personal protective equipments and are facing regular burn hazards. Tonge men who hold the molten steel/iron blocks are also working without PPE. Furnace is not insulated by any insulating material, so if any one mistakenly comes in contact with these furnaces, he can face severe burn hazards.

4. CONCLUSIONS

On the basis of available information and eye observations it is concluded that Ittehad Steel Mills need to undertake an OHS audit and develop “Safe Work Protocol” for all kinds of duties at the unit. While leasing out the unit to a contractor, enforcement of safety protocol be made mandatory to avoid health and safety issues critically.

5. RECOMMENDATIONS

Finally the gaps are identified for an improved occupational health and safety management system capable of reducing workplace accidents and improving employee’s morale in a sustained manner:

- Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees. Training should consist of basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training.

- Surfaces, structures and installations should be easy to clean and maintain, and not allow for accumulation of hazardous compounds such as grease and oil. All working and walking surfaces should be leveled, even, and non-skid type.

- Firefighting drill should be carried on at regular intervals to train the new workers. Fire resistant, noise-absorbing materials should, to the extent feasible, be used for cladding on ceilings and walls.

- Passages to emergency exits should be unobstructed at all times. Exits should be clearly marked to be visible in total darkness. The number and capacity of emergency exits should be sufficient for safe and orderly evacuation of the greatest number of people present at any time, and there should be a minimum two exits from any work area. Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down. In each shift rescuers should be defined and trained them according to their duties.

- Sufficient fresh air should be supplied for workers at hot work spaces. Factors to be considered in ventilation design include physical activity, substances in use, and process related emissions. Air distribution systems should be designed so as not to expose workers to draughts.

- Heat insulating devices should be installed to reduce the temperature at working area. Energy efficient light sources should be used that produce less heat.

- Hazardous areas (electrical rooms, compressor rooms, etc), installations, materials, safety measures, and emergency exits, etc. should be marked appropriately. Measures to prevent unauthorized access to dangerous areas should be in place. Locking out (de-charging and leaving open with a controlled locking device) and tagging-out (warning sign placed on the lock) devices during service or maintenance.

- If visitors to the site can gain access to areas where hazardous conditions or substances may be present, a visitor orientation and control program should be established to ensure visitors do not enter hazard areas unescorted.

- Signage should be in accordance with international standards and be well known to, and easily understood by workers, visitors and the general public as appropriate.

- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. Ear plugs should be provided to workers those who are working in high noise area. Periodic medical hearing checks should be performed on workers exposed to high noise levels

- Protecting power chords and extension chords against damage from traffic by shielding or suspending above traffic areas.

- Use of machine guards or splash shields and/or face and eye protection devices, such as safety glasses with side shields, goggles, and/or a full face shield should be made necessary.

- Manual handling of heavy objects that are more than 15 Kg should not be allowed.

- Active use of PPE should be made mandatory and force the workers to wear the PPE.

- A welfare officer should be hired to regularly monitor the OHS issues.

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7. REFERENCES

Akram, M. (2004). Status Report on AIHA Participation for the Improvement of Occupational Health, Safety and Environment in Pakistan for 2003 – 2004.

Bestratén, M., Gil, A., Piqué, T. (2003). La Gestión Integral de los Accidentes de Trabajo (III): Costes de los Accidentes. Nota Tecnica de Prevención. No. 594. Instituto Nacional de Seguridad e Higiene en el Trabajo.

Douglas, J., D., M. (1995). Salmon farming: occupational health in a new rural industry. Occupational Medicine (London). 45(2):89–92.

Environmental, Health and Safety (EHS) Guidelines. General EHS Guidelines: Occupational Health and Safety. International Finance Corporation, World Bank Group.

Fernández-Muñiz, B., Montes-Peón, J. M. and Vázquez-Ordás, C. J. (2009). Relation between occupational safety management and firm performance. Safety Science. 47:980-991.

Gardner, D., Carlopio, J., Fonteyn, P., N. and Cross, J., A. (1999). Mechanical equipment injuries in small manufacturing businesses. Knowledge, behavioral, and management issues. International Journal of Occupational Safety and Ergonomics. 5(1):59–71.

Hunter, W. (1999). Towards better OSH legislation. Magazine of European Agency for Safety and Health at Work. 1:10–11.

Moreau, D., T., R. and Neis, B. (2009). Occupational health and safety hazards in Atlantic Canadian aquaculture: Laying the groundwork for prevention. Marine Policy. (33): 401–411.

Mossink, J. (2002). Inventory of Socioeconomics Costs of Work Accidents. European Agency for Safety and Health at Work, Luxembourg.

Narocki, C. (1999). Si la prevención es rentable ? por qué no la han descubierto los empresarios? una revisión de propuestas para políticas en salud Laboral. Cuadernos de Relaciones Laborales. 14:101–133.

Palmer, K., T., Griffin, M., J., Syddall, H., E., Davis, A., Pannett, B. and Coggon, D. (2002). Occupational exposure to noise and the attributable burden of hearing difficulties in Great Britain. Occupational and Environmental Medicine. 59(9):634–9.

Rikhardsson, P.M., Impgaard, M. (2004). Corporate cost of occupational accidents: an activity-based analysis. Accident Analysis and Prevention. 36:173–182.

Safety and health in the iron and steel industry, Second edition. International Labour Office, Geneva.

Smallman, C., John, G. (2001). British directors' perspectives on the impact of health and safety on corporate performance. Safety Science. 38:227–239.

Workplace Health and Safety Handbook. (2006). Government of South Australia. Page no. 113-116.

Worksafe Saskatchewan. Hamilton: CCOHS; c2008 [citedJune14, 2008]. Ontario Workplace Safety and Insurance Board: Types of OHS hazards. [about 4 screens].Available from: /http://www.worksafesask.ca/files/ont-wsib/ cert manual/ch-01.html#HealthandSafetyHazards>.

World Trade Organization, Geneva, Switzerland.

Annex I

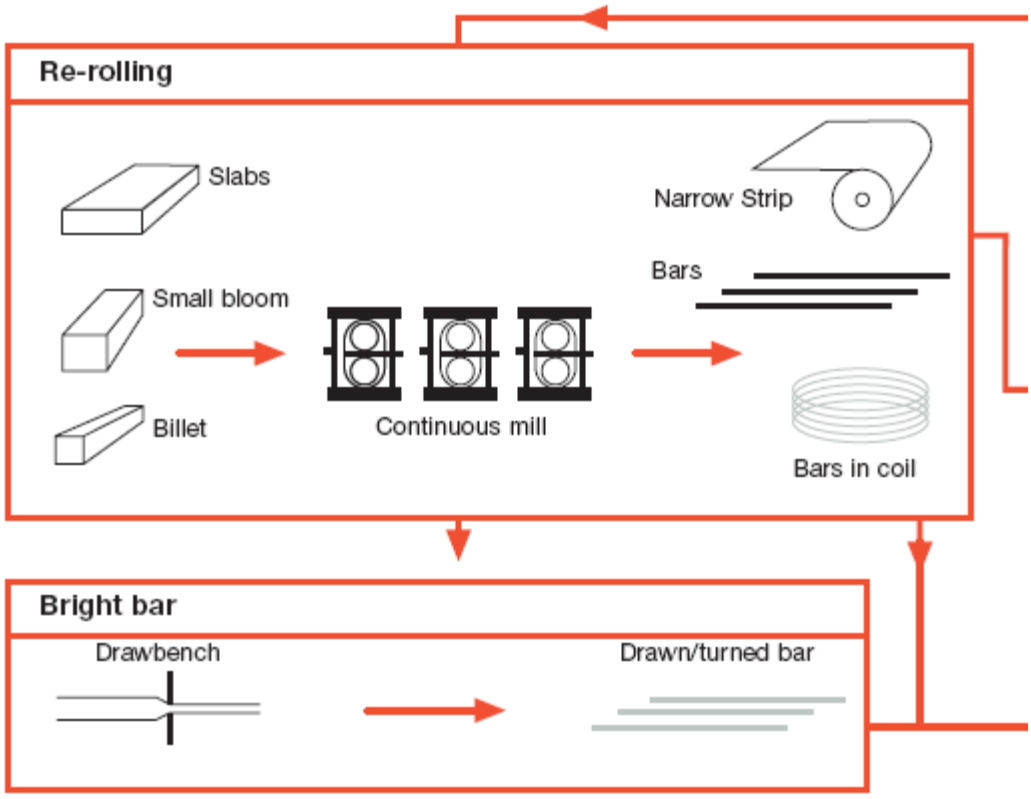

Figure 1: Process routes in steel re-rolling mills