

# What every **body** knows.



## **Sguig® Ergonomics Primer**

Designed by E00S for Keilhauer

Keilhauer and the Austrian design team E00S set out to create an “intuitive” task chair that would follow the human body’s natural inclination for movement and postural variation. A chair that would provide healthful support for the body at work – and preserve vital energy for the body at play.

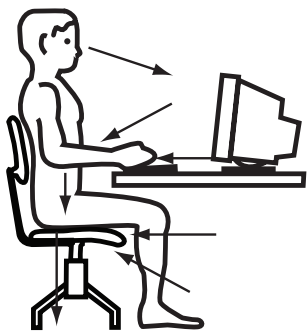
That chair is Sguig.



**KEILHAUER**

# Why don't people sit the way they're supposed to?

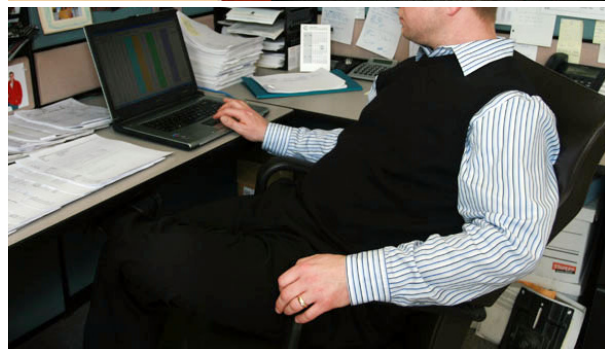
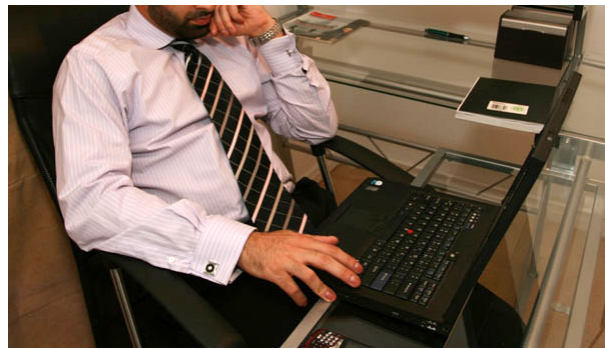
Years of research, design, and engineering efforts and millions of corporate dollars have been expended in the pursuit of an ergonomic task chair that will support the human body in a neutral posture. Doctors have written books, ergonomists have developed training programs, governments have published guidelines (e.g., NIOSH, 1997) to educate people about how to sit in those chairs so their bodies will benefit from that support.



*Ergonomic manuals often advocate an upright posture with torso, elbows, and knees positioned at 90-degree angles for people who sit at their work.*

Yet, in workplace after workplace we have observed men reclined under their keyboards, their upper backs rounded and necks thrust forward, and women perched on the front edge of their seats, their backs completely unsupported.

Why do people who work with computers persist in assuming these sitting postures even after ergonomic training? That is the question we set out to investigate. This paper presents our findings and our response to those findings as embodied in the design of the Sguig chair.



# The body wants to **move**.

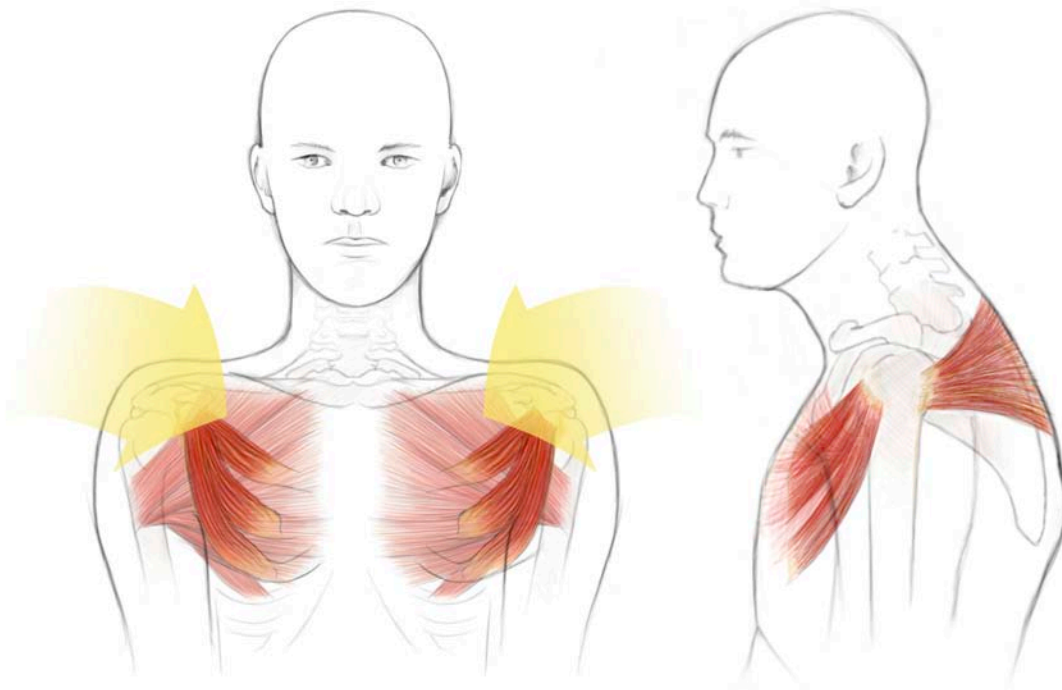
Working with the Vienna University of Technology, EOOs undertook extensive studies to record and measure the movements of the human body performing seated work. What they found was that people move constantly. Participants in their studies were never still for more than 15 seconds.

The body knows what it needs. As computer use has become ubiquitous and lower back pain and repetitive motion injuries plague increasing numbers of office workers, research has validated the dangers of maintaining a fixed position for too long. Static work postures contribute to chronic disorders including impaired circulation, muscle pain, and degeneration of the spine (Grandjean, 1987).

Lack of movement can also cause restrictions in the fascia – the web of connective tissue that permeates the human body – to initiate the cascade of symptoms known as Repetitive Strain Injuries (Tick, 2007). When muscles are required to keep static positions – either stretched (locked long) or shortened (locked short) – increased fascial tightening, decreased function, and possible trigger-point pain result (Myers, 2001).

Medical doctors and kinesiologists have long stressed the health benefits of postural variation and the need for task chairs that allow and encourage movement (Fleischer, 1987). Movement aids the natural process that brings nutrients to the spine, promotes circulation in the deep veins of the legs to reduce risk of life-threatening thromboembolism, and increases oxygenation to the brain to improve alertness and effectiveness at work.

Ergonomic experts also stress the importance of *supported* movement for the seated body at work. Back support reduces muscle work and loads on the spine; backrests that provide continuous support through a range of motions improve comfort and reduce fatigue for people working at computers (Hedge and Ruder, 2003). However, researchers have also noted that intensive computer users tend to perch on the front edge of their chairs or slump against the backrests, flattening or even reversing the natural lumbar and thoracic curves (Dolan and Adams, 2001).



*When a single seated posture is maintained for too long, the strong pectoral muscles in the front of the chest tighten and pull the shoulders forward, while the mid-back interscapular muscles lengthen and become fatigued.*

# Men and Women sit on **different planes.**

Preliminary in-house research by Keilhauer suggested that these two frequently observed postural variations – perching and reclining – are gender-related. When users sit the way their bodies tell them to – as opposed to the way the ergonomics manuals tell them to – we noted a significant difference in the intuitive positions assumed by men and those assumed by women.

Keilhauer contracted with Dr. Jack Callaghan, an expert in spine biomechanics at the University of Waterloo, Canada, to do an independent study of this phenomenon. Over the course of eight months, Dr. Callaghan and his research team collected data comparing postural alignment, body positioning, kinematics, center of mass, and seat pan interface pressure for male and female subjects.

The findings showed significant differences between genders in postural alignment and seating position on the chair. Continuous spine and pelvic measures taken during the study revealed that females sat with a more anteriorly rotated pelvis and less lumbar and trunk flexion than males, who sat with a posteriorly rotated pelvis, greater lumbar flexion, and more forward-leaning trunk postures (Callaghan and Dunk, 2005).

These gender-related differences in pelvic rotation have significant implications for the design of task chairs that support men and women equally. Differences in center of mass and positioning on the seat pan must be taken into account when designing a chair and mechanism that accommodate a woman's more anteriorly positioned center of mass, and a backrest that allows her to sit deeply enough into the seat to get the benefit of lumbar support.

For males, whose posteriorly rotated pelvic position predisposes them to a more reclined postural alignment when performing seated office work, thoracic support may aid in reducing the forward bending of the thoracic spine that results from sustained forward bending of the neck (Fitzsimmons, 2004).

Additional research by Dr. Jack Callaghan for Keilhauer found that a backrest design with thoracic support had a positive effect on the lumbar posture of males performing typing-related tasks (Callaghan, 2006).



# The result: Sguig, a chair that provides **equal** opportunity comfort.

Important innovations equip the Sguig chair to accommodate and provide unprecedented support for the distinct sitting styles of **both men and women.**

## **Pelvic Balance Point® Technology**

Our research found a wide discrepancy in the location of center of mass for the seated bodies of males and females. For men, the center of mass location averaged 4.6 cm behind the base point; for women the average was 1.1 cm in front of the base point (Callaghan and Dunk, 2005). Sguig's unique Pelvic Balance Point technology is designed to offer balanced support throughout this range for both genders.

The molded seat pan is designed to optimize comfort regardless of pelvic rotation or position by evenly distributing weight to avoid painful pressure points.

A sliding seat pan provides further positioning support for the posterior rotation of the male pelvis.

Negative space provided by the lower contour of Sguig's adjustable backrest in relation to the sculpture of the seat ensures that the anteriorly rotated female pelvis can be positioned deeply enough into the chair to allow women full benefit of the built-in lumbar, kidney, and thoracic support.



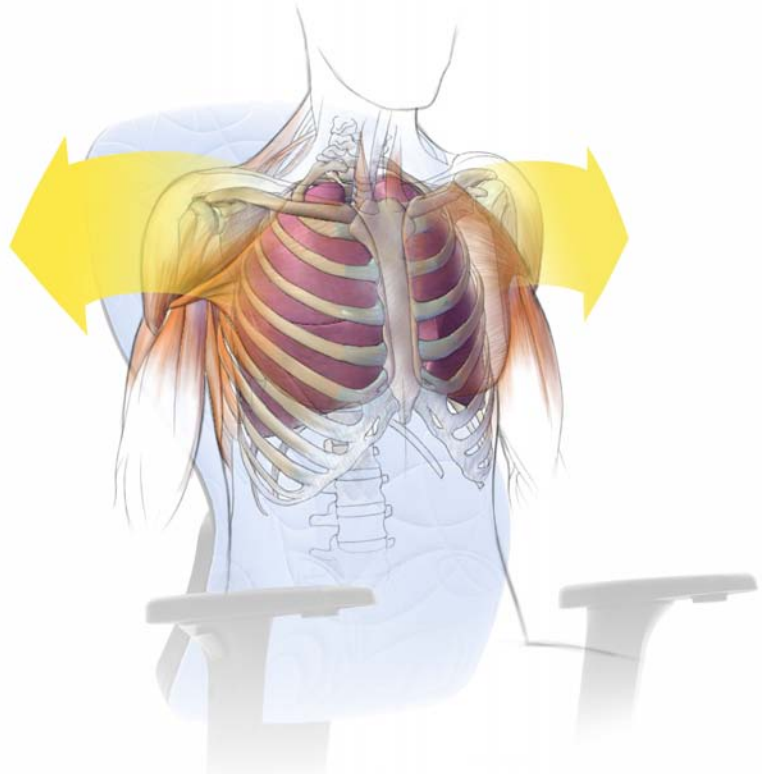
## T1 – L5 Free Shoulders® thoracic support

Shaped to support the spine in its natural S-curve from the first thoracic vertebra (T1) to the fifth lumbar vertebra (L5), the rigid central frame of the Sguig backrest provides the visual and tactile assurances the body needs to feel secure enough to let muscles relax. Back support with too much movement or flex keeps some muscles engaged as the body intuitively works to maintain equilibrium.

The molded contours of the backrest curve in at the side edges to provide secure lumbar and kidney support and curve away behind the shoulder blades to leave space for healthful movement of the upper back. This unique thoracic support system allows the shoulder muscles to release in a reclined posture, raising the sternum and opening the lungs to improve circulation and oxygenation to the spine and brain.

When the thoracic spine is securely supported in this way, the body can perform the small, intuitive myofascial stretches that reverse the muscle patterns associated with keying and mousing tasks. Reclining against Sguig's backrest allows chronically shortened pectoral muscles to stretch and encourages optimal lengths for the rhomboids and lower trapezius. This counteracts the kyphotic hunch that increases fascial tightening and also compresses the diaphragm, limiting deep breathing.

While these effects are obviously beneficial to both genders, our research (Callaghan, 2006) also found that Sguig's unique approach to thoracic support had the added benefit for men of helping them to maintain a more supported S-shaped spinal curve while performing typing tasks.



# Sguig: The intuitive chair.

Engineered to accommodate the intuitive movements and postures every body knows, Sguig provides the optimal support every body – male or female – needs. In a Sguig chair, people don't have to worry about how they're "supposed" to sit, so they can focus their attention on their passions, their work, and the companies that employ them – and still have vital energy left at the end of the workday to actively enjoy the rest of their lives.



# Sguig

Designed by E00S



## 9921 Sguig

W 26" D 26" H 40-46"  
SH 17-21" AH 23-30"

Sguig is available in three signature Sguig electro-welded back patterns and coordinating plain seat all done in 100% polyester Sguig textile. Please see [www.keilhauer.com](http://www.keilhauer.com) for downloadable images of each colour/pattern combination. Textile samples are available from your Keilhauer representative.

Sguig is also available upholstered in Keilhauer Leather and pre-approved COM textiles.

The polypropylene cover can on the cylinder is available in translucent white or solid grey.



Adjustable Arm



Adjustable Back Height



Adjustable Seat



T1-L5 Free Shoulders® Design

Due to the constant evolution of, and additions to, product lines, Keilhauer encourages reference to [www.keilhauer.com](http://www.keilhauer.com).

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