WHAT'S IN A JOB?
TASK ANALYSIS - A METHOD OF COMMUNICATING JOB DEMANDS

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SUMMARY

The process of Occupational Rehabilitation involves a multidisciplinary approach to assist in returning injured workers to productive employment. Many of the professionals involved in the rehabilitation process may be unaware of many of the intrinsic job demands of specific workplaces. Lemington Mine, in the Hunter Valley, contracted the Joint Coal Board Occupational Therapists to address this problem, by devising a means of communicating job demands to treating professionals. A systematic Task Analysis of all the jobs on it's minesite was completed. The document resulting describes the physical actions, and some of the cognitive processes, required to complete a given task.

A work study was completed to identify tasks and measure physical demands. The results were tabulated to form a working document. The task analysis document identifies characteristics of tasks allowing:

- Appropriate selection of suitable duties for injured workers.
- Task modification for individuals, eg. spinner knobs and exposure regimes.
- Hazard awareness leading to the introduction of risk control strategies.

Other areas currently being developed include an injury prevention exercise program for each task, and further analysis of the physical requirements of tasks to develop a specific physical tolerance assessment.

INTRODUCTION

The Joint Coal Board's mission is to deliver quality service to protect, support and advance health and welfare in the NSW coal industry. The Joint Coal Board was established in 1947 and has assisted the Australian coal industry in achieving the virtual eradication of pneumoconiosis, and the introduction of mechanisation. Following a major review of the Joint Coal Board in 1991, and subsequent new legislation, the main focus is now on the health and welfare of New South Wales coal miners. As such, the Board has developed unique expertise in the area of occupational health and rehabilitation in the mining industry. Within the Joint Coal Board Occupational Health Service we have expertise in occupational medicine, occupational rehabilitation, health education, industrial hygiene and counselling, all specific to the coal mining industry.

Occupational Rehabilitation is defined by Worksafe Australia (1) as "a managed process involving early intervention with appropriate, adequate and timely service, based on assessed needs, and which are aimed at maintaining injured or ill workers in, or returning them to, suitable employment". The Joint Coal Board is an accredited rehabilitation provider under Workcover NSW, and Occupational Therapists are employed as part of this service.

The Australian Association of Occupational Therapy (AAOT - (2)) describes Occupational Therapy as a health related profession which uses selected activity to prevent and overcome many physical, emotional or social disabilities in people of all ages. The objective is to promote, maintain or restore functional independence in daily living skills. It is concerned with human occupation and it's importance for persons of all ages. Occupational Therapists are concerned with promoting the highest possible level of independence in any given activity that a person is capable of achieving. As such, Occupational Therapists have the knowledge and expertise to comprehensively assess tasks and individuals, to determine match discrepancies.

Lemington Mine contracted the Joint Coal Board Occupational Health Service to provide a user friendly communication tool of task demands, specifically to provide information for treating professionals who may have limited knowledge of, and insight into, open cut mining, with the aim of empowering them to provide more constructive and relevant input into the occupational rehabilitation process. Lemington Mine requested this document as a type of safety audit to identify and allow for modification of tasks that exceed acceptable postural or strength requirements, thus reducing strain and sprain injuries. It was also to be used to assist in the rehabilitation process, to determine alternative duties for return to work programs, thus facilitating early intervention and more timely return to normal duties.

Over the years of providing occupational rehabilitation services in this area, some of the difficulties noted with communication include:

- work demands on rural doctors, limiting time available for conversation.
- use of industrial and medical jargon.
- cultural and educational differences.

As anyone familiar with the mining industry knows, the equipment used is very large. However treating professionals may not always be familiar with this fact. We have encountered medical reports or certificates for injured employees indicating:-

- Surprise at the fact that an injury could result from the lifting of an electrical extension cable - obviously not aware that some electrical cables onsite are 75mm in diameter.
- A lack of knowledge that a shovel is not a garden implement but a large mechanical plant.
- Carrying batteries entails batteries larger than car batteries, and not as easily accessible as a battery in a car.

The task analysis attempts to explain some of the mining terminology and detail requirements of tasks, thereby ensuring that the treating professional has available a more complete picture of the work situation. The document comprises tables describing tasks and outlining task demands, complemented with photographs to clarify tasks - as the proverb suggests, a picture is worth 10 thousand words!

Kirwan and Answorth (3) define Task analysis as the study of what an operator is required to do in terms of actions and/or cognitive processes to achieve a system goal. In addition, Howell, Kaplan and O'Connell (4) describe the process required to perform a Task analysis as isolating, sequencing and describing all the essential components of a task. Task analysis provides a means of describing tasks to enable evaluation and analysis, and was therefore chosen as a means of providing documentation of task demands. This allows for the future evaluation of the human - machine interactions within a system. For example, evaluating the capabilities of an injured employee with regard to his normal duties, to allow for modification of these duties on initial return to work.

Various methods of task analysis are available depending upon the purpose for which it is being carried out. A decomposition method of task analysis was chosen for our project, as this method incorporates the expansion of task descriptions focusing on specific aspects of the task.

The primary purpose of this project was to communicate job demands enabling the comparison between job demands and operator abilities, thus allowing, where necessary, these demands to be modified to increase safety and productivity. Task analysis requires data collection of the task demands, and tabulation of these into a usable document allowing for meaningful comparison between demands and operator characteristics.

METHOD

Preliminary Work

An initial meeting was held with Lemington Mine personnel to discuss project details, including document format and presentation. It was decided at this stage that the project would be divided into areas, these being:- Open Cut Production, Open Cut Maintenance and Coal Preparation Plant.

Decomposition categories were selected in response to the outcome desires of Lemington Mine. The categories agreed upon are outlined in Figure #1.

TASK	DESCRIPTION	FUNCTIONAL DEMANDS	FREQUENCY	CRITICAL ISSUES

Figure #1: *Decomposition Categories*

Operational definitions

Task: A set pattern of operations which done alone, or together with other tasks, may be used to achieve a goal. Kirwan and Answorth (3).

Description: A statement of the components making up a given task.

Functional Demands: A list of the physical and some cognitive requirements of the task.

Frequency: How often a task component is required to be completed. In some cases the length of time to complete a given task was included.

Critical Issues: A checklist of fundamental requirements for individuals to complete components of the task.

Following this, meetings were held with key people in each of the three areas. This determined the range of tasks to be covered and addressed specific requirements for that area, such as escort arrangements, personal protective equipment and contractor procedures. Tentative timetables for assessments were prepared, together with a list of the tasks to be covered in the individual areas. These tasks are listed in Figure #2.

Open Cut Production	Open Cut Maintenance	Coal Preparation Plant
Dozers Drills Lube Other Mobile Plant Shot Firers Shovels Trucks Miscellaneous	Associated Equipment Field Work Service Bay Toyota Bay Weekend Maintenance Workshop	Bathhouse / First Aid Dozers Electricians Fitters Front End Loaders Lighting Plant Light Vehicles Mobile Workshop Other Mobile Equipment Production Employees Services

Figure #2. *Areas Analysed*

One task was selected, assessed and documented in the format outlined in figure #1. This was then sent to Lemington Mine for final approval prior to commencing the rest of the project. Approval was granted with no further modifications requested.

Tools Required

Quantitative data relating to lighting, distances, weights and forces were measured using:

- Lux meter
- Ergotape
- Scales

Checklists were used to ensure consistency between analysts, and as a prompt to elicit information. Existing checklists were used together with checklists developed specifically for this purpose. These included:-

- Points to Consider in Assessing Cabin Design - Andrew and Simpson (5).
- Ergonomic Checklist: Workstation posture, movements and hand tools - Stevenson (6).
- Mobile Plant Task Analysis Checklist - Joint Coal Board (7).

A still camera was used to visually record working postures for illustration purposes.

Onsite Assessment

All assessments were completed onsite, where possible, during the actual performance of tasks. In some cases tasks were simulated for assessment purposes due to safety requirements or logistical reasons. Techniques used for assessments included:

- Walk through - Talk through analysis
- Informal observation
- Checklists
- Quantitative measures
- Reference to procedural and training manuals
- Photography

Data Tabulation

This was an extremely time demanding component of the project. Written notes were tabulated into the agreed format with much reviewing and editing required. Further onsite assessments were done to clarify discrepancies, review procedures and gather additional measurements and data.

Documentation

The final information was tabulated and complemented with photographs to illustrate postural demands and environmental considerations. Several copies of the final document were bound in 3 volumes, one for each of the areas assessed. Copies including colour photos were distributed to the Safety Manager, Company Doctor and the onsite Occupational Therapists. A black and white copy was presented in lever arch folders to allow for the quick removal of sections for photocopying purposes. A back up copy of all the written material was stored on a floppy disc.

DISCUSSION

The final document meets the initial purpose of the project, to provide a user friendly communication tool of task demands. Relevant sections are copied and sent to local doctors and treating professionals for their information, to enable more appropriate contributions to rehabilitation to be made. Feedback received to date, from Mining personnel and the medical profession, has been positive.

Onsite Occupational Therapists are using the document as a screening tool in the rehabilitation of injured employees. The task analysis is being used as an initial reference point when preparing for workplace assessments, thereby saving time and eliminating unnecessary and unsafe tasks. It is also being used to clarify information related to particular tasks.

Other areas where the document is being used and further developed include:

- Accident Investigations, highlighting discrepancies with procedures.
- As a type of safety audit identifying risk areas, thus allowing for injury prevention through task modification.
- Fitness training, designing specific exercises and warm up stretches for tasks.
- To help define the inherent physical requirements of the various jobs in the industry.

Some limitations of the project included:-

- The reliance upon operators to relay complete and correct information regarding tasks. The varying methods of completing tasks by individual operators was also noted during assessments, for example whether or not mechanical lifting aids are used. To overcome this, referral to training manuals, procedural manuals and discussion with supervisors and several operators took place, to clarify information. Checklists were used to standardise the details collected.
- The nature and range of Maintenance and Coal Preparation duties meant that to document all would create an unusable document, therefore examples of common and extreme tasks were analysed to generate ranges of demands. This relied upon accurate operator information. Several operators, and maintenance schedules, were consulted to obtain a greater variety of information.
- Access to information sources and tasks were dependent upon production and maintenance schedules. To minimise this limitation many onsite assessments were conducted on weekends and out of normal office hours. Flexibility in relation to the timetable allowed specific jobs to be covered as available, i.e. breakdown maintenance. Simulation of tasks also took place where necessary to enable information to be collected.
- Time constraints were also a limitation as a deadline had been agreed upon. However it is felt that further additions could be made, eg: as new equipment is purchased. As this is a dynamic document, the idea is that it is constantly updated.
- Scales were used to estimate force required for pushing, pulling and lifting tasks. Due to the nature of the scales used, measurements can only be considered approximates. The Joint Coal Board has since purchased a mecmesin force gauge to be used in future projects.

CONCLUSION

The Task Analysis has been very well received by Lemington and medical professionals alike. There has been interest from various other local mines to pursue similar projects.

The process provided a valuable learning experience for all the Occupational Therapists involved, improving their knowledge of mining equipment and associated duties. It also brought to light less obvious physical demands which in some cases surprised even the supervisors. An example of this is many of the manual handling requirements carried out on a regular basis.

The initial document was completed in great detail to highlight differences between similar machinery and to ensure a comprehensive coverage of duties. Upon completion of the document, there are a number of additions which can be made to increase its effectiveness. One of these is to produce summary sheets - containing less quantity of information and detail. These sheets would ideally contain critical information relevant to medical professionals who often have limited time to refer to such material.

The Task Analysis provides a set of core data which can be used as a resource for various projects. Other areas currently being developed include an injury prevention exercise program specific to each task and further analysis of the physical requirements of tasks to develop a specific physical tolerance assessment. It is hoped that this document will be continuously built upon to address specific needs, as they arise.

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