

# Focus on IFA's work

Edition 2/2013

617.0-IFA:638.81

## Ergonomic study of specific dynamic office chairs

### Problem

Owing to the growing number of office and VDU workplaces, increasing numbers of employees are physically inactive. Longer periods spent in a predominantly static seated position may lead both to static overloading (tension) in the muscular system, particularly in the neck and shoulder region, and to functional underloading of certain muscle groups, such as the back and abdominal muscles.

Some manufacturers of office chairs present a remedy in the form of models which are claimed to promote "active" sitting in various ways. These dynamic office chairs exploit special technical design features, such as lateral inclination of the squab, variation of the contact pressure and active self-rotation of the squab, which are intended to lend the chairs particular dynamic properties. For users in companies, the question is whether these additional dynamic properties significantly increase the physical activity and thus have a positive effect upon health.

### Activities

In conjunction with the IFA and the Dutch TNO Work and Employment institute, the Verwaltungs-Berufsgenossenschaft (the institution for statutory accident insurance and prevention in the administrative sector – VBG) conducted a comprehensive ergonomic evaluation of dynamic office chairs.



Measurement at a simulated office workplace in a laboratory environment; display in the CUELA software

Office chairs described by the manufacturers as being particularly dynamic were studied in comparison with a standard office chair in laboratory and field tests involving a total of 50 test subjects. In the tests, sitting postures and movements and the activity of the back muscles were measured mechanically and the subjective impression of the test subjects recorded by means of questionnaires. A measurement system for the recording of seated tasks was developed based upon the CUELA system, and employed.

## Results and Application

To summarize, analysis of the measured data from the laboratory and field studies revealed that the task performed had a greater positive influence upon the individual seating dynamics of the subject than the choice of chair. The results show that the chairs differed in their dynamic characteristics, but also that these differences do not directly result in greater physical activity on the part of the seated person.

Instead, the measured values suggest that the chair's movement has no significant influence upon the muscular activity and the body dynamics.

Interviewing the test subjects with regard to their subjective impressions revealed major differences between the individual chairs. Two of the special chairs failed to satisfy the expectations placed upon them, and were in fact considered by the test subjects to be detrimental to their health. One special chair and the reference chair met the expectations, and only one of the special chairs surpassed expectations and was rated positively by a majority of the test subjects. The study results were set out in a guidance document for users in the field with the title (in German): "Spoilt for choice: how do I purchase the right chair".

## Area of Application

All industrial sectors involving occupational activity which is primarily performed seated at office and VDT workplaces

## Additional Information

- Ergonomische Untersuchung besonderer Büroarbeitsstühle. BGIA Report 5/2008. Ed.: Deutsche Gesetzliche Unfallversicherung (DGUV), Sankt Augustin 2008, [www.dguv.de/ifa](http://www.dguv.de/ifa), Webcode [d18885](#)
- Die Qual der Wahl – wie beschaffe ich den passenden Bürostuhl. VBG Info Map. Ed.: Verwaltungs-Berufsgenossenschaft, Hamburg 2010
- Ellegast, R. P.; Kraft, K.; Groenesteijn, L.; Krause, F.; Berger, H.; Vink, P.: Comparison of four specific dynamic office chairs with a conventional office chair: impact upon muscle activation, physical activity and posture. *Applied Ergonomics* 43 (2012), pp. 296-307
- Groenesteijn, L.; Ellegast, R. P.; Keller, K.; Krause, F.; Berger, H.; de Looze, M. P.: Office task effects on comfort and body dynamics in five dynamic office chairs. *Applied Ergonomics* 43 (2012), pp. 320-328

## Expert Assistance

IFA, Division 4: Ergonomics – Physical environmental factors

## Literature Requests

IFA, Central Division