

Gesture: An Ergonomics Evaluation

An internationally renowned ergonomist critiques the Gesture chair and its innovative new headrest.



Jan Tissing can't stand it when he sees people in poor postures. As a physiotherapist and ergonomic consultant to companies around the world, he frequently sees work postures compensating for ineffective chairs.

"This affects not only your back and arms, but your head and neck too. The cervical spine, from the shoulders up, is a marvel of engineering, holding the head and supporting all our senses. But if your neck has to flex forward to hold your head, as is often done when you work on desktop screens, tablets and laptops, the cervical spine will deform rapidly. In my opinion, sitting is a fine way and, most of the time, the best way to perform tasks. But many chairs haven't kept up with how we use technology, the frequent collaboration, and the different postures we assume throughout the day."

Given these trends, Steelcase asked Tissing to evaluate the Gesture chair, the first office chair designed to support a greater range of technologies, postures and sizes. How well does Gesture, including its new headrest, perform for today's multitasking, tech-wielding knowledge worker?

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JAN TISSING | Physiotherapist and Ergonomic Consultant

A HEALTHY POSTURE

Tissing says good seated postures have many benefits. “We know that the human body can command an enormous repertoire of sitting postures. That’s why people have different preferred working positions. So I don’t look for a single, best posture; I look at the impact on the skeleton, muscles and blood flow.”

He says a healthy seated posture:

- Supports an angle of 100° or more between the hips and spine
- Maintains the spine’s natural S-shape
- Supports the head centered on the neck, not leaning forward
- Puts no pressure on internal organs
- Helps maintain healthy blood flow in the body



EVALUATION

Tissing and his team evaluated the Gesture chair with headrest in use by 22 test subjects, men and women between the ages of 23 and 61. Each person used Gesture from three to 10 hours during a typical workday.

Users were not told how to adjust Gesture or even how to sit with proper posture, only that they would be photographed while working. A high-definition video camera captured each user's position every 30 seconds, documenting how they worked, moved and interacted with colleagues as well as with the Gesture chair. The users were also observed and recorded while working in the chair they normally use at work each day.

Tissing says most of the users' regular chairs caused the natural S-curve of the spine to "deform" into a C-shaped curve. As people leaned toward their digital devices, the upper body inclined forward and the head and neck moved ahead of the back. "This has negative effects on the spine and discs. The lungs are pressed together and the bowels start to crowd the thorax (chest) area."

Some had chairs without armrests, or with armrests that are difficult to adjust, "which caused users to sit forward and assume a poor posture."

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Another issue he saw with the test workers' chairs: back tension adjustments were difficult to find and use. Some users lacked the weight or heft to recline the seat back, or didn't know how to adjust back tension, so the back remained in the upright position. That meant users could not recline and reduce the pressure on the sitting bones and more evenly distribute that pressure throughout the upper body.

Headrests were lacking on most of the users' chairs too. "Few standard task chairs have a headrest. It's typically added as an upgrade to create a manager chair," says Tissing, who believes headrests should be more widely available (see sidebar, left).

In fact, when Tissing gave users brief instructions in chair use and posture, or showed them time-lapse images of themselves at work, they assumed more reclined postures and took advantage of the Gesture chair back and headrest, more so than when using other chairs.



RESULTS

Tissing and his colleagues grouped the results of the study by specific chair adjustments and their support for different parts of the body. Here are their findings.

Seat Height

Gesture's range from 406 to 533 mm (16"-21") easily fits males from 157 to 200 cm (approx. 5'2"- 6'7") and females 153 cm to 197 cm (approx. 5'- 6'6"). That's 99% of all workers.

Seat Depth

Gesture's seat-depth adjustment (70 mm / 2.75"), together with its shape and soft edges, accommodates users from 149 to 200 cm (approx. 4'11"- 6'6") in height. Seat comfort, the smoothness of the mechanism and the backrest combine to provide good comfort and support. Even when reclined in the Gesture chair, users found no need to reposition themselves after long periods.

Lumbar Support

Advanced, automatic lumbar support, combined with Gesture's capability to adapt to weight differences between users and its inviting armrests, give the standard Gesture an advantage over many other chairs.

Adjustable Armrests

Easy and intuitive to use. A single button adjusts height and activates 360° motion of width, depth and pivot. The pivoting feature is unique: it supports the arm and shoulder in its natural movement and doesn't force the shoulder into protraction or other uncomfortable positions.

Headrest / Neck Rest

Adding the advanced design headrest to Gesture's already slightly higher back invites the body, especially the upper thorax and lower cervical region, to lean back and relax. The head is balanced on the torso.

The highly adjustable neck rest makes a difference to the user; the neck rest can be positioned very easily in every position with height, forward and tilting adjustments. It's easy to adjust: just grab with two hands and adjust it to your head. Plus, it supports the same range of sizes as the standard chair, 99% of the population.

Mechanism Adjustment

Often it's difficult to find a mechanism that can fit all users. For example, a small user might not have the weight to move the chair out of an upright position. Gesture really fits all users, and invites them to relax. The tension knob on the mechanism needs only four full turns to go from lightweight to really heavy. Even in the most upright position, there are a few degrees of movement of the back, just enough to comfort the body in a way that those who only want to sit in a fixed chair are pleasantly surprised.

General Adjustment

People tend to test a maximum of three knobs up to three times. Manuals are most often not read. Gesture has two turning knobs and no buttons to pull or push.

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All controls are located together on the right side of the chair. The single knob for each armrest is easy to find and works well. The neck rest has no knobs; just grab and position. You can even do part of it without your hands.

Summing up, Tissing believes that “today, there's no reason to sit in a chair from the equivalent of the horse-and-buggy era when you can use a hybrid car that offers speed, comfort and safety.”

“With Gesture, I see a chair that has it all. If you're considering a chair for today's knowledge worker, you definitely should consider Gesture.”

JAN TISSING | Physiotherapist and Ergonomic Consultant

WHY YOU MAY NEED A HEADREST

“A chair is like a human. It has arms, legs, feet, a bottom and a back. But where has the headrest been?”

Jan Tissing, physiotherapist and ergonomic consultant, believes this is a problem, and one exacerbated by contemporary workstyles. “Since CRT monitors were replaced by flat screens, people have been crossing the expanse of worksurface by leaning forward, which gets them into a poor posture and deforms the spine.”

Tissing says “headrest” is a misnomer. “A headrest doesn’t rest the head; it rests the neck. Let’s call it a neck rest.” Reclining in a chair with a neck rest brings the weight of the head into balance on the torso, instead of the head being suspended on the cervical section of the spine.

“The user can see the screen and keyboard by moving the eyes or slightly moving the head, without the neck having to carry the full weight of the head.

“Extending the height of the back isn’t the same. Most headrests don’t support the head properly. That’s why you see people putting their hands behind their heads to hold the head in position. You need a neck rest that truly supports the head. I see a neck rest as a must.”

AN ERGONOMIST RUNS THE NUMBERS

Jan Tissing, physiotherapist and ergonomic consultant, is passionate about the value of good seating and how comfort and support translate into company profits.

“Take a wage of €40,000 (\$45,000), about average for The Netherlands, Germany or France. Add €17,000 (\$19,000), the average cost for technology, HVAC, housekeeping, security, etc., for each worker. Add the profit a company would like to make, say, 10%.

“That means that each employee should generate an average of about €63,000 (\$70,000) to cover costs plus profit.

“If you can raise each employee’s productivity by just 5%, that would be an additional €3,000 (\$3,300) in profit for the company.

“Raise productivity just 1% and you’ve made an additional €600 (\$670). That’s the cost of a great ergonomic chair. And you get that back, through a better supported, more comfortable and more engaged employee.

“Plus, the chair is a one-time investment. One time. It will last for 10 or more years. After one year it’s paid for itself. And for the next nine years, it’s pure profit.”

HEAD OF THE CLASS

Developing the most advanced headrest available doesn’t happen overnight. “Simply extending the back with a panel and upholstery is not enough, nor is clasping something to the back,” notes Jan Tissing, physiotherapist and ergonomic consultant.

The new Gesture headrest builds on research and design development work done as far back as 2002. That year, Steelcase design researchers pointed out that a properly designed headrest needed to help keep the head oriented to a visual task and allow the head to be supported while not performing a visual task, and be out of the way when the user desires no support.

A good headrest should adjust vertically to accommodate users of different sizes, of course. But it also needs to move horizontally, toward the user. Too far forward and the headrest is in the way; too far back and it doesn't provide enough support. Passive adjustment headrests on the market had precisely those kinds of issues.

Researchers analyzed global anthropometric data, ensuring the headrest would comfort and support 99% of potential users. The ideal configuration would "present the headrest to the user in a refined, elegant and subtle way." Industrial designers sought a "good-looking, thin, elegant headrest that is both lightweight and pleasing to experience," what they called "a comfortable, cradle-like support." The headrest was also hinged so it could be angled by the user. Any user adjustment had to be intuitive, thanks to this legacy, the new Gesture headrest offers what Tissing calls a message: "'Use me for some support.' And that is what it does with all the tasks I can think of in a modern office."

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