

Focus on IFA's work

Edition: 2/2017

617.0-IFA:617.81

Use of one or two screens: physiological parameters and performance

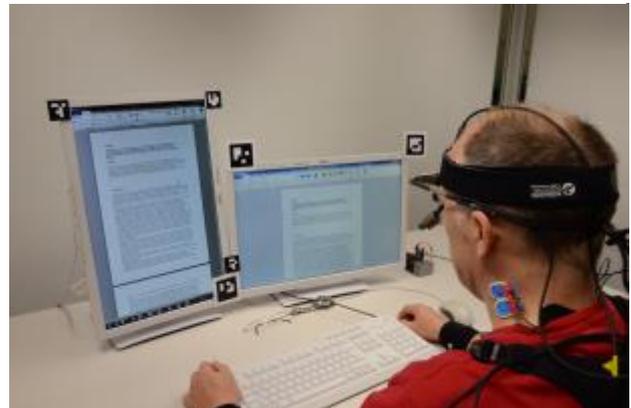
Problem

With increasing digitalization and networking of office work and a shift to paperless offices, the proportion of work being conducted at VDU workstations continues to grow (VDU: Visual Display Unit). The required usable screen real estate is also growing, since several programs or screen forms are often in use simultaneously. Consequently, work at typical conventional office workstations is increasingly being performed with multiple screens used simultaneously or in alternation rather than with a single standard 19" screen. Some studies indicate that worker performance can be increased by the availability of greater screen real estate. The influence of the use of different screen configurations upon the workers has however barely been studied before now.

The purpose of these studies was therefore to identify evidence of possible hazards to the workers presented by these screen configurations and in turn to identify any need for additions to the existing recommendations for prevention.

Activities

A laboratory study was conducted of three different screen configurations: a single screen (22") was compared with two variants of a dual-



Subject at the laboratory workstation with two screens

screen workstation (two 22" screens, in one arrangement horizontal + horizontal and in the other horizontal + vertical). Ten voluntary subjects (five female, five male) performed standardized tasks (copying texts, comparing texts, sorting data) at these VDU workstations on different days.

In order for physiological parameters to be recorded, body posture, movement and position, muscular activity in the shoulder/neck region, eye-blink rate, visual acuity, screen distance, and the subjective perception of the test persons were measured by a range of methods. Studies were also conducted of the subjects' qualitative and quantitative performance.

Results and Application

The subjects' performance differed in its quality and quantity according to the screen configuration and type of task. During copying of a text and sorting of data, the performance achieved with two screens was generally superior to that with a single screen. During comparison of text on the screen, superior performance was achieved on the single screen, but the subjects also made a greater number of errors.

Only minor, insignificant differences were observed regarding the movements of the upper body (thoracic spine); these movements were in any case not strongly pronounced. The majority of movements were performed with the head and eyes, and varied according to the screen configuration. Rotary movements of the office chair occurred on only a very minor scale, irrespective of the screen configuration. A significant change in muscle activity in the shoulder/neck area was detected as a function of the type of task, but not of the screen configuration.

The eye-blink rate also appeared to be determined substantially more by the task type than by the screen configuration used. A slight increase in the eye-blink rate was observed with the use of two screens compared to use of a single screen; this can result in better wetting of the cornea with tear film. A change in the subjects' visual acuity (pre- vs. post-test) was not demonstrated, nor was a general relationship between the distance adopted from the screen and the screen configuration observed.

Following the tests, eight of the ten test persons stated that given the choice, they would prefer the VDU workstation with two screens in a horizontal arrangement.

The conditions already stated in DGUV Information 215-410 for ergonomic work at VDU workstations can largely be transferred to the performance of tasks on two screens. The results of this study do not suggest a need at the present time for these recommendations to be amended.

User Group

Workers at VDU workstations; safety delegates; employers

Additional Information

- Brütting, M.; Ditchen, D.; Ellegast, R.P.; Petersen, J.; Schäfer, P.: Nutzung von einem oder zwei Bildschirmen an Büroarbeitsplätzen – Auswirkungen auf physiologische Parameter und Leistung. IFA Report 5/2016. Published by: Deutsche Gesetzliche Unfallversicherung (DGUV), Berlin 2016
- DGUV Information 215-410: Bildschirm- und Büroarbeitsplätze – Leitfaden für die Gestaltung. Published by: Deutsche Gesetzliche Unfallversicherung (DGUV), Berlin 2015

Expert Assistance

IFA, Division 4: Ergonomics – Physical Environmental Factors

Literature Requests

IFA, Central Division