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An Ergonomic Assessment of a Customer Service Organisation

The musculoskeletal hazards associated with ergonomically poor workstations are well-documented (1)(2). Safety related legislation requires these hazards to be eliminated if possible or adequately controlled. In order for organisations to eliminate or control these hazards, they must first be identified. This research project set out to identify quantify and remedy the ergonomic hazards encountered by employees in a busy customer service organisation.

The methodology combined five techniques; a survey of the premises followed by a detailed risk assessment, a comparison of the work environment with recommended anthropometric guidelines, an observational quantification of postural movements and finally, an employee questionnaire and semi structured interview. The results showed that employees dealing with customers had to endure a number of sub-standard ergonomic conditions in order to carry out their work duties. Based on these research findings, the ergonomic hazards are now being remedied by the organisation using a planned relocation schedule and redesign of the workstations.

The Organisation

This organisation consists of a busy service sector establishment, dealing with several hundred members of the general public each working day. On average, customers spend between two to three minutes at the counter with the service provider. Twenty employees from the workforce were monitored during the research period. Each employee would work for approximately ninety minutes before taking a break of at least one hour away from the counter.

The Method

A survey of the premises was first carried out and three-dimensional drawings were produced using a computer aided design package. These drawings were then used to compare the workstation layouts with recommended anthropometric guidelines and in particular with ISO 9241: Ergonomic Requirements for Office Work with Visual Display Terminals. A risk assessment was then carried out on the work environment

using guidelines adapted from Dul and Weerdmeester, 2001 (3) which are shown below.

Section 1- General

- What is the gender and age-range of workers?
- What are the work tasks carried out?
- What equipment and furniture is used?

Section 2- Work Organization, Jobs and Tasks

- Does the job consist of more than one task?
- Do those involved contribute to problem solving?
- Is the customer cycle time longer than 1 minutes?
- Is there variation between easy and difficult tasks?
- Can those involved decide independently on how the tasks are carried out?
- Are there adequate possibilities for contact with others?
- Are the working hours flexible?

Section 3 – Biomechanical, Physiological and Anthropometric Factors

- Is the work held close to the body?
- Are forward bending and twisted trunk postures avoided?
- Is there a variation in posture and movement?
- Has account been taken of different body sizes?

Section 4 – Factors relating to Posture

- Is sitting alternated with standing and walking?
- Is the height of the seat and backrest adjustable?
- Have good seating instructions been provided?
- Is a footrest provided and are excessive reaches avoided?
- Is there enough legroom and is the height of the worktable adjustable?
- Has work above shoulder level been avoided?
- Has work with the hand behind the body been avoided?

Section 5 – Environmental Factors

- Is the noise level below 80 dB (A) and is annoyance due to noise avoided?
- Are rooms too quiet?
- Is the light intensity for normal activities within the 200-800 lux range?
- Is the information easily legible and are reflections and shadows prevented?
- Is flicker from fluorescent tubes avoided?
- Is the air temperature suited to the task?

- Is the air prevented from becoming too dry or humid?
- Is the room temperature too hot or cold?

Section 6 – Factors relating to Information and Operation

- Has the QWERTY layout been selected for the keyboard?
- How frequently is the mouse used?

An observational pro-forma for staff was then developed using the REBA: rapid entire body assessment (4), and RULA: rapid upper limb assessment (5) techniques to identify those postural movements likely to cause musculoskeletal disorders. Each employee was then observed over a specified time period (approximately sixty minutes) and the number of specified postural movements during this period recorded. The numbers of customers the employees dealt with was also recorded. In total fifteen employees were observed over a five day period. The observational pro- forma used is shown below in Figure 1.1

Figure 1.1: Observational Pro-Forma

NECK			TRUNK		RIGHT/LEFT ARM	
Neck twist	Neck extension	Neck flexion	Trunk twist right	Trunk twist left	Right/left arm stretch forward	Right/left arm extension

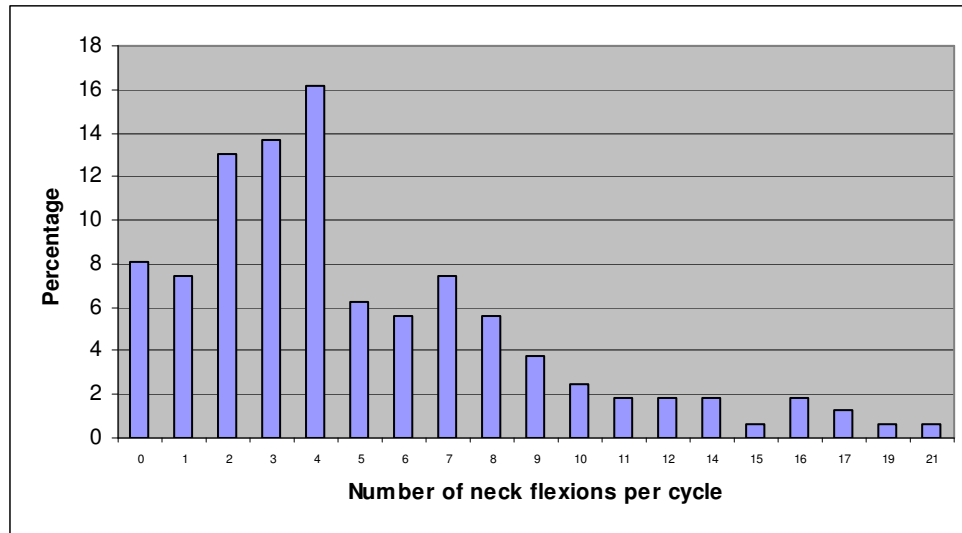
Finally a questionnaire and semi structured interviews relating to shift patterns and musculoskeletal symptoms experienced by employees was carried out.

Results

The environmental conditions (temperature, light and noise) were found to be adequate. However the study identified several ergonomic risks. Employees adopted unsuitable postures, repetitive movements, static work positions and inappropriate stretching bending and twisting movements. They also experienced a rapid work pace and a lack of control over their general working environment. An example of the

results found is shown in figure 1.2 below, detailing the number of neck flexions per adopted by staff member when dealing with customers.

Figure 1.2 Frequency of neck flexions* per task cycle**



* The neck flexion position was noted with the head facing downwards.

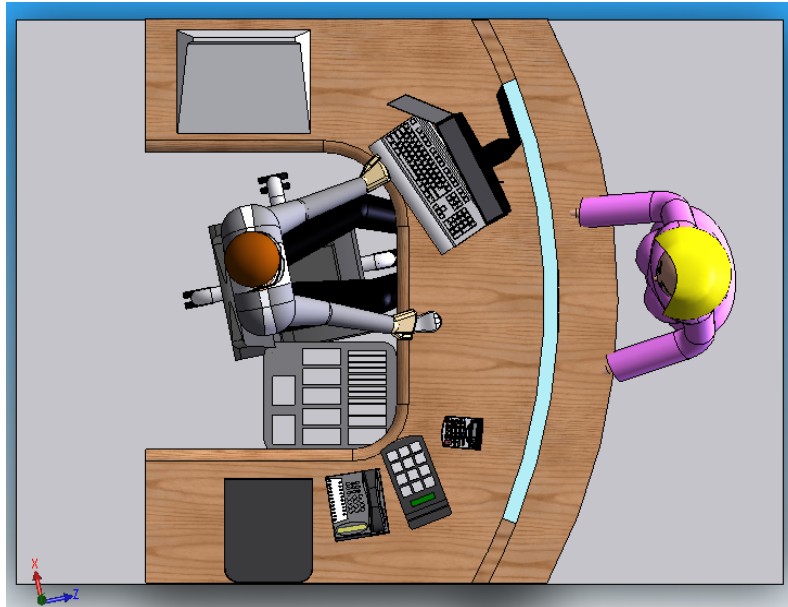
**The task cycle is the time taken for the employee to deal with the customer from start to finish.

Symptoms of musculoskeletal disorders were self-reported by seventy-nine percent of observed employees. These symptoms were mainly felt in the shoulders, neck and back while the observational analysis illustrated that the neck was most at risk.

The existing design of the workstation was less than ideal for the tasks being carried out. All equipment was located on one side of the workstation and the visual display monitor was positioned too high and too far to one side for comfortable use. This layout contributed to unnecessary neck movements and stretching of arms.

Recommendations to improve the layout included redesigning the area to use both sides of the workstation and adopting a semi-circle work area around the operator. A computer aided design package was used to create a number of possible remedies to the existing workstation. Figure 1.3, illustrates one of the possible redesigns, which complies with ISO 9241. A document holder and footstool is also designed in. All equipment in the new design is now shown as placed within easy reach of each user.

Figure 1.3: Redesigned Workstation Layout



The recommendations of this research are currently being implemented by the organisation. Future research work will involve a re-evaluation of newly designed workstations using the same methodology.

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Darren Mulligan M.Sc., and Suzanne Rossiter M.Sc., are graduates of the M.Sc. Environmental Health and Safety Management course at the Dublin Institute of Technology. Together with Aisling, they collaborated on this research project and submitted separate dissertations in 2006 as part of their M.Sc. course work.

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