Workspace design for healthcare workers and domestic helpers - ergonomics used for the planning of future workplaces

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Abstract: The described project deals with workspace design in housing for disabled or elderly people so that 5 – 95th percentile Scandinavian population is able to work with modern technical aids and installations in a safe way. Human modelling CAD-system SAMMIE was used to design bedrooms and bathrooms where healthcare workers and domestic helpers are performing many heavy manual jobs. The models were finally tested in 1:1 mock-up. This paper and presentation shows bathroom examples taken from the full project.

Keywords: workspace design, healthcare workers, domestic helpers, bedroom, bathroom

1. Introduction

It is a common assumption that there is a relation between restricted workspace and musculo-skeletal disorders and accidents at the workplace. This also goes for healthcare workers and domestic helpers taking care of the elderly and/or disabled persons. For this reason a consortium of national Danish authorities and other Danish stakeholders in the 1990's initiated a process of defining the demands for domestic living spaces based on anthropometric measures and different technical aids related to the care of these persons.

The project also focused on a holistic approach so that disabled or elderly people able to manage without helpers could also use the same living spaces with or without assistance from carers. The presentation will deal with the applied ergonomics methods used and the results.

Methods

Anthropometrics of Scandinavian population 20 – 30 years old were used to define size of assistive care workers both now and in the near future. In general the population was based on the interval from 5th percentile. mesomorph female up to 95th percentile mesomorph male. The citizen (for instance a wheelchair user) was also defined within this interval. Included as wheel-chair users there were also persons with stiff knees and hips who can require additional manoeuvre space (Bolstad et al 1992, Nowak 1996).

The dimensions and form of technical aids and installations, such as wheel-chairs, lifts, hoists and domestic furniture (such as toilets and sinks) were surveyed from market studies looking for best possible equipment.

Functional three dimensional CAD models were created and tested using the SAMMIE human modelling system (Sengupta, 1995). SAMMIE is able to test the function of dynamic working situations with a range of human operator models. An example of a two dimensional diagram generated from the system is shown in fig 1. Finally a full scale testing of these results was carried out using a mock-up with real installations and technical aids.

Results

Assessments were undertaken for single well defined situations. The results were not used to develop a uniform design of bath rooms or sleeping rooms – but rather provided the minimum space requirements to perform care for the inhabitants or to give them the possibility to manage adequately by themselves. The requirements defined for the single situations were combined to develop examples of 'ready-to-build' architect drawings.

In figure 1 and 2 examples of such a single situations are given.

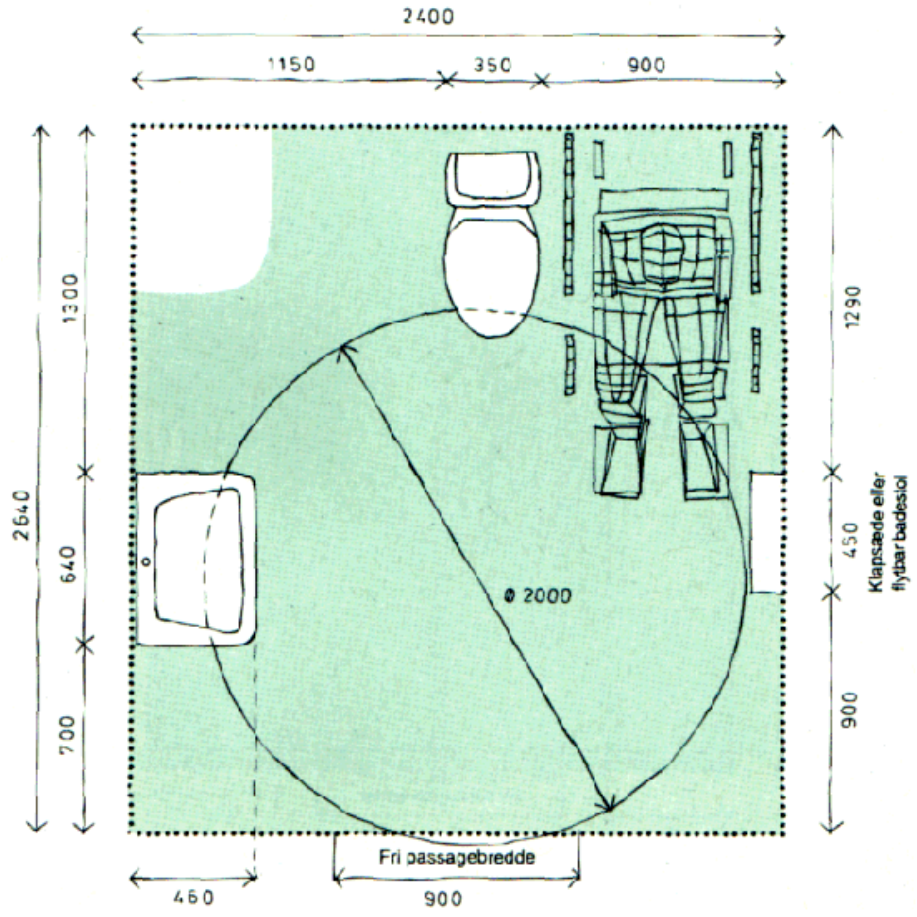


Figure 1: Example of results: Bathroom space envelope and layout for users able to mange by themselves as well as those requiring professional assistance from one or two helpers. Measures are given in mm.

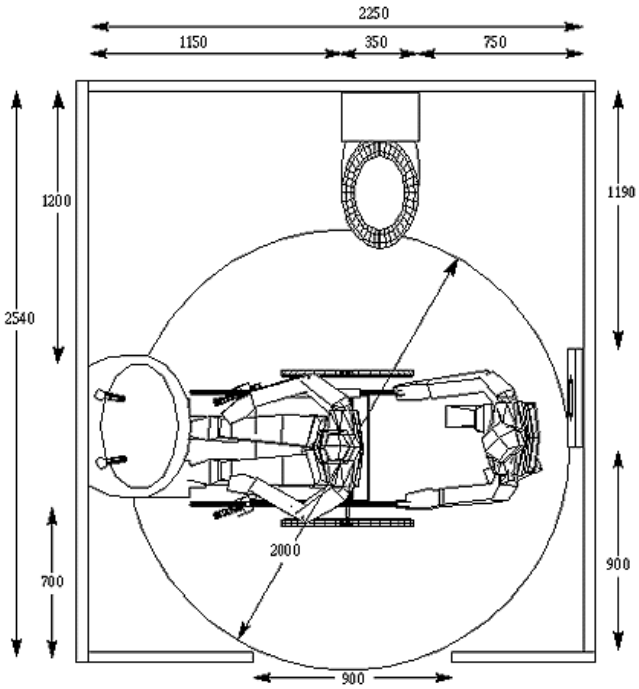
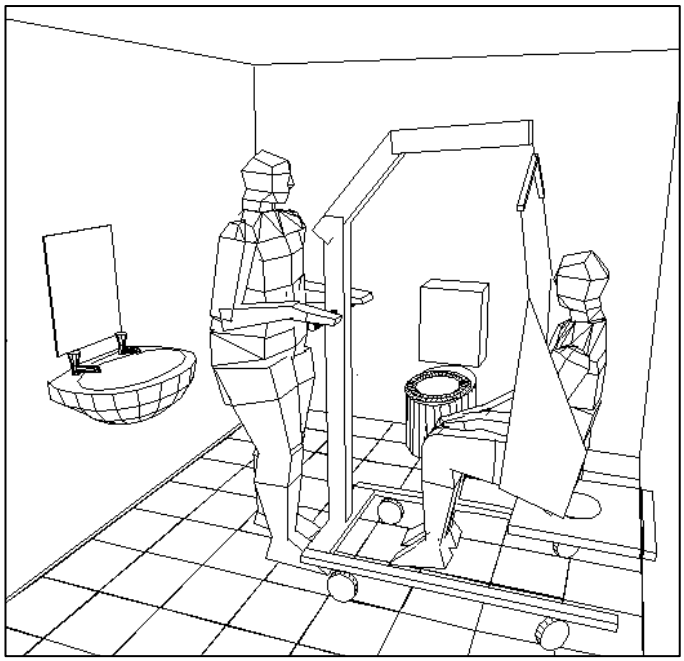
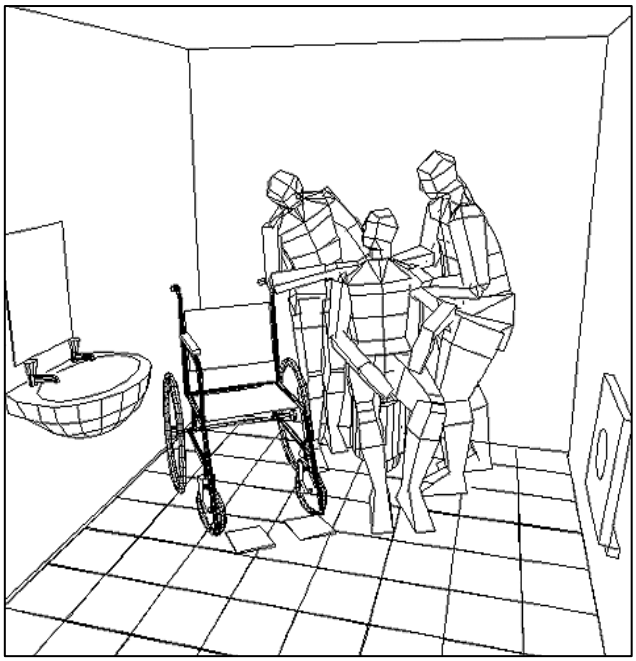


Fig 2: Bathroom designed only for elderly or disabled persons needing help. Here there is not space enough for self-managing persons using a wheel-chair at the right side of the toilet.

Below are shown two work situations

the bathroom used to test the dynamic work performed in two different manoeuvres





For a full presentation of all results see ”*Indretning af ældreboliger for fysisk plejekrævende m.fl.*”.

Discussion
This project laid down a framework for the improved future housing of elderly and disabled persons along with a better basis for safe and healthy working conditions for their helpers. The results of project are still providing examples of best practice design useful for decision-makers, building owners and their architects, and last, but not least, act as an instrument for the authorities dealing with social matters as well as those dealing with occupational health and safety.

The increasing preponderance of people of extreme body size is well documented in science and the media; however the project did not cover people belonging to this fraction of the population. It is recognised that in order for people who fall into this category to be accommodated using the framework designs from this project, in for instance a future community housing for elderly, that special designs and arrangement are likely to be required for at least some rooms.

Additionally, new assistive equipment or technologies and furniture installations may also alter design conditions.

The presentation will show the actual results as 'ready to use' data and will discuss how well of the legislation and code of practise has been implemented since the work was published in Denmark in the late 1990's.

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