

# THE PEOPLE IN THE PROCESS : OPTIMISING THE PERSON JOB FIT TO ACHIEVE SAFE PRODUCTION

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## SUMMARY

To create a safe workplace requires safe equipment and environment, safe methods of work and people with the motivation and capacity to work safely. Increasingly the focus in the mining industry is including the people and looking at how to ensure people have the capability to work safely. This may be done pre placement, on initial employment or when internal transfers occur, and throughout a person's employment with the organisation. Optimising the match will reduce injury risk by minimising the risk of human error and minimising the likelihood of muscular skeletal injuries from overloading body structures, two common contributing factors to accidents and injury. This process involves focusing on the job (process and equipment) as well as on selecting persons with the right capacity. This process while creating a safer workplace will also improve production.

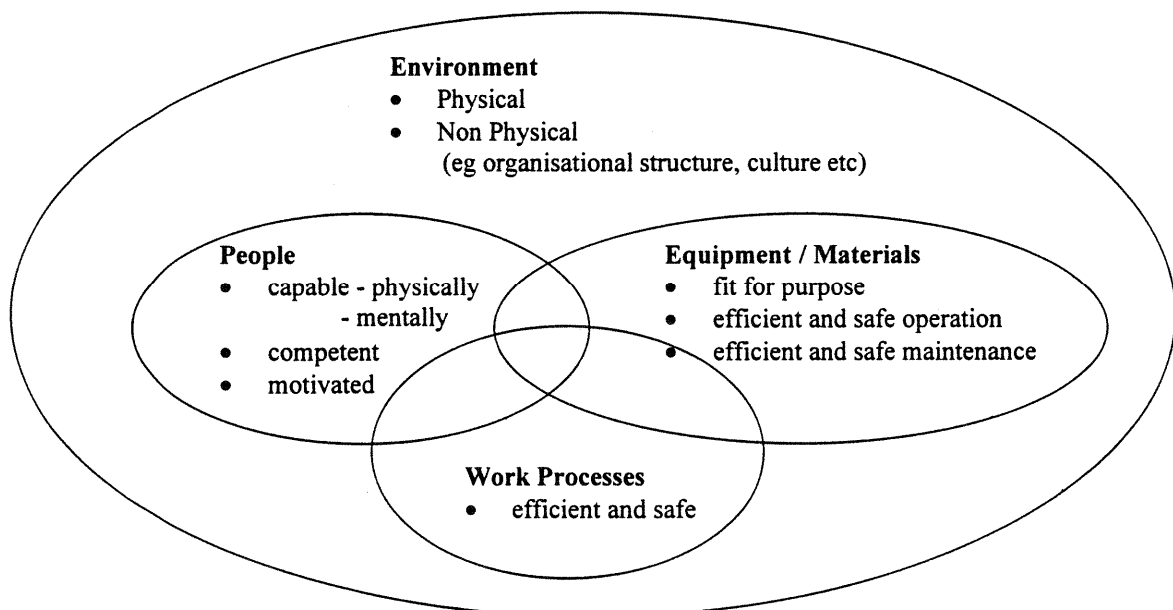
This paper will outline a process that can be used to ensure people are in jobs that are within their capacity by analysing and optimising job design

and then matching the right person to the job. Practical examples of how this process can and is being used in the mining industry will be given. Methods to ensure and maintain employees' fitness for work will also be discussed.

## MODEL FOR HEALTHY AND SAFE PRODUCTION

This is a commonly used model for the elements that contribute to creating a healthy and safe work environment. As you can see each part of the system interacts with the others. Changes to any part of the system will influence other elements. For example, optimising lighting will increase a persons visual capability. Changes to the design of equipment will change the capacity required by people to operate and maintain that piece of equipment.

This model provides us with a framework for key elements that need to be considered when creating a healthy and safe workplace. A safe workplace requires suitable equipment and materials, a suitable physical and non-physical work environment, suitable methods of work, and people with the motivation and capacity to work safely.



## AN IDEAL WORLD

The ideal work/environment/equipment/ job design:

- allows employees to work in a upright forward facing posture;
- provides the opportunity to change posture and position often and not sit or stand still for prolonged periods of time;
- requires the employee to only manual handle easy to grip objects close to the persons body and only within hip to shoulder height;
- requires the employee to perform a moderate level of physical work to maintain their strength, endurance and flexibility;
- is performed in an environment with optimal lighting, noise, temperature and humidity and no fumes or dusts;
- allows easy access and does not involve restricted space, climbing or uneven surfaces;
- involved displays that are easy to monitor and controls easy to operate (both physically and cognitively);
- jobs are designed with enough demand to stimulate and challenge but not overload capacity (both physically and cognitively);
- and where human errors would not have serious consequences

Unfortunately to my knowledge this work environment does not yet exist.

## THE MINING INDUSTRY

The nature of work in the mining industry is variable and not always ideal. Vary rarely is work performed in ergonomically ideal postures or positions, environments or with ideal job and equipment design. More common is work that is:

- sedentary;
- very heavy, awkward and/or physically demanding;
- in a uncontrolled environment;
- may involve potential for serious injury and fatalities of errors or accidents occur.

The physical work demands in the mining environment vary –

- some employees may spend all day sitting operating machines often in twisted postures and exposed to jolts, jars and vibration;
- others may spend the day working, lifting and handling in awkward postures such as overhead, ground level or in restricted spaces;
- many have to work on conveyers, booms, standing on machinery, uneven ground and surfaces, ladders;

- many have to lift very heavy objects occasionally (weights in excess of any manual handling weight guidelines).

Despite being demanding the nature of mining work will not maintain our employees fitness (strength, endurance and flexibility). Few jobs have adequate consistent aerobic work to maintain fitness. Occasional extreme demands and/or highly sedentary work is more common. Likewise the lifestyle adopted by many workers outside of their employment may not promote health and fitness.

*The results of Coal Board medicals and personal observations show us that many miners are:*

- deconditioned / unfit
- overweight
- have accumulated injuries
- have diseases (heart conditions etc)
- adopt a poor lifestyle
- are aging (which is associated with reduced tolerance for shiftwork, reducing vision etc)

It is important to note that fitness testing conducted on one mine site found that general fitness related more to which job a person performed than their age. Age on its own is not an indicator of reduced capacity - the specific capability should be specifically examined.

Personal experience working with persons who have injuries has found many mining employees:

- have physical capacity below work demands eg can lift a heavy object once (strong) but not repetitively (endurance) yet their job requires this capacity on occasions, or may not have adequate strength for the job demands;
- have tightness (flexibility) or weakness in muscle groups resulting from optimal posture and or use of wrong muscle groups to perform activities. A common example seen is a weakness in abdominal muscles and a tightness in hamstrings which is associated with low back pain.

Not only is the physical environment demanding, people are also asked to meet sensory and cognitive demands:

- to concentrate and perform repetitive and/or boring tasks;
- to monitor and respond to poorly designed displays and controls;
- to use vision to operate machinery;
- to problem solve and perform difficult mental tasks.

Employees work shiftwork and may work extended shifts, often on less than ideal rosters. This means people are asked to concentrate and perform work during times of the day when human performance is not optimal.

Mines expect their employees not to make errors that result in incidents or accidents and to not injure themselves yet may not spend much time selecting the right person for the task - physically, personality or cognitively.

## **A PROCESS FOR IMPROVEMENT**

A process that can be used to ensure people are in jobs that are within their capacity begins by analysing and optimising job/equipment/environment design and then matching the right person to the job.

Optimal job design is important because it will increase the pool of people who can be placed in the position and reduce risk for any person who works in that position. A very strong and fit person will still be at risk of injury in a poorly designed job therefore employee selection processes do not replace optimising job design.

The process is not a single event but rather a continuous improvement process. It should occur at initial job design, personnel recruitment and placement and also be an ongoing process i.e. when changes occur to jobs and equipment, when people change position, monitoring to ensure optimal job-person match and interventions to maintain employees' fitness for duties.

The process involves five steps:

- Step 1: Job Analysis - Analyse the job and identify job demands
- Step 2: Job Redesign - Identify and implement ways to bring demands to within the ideal range to suit human capabilities
- Step 3: Prepare Job Specification - Identify the human capabilities that are required to meet revised job demands
- Step 4: Assessment and Selection of employees - Select employees for the job
- Step 5: Maintenance Activities - Activities to improve and maintain employee capabilities in their position

Employee turnover in the mining industry is minimal so the investment in selecting the right

employee and maintaining their capacity is a sound one.

### **Step 1: Job Analysis - Analyse the job and identify job demands**

Job Analysis is the process of identifying the various components or steps that make up a job. For the purpose of identifying the key demands placed on people this is most effectively done by someone with training in human capacities and limitations both physical, psychosocial and cognitive. Many mines are using occupational therapists to conduct task analyses and develop comprehensive descriptions of the task demands.

These documents are being used:

- for risk management to identify the high risk jobs that are priority for redesign;
- pre placement they are supplied to doctors and other assessing persons so that they have a better understanding of the job demands to assess against;
- and post illness/injury to assist with selection of rehabilitation duties and the normal duties that rehabilitation activities aim toward.

Factors considered include:

- physical - manual handling, postures and positions, dexterity, work surfaces, lighting etc;
- sensory - vision, touch, hearing, smell etc;
- cognitive - attention, processing, problem solving, etc;
- psychosocial - working alone, working in teams, supervisory etc;
- other - heights, chemical exposure, wearing respirators, etc.

For jobs with complex psychological or cognitive (mental) demands there may be a need to involve psychologists or cognitive ergonomists eg human computer interaction.

James C & Holman F (1997) described in detail how task analysis has been used in a Hunter Valley Mine for rehabilitation purposes. The same process can be equally applied to the above purposes.

### **Step 2 : Job Redesign - Identify and implement ways to bring demands to within the ideal range to suit human capabilities**

This is often done at the same time as the job analysis. As highlighted in earlier sections there is much that can be done to improve job and equipment design in mining. Often these improvements are low cost and easy to implement once identified. Sometimes it is as simple as re-

organising the order that tasks are performed, materials flow, equipment or storage layouts. Manual materials handling equipment, access platforms and other simple pieces of equipment may also be used to reduce demands and bring tasks within easy reach.

There are a variety of documents and publications on ergonomics, human factors and mining that can be used to identify human capabilities, limitations and optimal designs of equipment and work to suit human capacities eg McPhee 1993.

**Step 3: Prepare Job Specification - Identify the human capabilities that are required to meet revised job demands**

Once the job design has been optimised the job specification can be prepared. This involves simply converting the critical job/task demands for a particular position to selection criteria. The critical demands are those that are key to successful and safe performance of the job and particularly the ones that create increased demands on a person's capabilities. For example a position may involve a large amount of overhead work therefore good neck extension and shoulder function is required for the position. Another position may require a large amount of sitting and therefore high tolerance for sitting is required. Another position may involve working on uneven surfaces and therefore good knee and ankle function would be required. Working in the dragline house is not suitable for persons who experience severe motion sickness. Good visual field and general vision would be required for machine operation.

**Step 4: Assessment and Selection of employees - Select Employees for the job**

This process basically involves assessing a person's capabilities against the job specification.

Traditionally mines have relied on Coal Board Medicals to ensure employees are fit for work. The Coal Industry Employee's Health Scheme's stated purpose is to:

- ensure entrants are fit to undertake their specified duties without risk;
- ensure existing employees are fit to continue to perform their specified duties without risk;
- early identification of those conditions or behaviours which may inhibit employee ability to perform specified duties without risk;
- provide health and lifestyle information; and
- provide awareness of the benefits of workplace health screening and monitoring.

The medical is limited in the areas it covers and it is generic to all positions. Visual and hearing capacity are examined superficially during the Coal Board but may warrant further consideration for some jobs eg visual field for drivers, hearing for control room operators etc. Manual handling capacity is not examined.

The Coal Board Medical may be improved by:

- employers providing more specific job demand information to examining doctor;
- screening process being tailored to specific jobs, eg use Qld Transports "Guidelines for Medical Practitioners" when assessing fitness to operate machinery;
- doctors being given greater options for reporting findings and identified needs to employer, i.e.
  - "Vision"
  - "Further assessment required by ....."
  - "Intervention required .....eg weight loss"

Many mines have upgraded their pre-placement assessment processes to include functional capacity assessments by occupational therapists to ensure employees are physically capable to perform the work.

Cognitive and personality characteristics need to be also considered to various degrees. Matching psychologically to a job is as important as the physical match. Pain is a highly psychological experience rather than just a physical one, for example employees who do not like their job tend to experience and report more discomfort (pain) and are slower to recover. Attention, motivation and other key performance factors relate to how suited a person is to a job and this may effect risk of incidents and accidents.

**Step 5: Improvement and Maintenance Activities - Activities to improve and maintain capabilities**

Once employees are employed and placed in a job it is important to put in place programs to maintain their fitness and capabilities (particularly due to low employee turnover in the mining industry). This may include things such as:

- specific exercise and stretching programs for individual employees and positions;
- hearing and vision conservation programs;
- vision screening and arranging provision of appropriate glasses if required;
- health promotion / health screening ;
- exercise programs especially for those in sedentary jobs;

- manual handling programs specific to job demands to help employees minimise the risk of musculoskeletal injuries in their method of performing work ;
- workplace based rehabilitation programs to maximise recovery and minimise risk of reinjury.

Many mines have workplace based health promotion programs to promote healthy lifestyle choices. A number of mines in central Queensland now employ occupational therapists to visit on a regular basis to see employees who are identified by themselves or supervisors as having musculo-skeletal or other problems. The purpose is early intervention prior to people developing any significant problems. These occupational therapists will also look at the individuals job and equipment design.

The health promotion initiatives and individual programs should be based on issues identified during pre placement assessments and health needs surveys. The intervention begins at the time of assessment and is ongoing for the duration of employment.

### **WHEN DO YOU GO THROUGH THE PROCESS?**

1. When a employee is recruited, selected and placed for a specific position. This should occur at initial employment and placement and when internal transfers occur.
2. Ongoing initiatives throughout a persons employment with the organisation to try and maintain or improve the individuals capacity.
3. When change is being implemented - eg new or major modification to equipment, processes, people or the environment.

### **CONCLUSION**

The five step process outlined in this paper provides a methodology for ensuring the optimal person job match is achieved. The goal is to reduce injury risk by designing jobs that suit human capacities and limitations, then selecting employees suited to the specific demands of the job and maintaining the employees capacity and fitness for their specific job and the mining industry.

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