REDUCTION OF LIFTING THROUGH SMART DESIGN

Organisation

City of Delft

Gardien bedrijfsfysiotherapie bv

Introduction

The city of Delft employs approximately 40 road workers and service employees in its maintenance department. Workers were known to be exposed to high levels of physical stress. In 1999, a Periodic Workers Health Survey (PAGO) was conducted. This survey showed that this group of workers suffered from a relatively high incidence of back and knee complaints. Their sickness absence was high, around 10% at the end of the 1990s.

These musculoskeletal problems were obviously related to the high physical demands of the road worker's job: lifting heavy stones and tiles, often kneeling on hard ground.

To reduce the incidence of back and knee problems, the city decided to take action to reduce the physical demands. A company physiotherapist investigated the physical demands and used visual aids to document the issues identified. The city subsequently formulated a workgroup consisting of workers and supervisors. This group was provided with training concerning the guidelines and risks related to physical load by the company physiotherapist. The issues and potential solutions were then discussed by the workgroup.

Aims

The intervention aimed at reducing the musculoskeletal load and complaints of the road workers and thus, to reduce the incidence of back and knee problems.

What was done, and how

Risk analysis

First, the company physiotherapist carried out an analysis of the physical load to which this group was exposed. The major problem appeared to be that the materials, i.e., tiles and bricks, were too heavy or not easy to handle.

The weights of paving tiles and concrete stones and bricks exceeded the guidelines of:

- a maximum weight of 9.5 kg for tiles and 4 kg for paving bricks, set by the Arbouw Institute on branch level;

- a maximum lifting weight of 25 kg per person and a maximum weight of paving bricks of 4 kg set by the Occupational Safety and Health (Arbo) policy regulations.

Guidelines on maximum weights of tiles and stones

The Dutch Arbouw Institute works to improve working conditions in the building industry and provides the following guidelines for materials that are handled manually:

- 300 × 300 × 45 mm tiles must not weigh more than 9.5 kg;
- 211 × 105 × 80 mm stones must not weigh more than 4 kg.

In accordance with the Arbo policy regulations, the lifting weight must not exceed 25 kg per person, and a paving stone must not weigh more than 4 kg. The elongated concrete stones, respectively weighing 9.05 kg and 4.15 kg used by the City of Delft exceeded this guideline. The other stones used were below the guideline figure, weighing 2.35 kg, 1.70 kg and 0.55 kg. The street tiles used were also too heavy. Only paving tiles that are 45 mm thick met the 9.5 kg guideline. Thicker street tiles are heavier:

- 300 × 300 × 80 mm: 16.5 kg;
- 300 × 300 × 70 mm: 14.6 kg;
- 300 × 300 × 60 mm: 12.4 kg.

Some tiles and stones of different dimensions are even heavier: 500 × 500 × 80mm tiles weigh as much as 60 kg, high kerbs weigh 40 kg, and corners weigh 94 kg.

Analysis of available aids

The key issues were documented using video recordings. Using heavy materials as such is not a problem as long as good aids are available. Together with the health and safety expert of the municipality, the effect of lifting equipment which the road workers used or, rather, needed were considered. Together, they assessed whether the devices that were used reduced the physical load sufficiently. They also considered whether existing devices could be improved or new devices were required.

For example, district plans called for the use of materials for which, at that particular location, it was impossible to use lifting equipment due to the lack of space. As a result, the materials still had to be processed manually.

Work group meeting

Gardien then informed a work group consisting of superiors and workers about the guidelines and the risks of physical strain. The workers watched the video and were asked to suggest solutions.

A tile suction device was considered but, in practice, it appeared to be unsuitable for the job, since it required extra handling and time. Since then, the city has acquired a few “skidsters”, the equivalent of a mechanical wheelbarrow. These work tools qualified for a subsidy under the Dutch Farboregeling (Farbo Scheme) that promotes the use of innovative tools and equipment to improve working conditions.

Making a plan of action

After the analysis stage, the City formulated a plan of action that consisted of measures on three levels:

Ergonomics – providing tools to prevent physical stress

A major ergonomics solution was the “skidsters”, a mechanical wheelbarrow consisting of a custom-fitted kerb gripper and machine for mechanically laying new roadwork. The worker performs his task not sitting but standing. Other new tools were tailored band pliers and machines to lay down new road surfaces mechanically.

Optimising the content of tasks and organisation of activities

The logistics aspects were more closely examined, particularly during the project preparation phase. This helped to prevent the need for transporting materials over large distances.

Modifying workers’ workstyle

Workstyle is the way workers perform their jobs, e.g., the working postures they tend to choose or whether they use the available lifting equipment or not. All workers were trained in improving their working techniques by the company physiotherapist. Working agreements were formulated with the workers and documented in the form of a working techniques protocol.

Policy document

The City wrote a physical load policy document that describes all responsibilities and tasks. In the document it is stated how the City of Delft intends to act on the agreements made. The policy document covers:

- the composition of the Physical Load Committee;
- meeting structure;
- training and education;
- purchasing policy;
- policy regarding older workers;
- rehabilitation policy;
- setting up a new project – points for attention;

- use of tools and materials;
- contracting policy.

Figure 1 A 60 kg 500 × 500 × 80 mm tile that is very fragile. The elongated concrete stones and paving bricks exceed the maximum 4 kg weight. The other bricks weigh less than 4 kg.

Before the city implemented the agreements, it carried out a “Municipal Occupational Safety and Health Survey” that had been developed for the municipalities by the SKB Institute (Centre of Expertise for Work and Health). The city repeated the survey a year later. It showed that road workers felt that their physical load had decreased.

Unwieldy materials

The high physical loads on the road workers were mainly caused by the fact that the materials were too heavy or unwieldy. Most of the bricks and tiles they used exceeded the maximum weight standards for manual handling. Using heavy or unwieldy materials would not be a problem in itself if the road workers were able to use the proper tools or lifting equipment. However, this was not always the case. For example, the architects responsible for planning the district did not take into account the discomforts and health risks that road workers face. The streets were often designed to be too narrow to accommodate a crane or lifting machine. As a result, the heavy materials had to be processed manually.

To tackle this problem, agreements were made with the district planners and with the engineering company. First, an information session was organised to inform the fifteen engineers in the engineering company of the risks associated with physical load and the guidelines issued by the building industry. Then, the engineers studied the video recordings of the manual processing of heavy materials in areas where machines could not be used. Finally, the City Maintenance Sector drew up an agreement concerning the use of guidelines on physical load and the use of materials. Apart from the engineers, the Road Workers Project Leader, a team leader, the safety expert and an executing road worker were also involved in this process.

The agreements and guidelines concerning the use of unwieldy and heavy materials were:

- Instead of concrete paving bricks, large format concrete stones (7-inch) are used. This keeps the weight handled by road workers below the maximum of 4 kg.
- In areas where machines are unable to drive across the sidewalk, 45 mm thick paving tiles will be used.
- Half-sized street tiles that are thicker than 45 mm will be used for access ramps.
- When materials are used that are heavier than 25 kg or that do not meet the guidelines, the engineering firm will consult the road workers about the available lifting equipment that could be used. It should be noted that it is easier for road workers to work with machines on large surfaces.
- These agreements were to be included in the new Public Spaces Manual. This manual is used a standards manual for designing the city's infrastructure.
- The engineers stated that they intended to follow the agreements made.
- The safety expert will monitor compliance to these agreements on an annual basis and will keep the engineering company informed of new guidelines.
- City Maintenance will communicate the agreements to the workers.

What was achieved

The results of a workers' survey on physical load that was conducted before the project began and repeated two years later showed that the physical load that the workers experienced had been reduced.

A more objective improvement that could be seen in this period was a reduction in leave of absence of 3.9% over the period between 2003 and 2005 inclusive. The effect was that the city of Delft earned back its investment.

A key factor that cannot be expressed in terms of money is the strong involvement of the workers in the project. The road workers felt they were taken

seriously because their ideas for improvement were respected. The A&O (Labour Market and Training) Fund co-financed 50% of the investment (costs) related to the company physiotherapist.

Summarising, since the new guidelines were introduced, musculoskeletal complaints and disorders and sick leave of the road workers were reduced. Over time, this is expected to have a significant impact since the design company will also use these guidelines for renovation projects.

A number of factors contributed to the success of the plan of action:

- a sense of urgency, e.g., sick leave due to musculoskeletal problems, disruption of the primary processes, commotion among workers, the new Poortwachter Legislation (governing the reintegration of workers on long-term sick leave), etc. made it clear that immediate action was needed;
- management commitment was present and sufficient time and budget was made available;
- participation of the workers happened from the start to the end of the project. The project made use of their experience and they were shown the results;
- the starting point was the group of workers with a positive attitude, not a focus on a few negative workers;
- extensive communication took place with all workers in addition to the already existing Occupational Safety and Health workgroup;
- the agreements with and promises made to workers were respected;
- a “chain approach” was used that involved the suppliers, in this case the engineers, in the project.

Further information

Enterprise

City of Delft

Martinus Nijhofflaan 2, 2624 ES Delft, Netherlands

Contact person: Mr A.J.F. Verbeek

Email: averbeek@delft.nl

www.delft.nl

Organisation providing the information

Gardien bedrijfsfysiotherapie bv

Delftechpark 26, 2628 XH Delft, Netherlands

Contact person: Mr L.J.C.M. Gardien

Email: info@gardienbv.nl

www.gardienbv.nl

Transferability

This good practice can be applied in other sectors and other countries very well. Components of this example that are well transferable to other job and countries are:

- the fact that by redesign and using lifting equipment the source of the problems was addressed;
- the participative approach to find solutions, in cooperation with employer and employees but even with consulting the designers;
- the chain approach, by involving district planners, designers and suppliers of materials in the process and developing design standards; developing such a solution is often not the responsibility of a single party, but requires the involvement of several parties.

Finally, road construction is a worldwide job, which makes the transferability of this good practice excellent.