

## **Body Support in the Office (Excerpt)**

**The following is an excerpt from the Herman Miller Research Summary: Body Support at the Office: Sitting, Seating, and Low Back Pain (2002).**

### **“Ergonomic Chair Features**

The variety of “ergonomic features” offered by office chairs can be bewildering. This list of common chair features explains the potential usefulness of each, based on the material presented in this paper. Although establishing dimensional criteria for chair adjustments must depend on the specific situation, recommended ranges are given in documents such as the “ANSI/HFS 100 Standard for VDT Workstations” (available from the Human Factors and Ergonomics Society, PO Box 1369, Santa Monica, CA, 90406).

Many of the features described here allow a chair to adjust to a given posture, body size, or task. It is important to keep in mind that posture change is essential to healthful sitting. Adjustability features should allow, rather than inhibit, free movement in the chair.

Seat-height adjustability allows users to adjust the chair so that their feet are on the floor or the work surface or keyboard is at an appropriate height or, preferably, both. Pneumatic adjustment mechanisms are easier to use than mechanical ones.

Seat-depth adjustability, achieved through an adjustment that moves the backrest in or out or through a sliding seat pan, changes the front-to-back depth of the seat. A shorter seat pan allows small people to use the chair’s backrest; a deeper one feels more stable to taller individuals.

Backrest-angle adjustability allows the sitter to change the angle of the backrest relative to the angle of the seat. Although this may be accomplished with an adjustment mechanism, it can also be achieved through the use of flexing materials or springs in the chair shell. With backrest angle adjustability, the chair can support different degrees of recline. Reclining transfers some upper-body weight to the chair backrest and lightens the load on the lower back’s intervertebral discs. Backrest-angle adjustability also allows the sitter to increase the angle between torso and thighs, reducing pressure on discs by restoring the natural inward curve of the lower back, called lordosis.

Chair recline, or tilt, achieves the benefits of recline by changing the angle of the entire seat relative to the floor. There are two types of tilt geometries: column tilt, in which the chair pivots at the top of the base post and lifts the knees slightly while the back descends, and knee tilt, in which the pivot point is forward of the post, nearer the knees. In a knee-tilt chair, the knee lift is negligible, but the back (and head) descend more than in a column tilt chair.

Seat pan-angle adjustability generally refers to the ability to change the angle of the seat forward or back. It allows the user to choose a fixed angle instead of a free-floating

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recline. Often this feature provides forward tilt, in which the thighs slope downward. The main purpose of forward tilt is to open the angle between the trunk and thighs, inducing lordosis and reducing disc pressure.

Armrests support the arms, reducing the work of the shoulders and possibly the upper arms. Used inappropriately, armrests can inhibit free motion of the arms during activities such as typing.

Height-adjustable armrests help avoid the problems of too-high armrests, which result in elevated shoulders and pressure on the undersides of the elbows and forearms, and too-low armrests, which require the worker to slump or lean to one side to use them. Height adjustable armrests also can keep armrests out of the way during typing or other activities requiring free motion.

Width-adjustable armrests let the sitter change the distance between armrests. Armrests close to the body help avoid the splayed elbows that cause wrists to bend to the side during activities such as keying. A mechanism that allows the user to adjust armrests while seated permits closer positions than one that requires out-of-the-chair adjustment, since the latter must leave hip room for entering and leaving the chair.

Padded armrests potentially avoid uncomfortable pressure on the undersides of the forearms and elbows.

Lumbar support is intended to promote lordosis and is usually accomplished through gentle curves in the backrest shape. Back rest height adjustability refers to the ability to change the height of the lumbar support area of the chair backrest, although it is often interpreted to mean the ability to change the height of the entire backrest. This feature accommodates preferences by different workers regarding where and how the lumbar support curve contacts the back.

Lumbar-depth adjustability affects the size and sometimes the firmness of the lumbar support curve in a chair's backrest. Like backrest-height adjustability, it accommodates different references and body shapes.

Pelvic stabilization also promotes lower back support at the sacrum, the base of the spine, by enhancing upright posture.”

**For the complete text of this research summary, please CONTACT Thomas Interior Systems.**