

# Reduction of physical strain in a group of road-makers



<http://www.gemeentedelft.info/>

## Country

The Netherlands

## Organisation

Municipality Delft

## Key points

- Reduction of physical strain;
- Participation of road-makers in reduction of occupational risks;
- Harmonisation and dialogue between design and execution enhances the trust in design from the executors.

## Introduction

The road-makers in the municipality Delft are exposed to a high physical strain which resulted in a high prevalence of knee and back problems. A physiotherapist was consulted to study the physical strain and to map the working methods in order to define the bottlenecks. Solutions were described in a plan of approach and implemented successfully. As a result the absenteeism rate decreased with 3.9%, which was mainly related to the decrease of the physical strain.

## Background

The main reason to start with the project was the request from the road-makers themselves. They complained mainly about knee and back pain. Based on this request a periodic study concerning occupational health (PAGO) was performed in 1999.

*"PAGO or periodic study concerning occupational health finds its origin in article 18 from the Law on working conditions (Arbowet)<sup>1</sup>. In case of presence of occupational risks, the employer is obliged to provide the employees with the possibility to undergo an occupational health examination periodically. The examination has to be focused on the prevention or limitation of the occupational health risks. The objective of the PAGO is to trace possible (early) health effects on individual workers, as a consequence of the occupational risks, in order to prevent professional diseases."<sup>2</sup>*

The PAGO showed that physical strain is an important occupational risk in the group of road-makers. Many of the 40 road-makers and service employees in the sector Municipality Management of Delft have problems with knee or back. During participative consultation, the employers, management and

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<sup>1</sup> This law describes the rights and obligations of the employer and the employees concerning working conditions. The 'Arbowet' applies to every place where labour is done. Not only in companies, but also in associations and foundations. (Source: <http://www.arboportaal.nl/onbekend/onbekend/algemeen/wet-en-regelgeving>)

<sup>2</sup> Source: [http://www.rug.nl/bureau/expertisecentra/amd/producten/bedrijfsgezondheid/pago\\_uitgebreid](http://www.rug.nl/bureau/expertisecentra/amd/producten/bedrijfsgezondheid/pago_uitgebreid)

the safety expert chose together to consult an occupational physiotherapist, who has eventually played an important role in the project.

The results from the PAGO already proved that measures had to be taken in order to improve the working conditions for the road-makers. However, from 1999 until 2002 no action was taken. In 2002 the new prevention officer conducted several conversations with the workers, who complained that there was still no improvement concerning working conditions, especially physical strain. Together with the executive he started the project in 2003 that ended in 2005.

## Objectives

The main objective of the project was to reduce the physical strain in order to lower the prevalence of knee and back problems and as a result the absenteeism.

In function of the objective, the bottlenecks had to be defined and proper solutions had to be found. During the project they realized that it wasn't enough to alter the working method of the workers. Sometimes it's impossible to provide manual handling aids and the task itself has to be changed by altering, in this case, the design of the street. Thus, a second objective was to address the designers and make clear to them that they have to consider human factors when designing a street.

## Scope of the project – What was done?

The results from the PAGO showed a high prevalence of knee and back problems. Therefore the prevention officer and the executive chief agreed that a specialist in the field of anatomy who is familiar with occupational hygiene strategies would be necessary for the development and implementation of the project. They decided to contact an occupational physiotherapist. The physiotherapist succeeded in drawing the attention of the workers by adapting his strategy to the target group, which was necessary because of the specific characteristics of the group.

The different steps of the project were the following:

- 1° During a meeting the high absenteeism rate was discussed in function of the high physical strain.
- 2° The PAGO was performed in order to perceive a correct quantitative and qualitative view on the situation.
- 3° Discussion between management, safety expert and participative body representing the workers. They decided to consult a physiotherapist.
- 4° Consultation of the occupational physiotherapist.
- 5° The physiotherapist studied the physical strain and used videos to map the working methods of the workers. Based on the images, they were able to define some bottlenecks.
- 6° The municipality put together a work group that represented workers as well as executives.
- 7° The physiotherapist informed and educated all members of the work group about the guidelines and risks related to physical strain.
- 9° Discussion of the results and bottlenecks concerning physical strain.
- 10° Discussion of possible solutions within the field of ergonomics: techniques, organisational factors and individual factors. An approach plan was set up. The plan is based on regulations from the Arboret (the law on working conditions), which demands to provide with solutions in the following order: first technical adaptations, than organisational solutions and as final option an individual solution.
- 11° Measurement of the situation before the implementation of the solutions by using the 'Arbomonitor Gemeenten'. The 'Arbomonitor Gemeenten' is a questionnaire on working conditions from SKB specifically designed for municipalities. "*SKB is an institute in the Netherlands that performs studies concerning the topics vitality, health and satisfaction of employers for over 10 years. They are the largest institute of the Netherlands within the field of 'employee studies'*".<sup>3</sup>

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<sup>3</sup> Source: <http://www.skbvs.nl/>

12<sup>e</sup> The proposed solutions that were implemented were the following:

- a) A small motorized vehicle that is able to transport stones en sand (called skidster, these 'skidsters' were considered for a subsidy on the basis of the 'Farbo' arrangement.<sup>4</sup>);
- b) Buying stones beneath the weight of 4 kg;
- c) Mechanical paving instead of manual<sup>5</sup>;
- d) Special tool for lifting the bigger stones;
- e) Attune work between the road-maker and the stone supplier;
- f) Using special knee protection;
- g) Using a crane in the preparation phase.

13<sup>e</sup> During a meeting the progress of the project was discussed with the work group.

14<sup>e</sup> Based on the results from the evaluation in the progress meeting the physiotherapist was consulted a second time in function of sensibilisation of the designers from the engineering office:

- a) Educating designers about physical strain among street workers;
- b) Making agreements about pavement material in dialogue with a few street workers.

15<sup>e</sup> Impact measuring by means of the Arbomonitor Gemeenten (this also justifies the projects towards the A+O Fund<sup>6</sup> concerning the co-financing of the physiotherapist.) The results from this second Arbo Monitor revealed that the road-makers felt that the physical strain had diminished.

The project was co-financed by the A+O Fund for 50% of the costs for the occupational physiotherapist. This is twice 10,000 Euro, one time in the beginning of the project and one time after the evaluation.

## Results and evaluation of the project

- The absenteeism decreased from 2003 until 2005 with 3.9 % which is related to the decrease of the physical strain.
- The road-makers feel that their concerns are taken seriously and that the street designers recognize their point of view.
- The manual 'public space' was adapted. This manual describes which material has to be used for the different parts of the road. An adjustment was made in the use of the type of stones so that nowadays less heavy stones are used to pave the streets. This means that the occupational risk during manual handling has been diminished.
- Designers are conscious about physical strain among the executors (road-makers).
- The main occupational risk is dealt with and diminished.

## Problems

According to the safety and health team manager André Verbeek:

- The project lasted for 2 years which is quite a long time and which made it sometimes difficult to stay focused on the topic.

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<sup>4</sup> The 'Farbo' arrangement provides entrepreneurs with the possibility to request a subsidy for the purchase of equipment that decreases the risk at health problems. (Source: [http://home.szw.nl/navigatie/dossier/dsp\\_dossier.cfm?set\\_id=99](http://home.szw.nl/navigatie/dossier/dsp_dossier.cfm?set_id=99))

<sup>5</sup> There are three ways of paving: By using a hammer which requires much labour. The sand is made even and the road-maker works backwards when placing the paving-stones. Each stone is placed individually on the sand and the road-maker tamps the stones in the sand with the hammer. This type of paving is the most accurate but requires much labour. The road-maker can also use the technique "vlijen" which means that he levels the sand and then places the paving-stones on the sand working forwards. This can be done manually or mechanically. Mechanical paving has been developed to lighten the labour of manual paving. Machines place the paving-stones that were already in the right pattern in packets on the sand. (Source: <http://www.knb-baksteen.nl/publicaties/pdf/In%20verband%20straatbaksteen.pdf>)

<sup>6</sup> A+O Fund = The Foundation Labour Market and Training Fund Municipalities, <http://www.aeno.nl/>

- Workers aren't really fond of questionnaires. That's why they decided to let the workers fill in the questionnaires in group during work time with provided support.
- Sometimes, attention went too much towards the non-cooperating workers instead of the cooperating workers.
- Recently a new standard concerning occupational strain on road-makers was published. When the surface that has to be paved is above a certain threshold (1500 m<sup>2</sup>), the street has to be paved mechanized. Now it seems that in the branch they will make smaller orders to get round the new standard. Apparently not all designers feel responsible.

### **Success factors**

- The involvement of the workers themselves was an important factor in the success of this project. The workers accept solutions much easier when they can participate and when they feel that they are taken seriously. The workers are the only party that knows what will really work in practice.
- The focus wasn't only on the working methods of the workers but also on the design of the streets. When the street is designed in that way that the physical strain of the workers is high, a change in working methods won't solve the problem. An integrated solution is indeed the best.

### **Transferability of the project**

According to the safety and health team manager André Verbeek:

It could be interesting to make the designers of public spaces responsible, not only for their own personnel but also for the contractors so that these parties also take human factors into account.

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### **Organisation that provided the physiotherapist**

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### **Sources**

Farbo arrangement on the site of the Ministry of social affairs and employment, consulted at 21 September 2007: [http://home.szw.nl/navigatie/dossier/dsp\\_dossier.cfm?set\\_id=99](http://home.szw.nl/navigatie/dossier/dsp_dossier.cfm?set_id=99)

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SKB, consulted at 5 September 2007: <http://www.skbvs.nl/>

PAGO from the university Groningen, consulted at 5 September 2007:  
[http://www.rug.nl/bureau/expertisecentra/amd/producten/bedrijfsgezondheid/pago\\_uitgebreid](http://www.rug.nl/bureau/expertisecentra/amd/producten/bedrijfsgezondheid/pago_uitgebreid)

Portal on health and safety from the Ministry of social affairs and employment, consulted at 21 September 2007: <http://www.arboportaal.nl/onbekend/onbekend/algemeen/wet-en-regelgeving>

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<http://www.arbo-online.nl/?subject=article&id=156> consulted at 5 September 2007.

Verbeek A., team manager health and safety municipality Delft, conversation by telephone on 5 September 2007

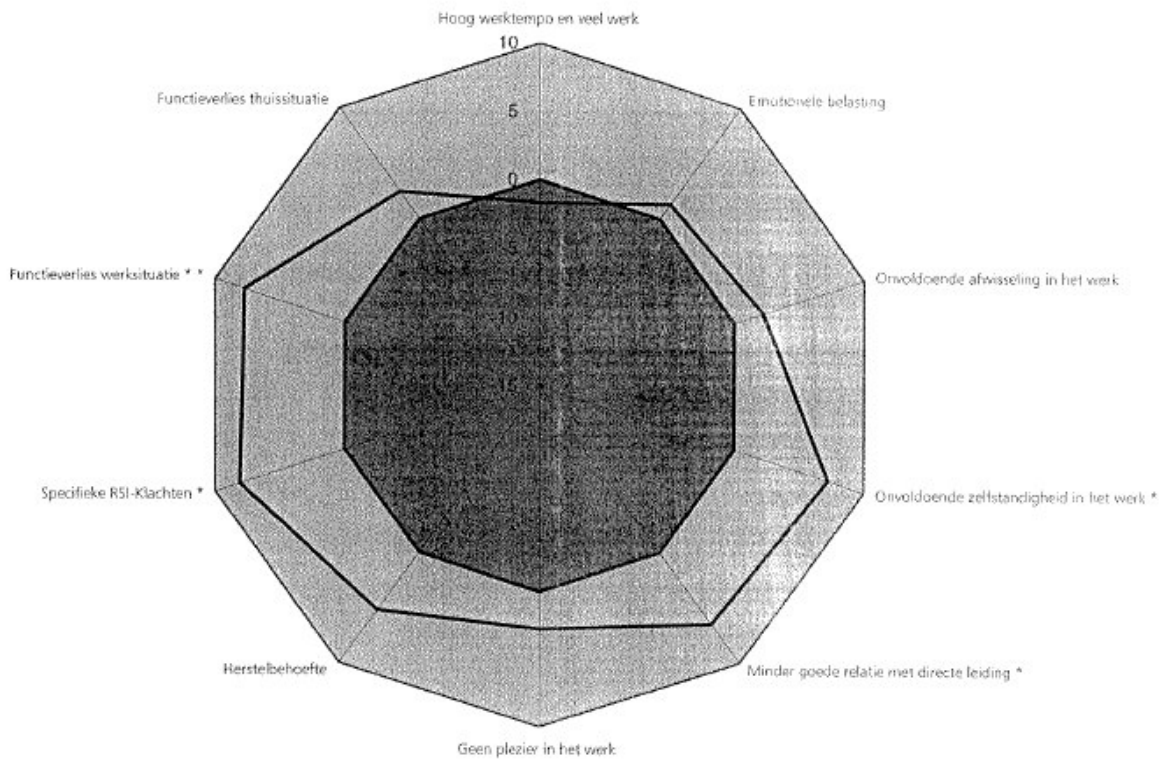
## **Attachement**

The diagrams below give the results from the zero measurement and the effect measurement. Ten different factors have been measured. From the top and then following the circle clockwise, they are:  
High pace and lots of work, emotional strain, insufficient variation in the job, insufficient independency, not that good relationship with the supervisor, no pleasure in work, recovery need, specific RSI complaints, function loss work situation and function loss home situation.

The reference group stands at zero. This has been made visible by the black line around the inside dark grey circle. The capricious line shows the difference between the reference group and the examined group. When this line is within the dark grey circle, the examined group scores favourably with respect to the reference group. When this line is outside the dark grey circle, the examined group scores unfavourably with respect to the reference group. The stars show in how far the score is significant in this scale.

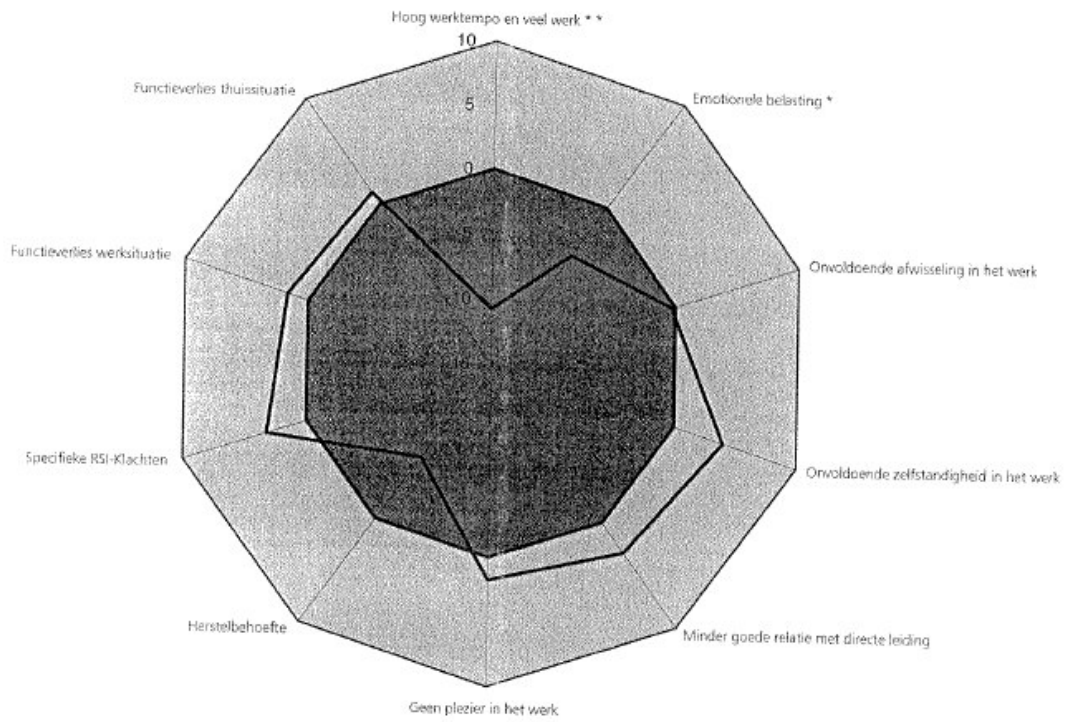
### **Zero measurement**

The results from the zero measurement show that negative scores are significant for the following factors: insufficient independency, not that good relationship with the supervisor, specific RSI complaints and function loss work situation.



### Effect measurement

The results from the effect measurement show that the effort really paid off. There are no longer negative scores that are significant. Instead there are two factors that have a very positive score, namely high pace and lots of work and emotional strain.



Source: The results come from the municipality Delft, André Verbeek  
 The diagrams resulted from the 'Arbomonitor Gemeenten' from SKB.