

PARTICIPATIVE DEVELOPMENT OF WORK METHODS (SÄTKE, TASKE)

Organisation

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Introduction

Electricians in power network construction companies construct and maintain power networks, lighting systems, and traffic lights. They also operate and maintain hydroelectric power stations. They work in difficult terrain, in the midst of heavy traffic and on poles. The weather conditions vary with the seasons from freezing temperatures and snow to sunshine and rain.

Mechanics and electricians install heating, plumbing, air-conditioning, and electrical systems in new buildings under construction and in renovation projects. They have no permanent workplace, but work in different construction sites in different phases of construction. The work sites bring together workers of different occupations and from different firms, which has an impact on both safety and the practices and outcomes of the work.

The work of heating, plumbing, and air-conditioning mechanics and electricians both in the energy and in the construction sector involve awkward work postures and physical strain. The work often requires positions with upraised arms. Postures that involve stooping or twisting strain the back and the neck. Working in crouching positions, on one's knees, or with one's weight on one leg strains the legs. The work includes much carrying, holding, lifting, and other use of force.

Most of the 900 heating, plumbing and air-conditioning mechanics and electricians who had responded to the Taske project's questionnaire (response rate 30) had experienced musculoskeletal pains or aches that had restricted their daily activities during the past twelve months. Most often pain and ache was located in the head or neck, shoulders, the lumbar region and knees, thighs or calves.

Table 1 Results of Taske questionnaire on the question: “Have your daily activities been restricted during the last 12 months due to pain and ache in the following body parts?”

Body part	a) not at all	b) a little	c) much
Head, neck	14 %	67 %	19 %
Shoulders	24 %	56 %	19 %
Elbow or forearm	46 %	44 %	9 %
Wrist or fingers	42 %	51 %	7 %
Lumbar region	22 %	59 %	19 %
Hips	64 %	31 %	5 %
Knee, thighs or calves	25 %	59 %	17 %
Ankles or feet	50 %	43 %	7 %

Besides physical strain, the work of heating, plumbing, and air-conditioning mechanics and electricians involves many accident risks. Lighting, noise, cold and draught also cause problems.

Aims

The aim of the project was to develop safer work methods and to promote the health of electricians who work in power network construction and maintenance companies.

What was done, and how

As a solution, work methods, equipment and personal protective equipment were developed in co-operation with many different actors in power network construction and maintenance (project SÄTKE, three energy companies) and in technical building services (project Taske, two construction companies).

Specific information on risks was gathered by analysing past accidents, by performing risk assessments of the work tasks, and by asking the workers about their work conditions. The work tasks and the workers' performance of them were observed through videoing and photography, and risk assessments based on work site visits. The aim was to focus the risk assessments and development work on the most frequent work tasks.

Working groups were formed to develop risk prevention practices. The groups consisted of experienced heating, plumbing and air-conditioning assemblers, electricians, manufacturers and dealers of tools and work equipment, and occupational safety specialists. The projects involved companies who sell tools, work equipment and personal protective equipment. Some of the companies

also manufacture equipment. The number of participating companies was 13 in SÄTKE and 11 in Taske.

The managers of the construction and power network construction companies supported the work of the development groups. Information, pictures and videos, gathered in work site visits, were utilised by the development groups.

The development groups assembled several times for development meetings organised by researchers. First, the groups discussed problems related to their work and selected some of them for closer examination. Then, the groups innovated possible solutions for the problems with the instruction to maintain an uncritical approach. The solutions created comprised of new work methods, uptake of already existing good products, new work tools and instructions. The best ideas were chosen for further development.

Between the meetings, the participants manufactured prototypes of new equipment and tested different equipment in practice. One of the tasks of the development groups was to promote the use of solutions recommended by them.

The development groups introduced many useful solutions for health promotion.

- Provision of a drawstring and bag for lifting tools up the pole to remove the need to carry tools when climbing. In addition, the device serves as a shelf diminishing the need for electricians to carry tools and materials in their belt.
- Using a helical tie for tying cables was recommended. This reduces the amount of work done in awkward work postures and diminishes the rotating motion of the wrist and the arm.
- Use of a drive wheel slide instead of regular fasteners in corner purlins improves the speed of work and diminishes the amount of time working in awkward postures.
- A special device was introduced to protect the knees when kneeling at work. It also functions as a stool, thus diminishing the strain in the legs.
- A new type of ladder was developed based on the needs of workers. Besides stability, factors such as mobility, climbing angle, width of tread and fittings were accounted for in its design. In particular, the ladder diminishes the strain on legs.
- For transferring heavy switchboards, a special trolley and lifting handles were developed.

Trade unions and employers' associations were represented in the projects' steering groups. They had a broader conception of the fields and were able to inform their members about the projects and their results. In the Taske project, the occupational health nurses working in the construction companies took part in the steering group. The nurses had knowledge about the health issues in the work of heating, plumbing and air-conditioning assemblers and electricians and

were in a position to inform assemblers and electricians about better work methods.

What was achieved

A particular strength of the participative approach used to develop improved work methods was the co-operation towards the common goal of making work safer and diminishing work-induced strain. Different groups brought different knowledge and experiences, which were utilised by gathering them and combining them in a creative way. Co-operation of assemblers and electricians with tool and work equipment manufacturers and dealers was found to be very useful for creating and testing prototypes. The co-operation was fruitful and the relationships formed in the projects enabled the participants to continue the joint development work even after the projects.

So far, no research has been conducted about the effects of solutions recommended by development groups. Based on the tests carried out by the assemblers and electricians in the work sites, these solutions seem to diminish physical strain at work and prevent accidents. Consequently, it can be assumed that pain and sick leave days among assemblers and electricians will also be reduced.

One goal of the projects was for assemblers and electricians to be able to continue working until retirement age if the work is rendered less risky and physically demanding. Moreover, we wanted to enhance the attractiveness of these jobs to young people. Solutions concerning work environment and ergonomics are generally expected to improve the productivity and quality of work.

Participative development takes time. The projects lasted from 18 months to 2 years. Every construction and energy company had from three to ten people who actively developed work methods and equipment.

Development groups of the SÄTKE project came up with over 30 solutions to improve safety and reduce physical strain in the work of electricians. The Taske project reported about 15 solutions to improve safety and reduce physical strain in the work of heating, plumbing, and air-conditioning assemblers and electricians. Some of the solutions had already been adopted into active use when the project ended, whereas others were still in the planning phase.

Along with the introduction of new solutions, the company will save time and money due to reduced sickness absences and improved work quality.

Manufacturers and dealers of work equipment and personal protective equipment will receive value for the time spent on the project through information about the needs of product users and ideas for product development. It is likely that their sales will also be improved.

Further information

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Transferability

This approach has been used in two projects that were focused on different fields: on the energy sector and on technical building services. The approach can also be applied in other fields.