

Measure for your health



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INVESTING IN YOUR FUTURE

ENGLISH EDITION



SMARTSEAT

INTRODUCTION

During evolution, the human body did not evolve in terms of working in a sitting position. Nowadays, however, we spend more time in a sitting position than ever before. Most office workers spend an average of 6 hours sitting in front of a monitor, typically in an incorrect posture, in an inappropriate office chair. Persistent poor posture damages not only the spine but also the surrounding muscles and soft tissues. In addition, a sedentary lifestyle has a detrimental effect on the functioning of internal organs, especially the digestive and respiratory organs.

Because few workers consciously pay attention to proper posture, poor sitting positions become commonplace, common, and only come into focus when the resulting bodily symptoms have already developed.

SmartSeat is an intelligent office chair with sensors that provides the most ergonomically favorable seating position, is able to send feedback to the user about his posture and makes suggestions for correcting any errors.



THE ERGONOMIC SEAT

According to the angle of inclination of the torso, three types of seating positions are worth distinguishing:

- Leaning back (center of gravity at the back)
- Center (center of gravity)
- Tilted forward (center of gravity in front of the seat)

Each type of seat depends on the form of action. The reclining seat is a posture for relaxation and rest (reading, watching TV).

The center seat is the most common position taken while working on a computer. Ideally:

- the backrest fits well with the curvature of the spine
- the lumbar support is adjusted to the correct height
- the user's thighs are in a horizontal position, the lower legs are vertical
- the soles rest on the floor
- the armrests are adjusted to the height of the elbows, the forearms are horizontal.

The tilted seat is typical of activities on a table that require special attention (use of a microscope, meticulous manual activity).

In a sitting position, low back pain and long-term damage to health usually result from the relaxation of the muscles of the spine and thus from the increased pressure on the cartilage discs. The lower the angle of inclination of the hip, the lower the pressure on the cartilage discs. We should therefore strive for the angle of the backrest and seat to allow for the most open hip angle possible. To do this, the seat of the SmartSeat can be tilted slightly forward, thus ensuring an open hip angle, even when tilted forward.

However, in office workplaces, in addition to the correct sitting position of the user, the position of the equipment, the desk, the monitor, the keyboard, and the mouse must also be considered.



Tilted forward



Center



Leaning back

Consequences of an incorrect sitting position

Neck pain

A common problem when working at a computer is neck pain. The primary reason for this is that the monitor is too low. The height of the monitor is adequate when the top of the monitor is in line with eye level.

Shoulder pain

The weight of the arms puts a steady load on the shoulders in the event of an incorrect posture. The elbow is ideally located under the shoulders, and the weight of the arms is supported by armrests adjusted to the appropriate height.

Back pain

The most common cause of back pain is improperly adjusted back or lumbar support. Whether you are leaning forward, vertical, or leaning back (resting), it is important that the backrest provides adequate support in all positions.

Depression of the lower half of the thigh

A seat with a sharp edge or an inadequate height results in the compression of the tissues in the lower half of the thigh, which causes circulatory problems and numbness in the legs. To avoid this, it is important to provide the correct height adjustment range and a soft, downward-curving design of the front edge of the seat.

Low back pain

The lower, lumbar region of the spine, where there is a characteristic curvature in the spine, is the most vulnerable, with low back pain and most of the spine problems also occurring here. A straight posture can be achieved on a horizontal seating surface without a backrest if the back muscles are properly active while sitting. However, pain can occur in the muscles due to fatigue, after the muscles relax, the load is taken over by the spine, resulting in strong distortion of the spine.





SETTING OPTIONS

The goal of SmartSeat is to offer a static office chair with a wide range of settings and configurations that also meet the needs of users with different physical abilities.

1. Height adjustment

The height of the seat can be adjusted in the range of 40-52 cm with a gas telescopic system.

2. Backrest height

The backrest becomes adjustable by loosening a thumbscrew. It can be moved in a vertical direction within a range of 50 mm, which makes it possible to adjust the appropriate height of the lumbar support that is part of the backrest in an interval of 12-17 cm from the seat.

3. Backrest tilt

The angle of the backrest can be adjusted with the rear crank in the range of 85-115 degrees. The unique feature of the chair is that the backrest can be tilted 5 degrees forward than the vertical for working in a tilted position.

4. Seat depth

The seat can be moved back and forth in a range of 50 mm, making it possible to adjust the seating depth to the user's upper leg in a range of 40-45 cm.

5. Tilt seat

The angle of the seat can be adjusted between -5 and +8 degrees with the front crank.

6. Armrest height

The height of the armrests must be adjusted to the height of the user's elbow. Properly adjusted armrests keep the arms stable, thereby reducing the load on the shoulders. The height of the armrests is adjustable in the range of 15-27 cm.



1. HEIGHT ADJUSTMENT



4. SEAT DEPTH

5. TILT SEAT

2. BACKREST HEIGHT



3. BACKREST TILT



6. ARMREST HEIGHT

MEASURING CELLS



The uniqueness of the SmartSeat office chair lies in the use of high-precision measuring cells. The metal frame structure, which is the basis of the modular design, is suitable for placing 4-4 strain gauge stamps on both the seat and the back. This also allows the stress conditions of the chair structure to be studied during use without the user perceiving anything about it. Equipped with the measuring elements of the seat and backrest of the chair structure, it is possible to track the use of the chair during use and its changes. This provides an opportunity to provide feedback on the seat position and posture of the chair user via a mobile phone application.



CENTER OF GRAVITY CALCULATION



BASED ON MEASURING CELL DATA



ELEMENTS OF THE SMARTSEAT SYSTEM

In addition to real-time posture analysis available to the user, the online database provides an opportunity for the ergonomic consultant or treating physician to make a remote diagnosis.





Following user calibration, the sensors continuously analyze the user's body position and session duration. The sensor data is sent to the mobile application via Bluetooth. In the mobile application, after logging in, the user can track his body position in real time on a data visualization interface. The application analyzes the body position, the quality of the seating position, and sends a warning to the user in case of sitting work exceeding the set duration. There is continuous data synchronization between the mobile application and the online database, making it possible to view SmartSeat data from a remote computer as well.



CLOUD DATABASE

The SmartSeat application can not only display current data about the user, but can also be used for long-term tracking. The data stored in the online database can be used to evaluate the user's characteristic postures and work habits.

MOBILE APPLICATION

Real-time assessment of seating position

The values of 4-4 measuring cells located on the seat and back of the chair are transmitted to the mobile phone via the Bluetooth connection of the chair. The telephone application does not display the raw weight data to the user, but displays the center of gravity calculated from the sensor data with a moving point each on an interactive visualization interface corresponding to the seat and backrest. From these two positions, or their relative positions, the user's body position can be accurately determined and bad posture can be identified.

On the stylized seat and backrest, the application indicates the reference areas with two circles.

- If the center of gravity is located within the inner circle, the user sits in an optimal body position.
- If the center of gravity is inside the outer circle but outside the inner circle, then we can speak of a moderate posture.
- If the center of gravity is outside the outer circle, the posture is bad, the user must adjust his posture.



Long-term statistics

Long-term statistics are used to map the user's work-related habits. The test period can be specified by selecting the start and end dates.

- How many hours per day does the user spend sitting?
- In what proportion does the optimal, tilted or reclined body position occur?
- Asymmetry Displays the aspect ratio
- The Sitting map shows the most common locations of centers of gravity.

The Sitting map depicts the most common positions of the centers of gravity in a depth map.

STATISTICS





ALERTS

Following user calibration, the sensors continuously analyze the user's body position and session duration. In addition to a visual display of body position, the system also alerts the user with sounds

• Too much time spent sitting - time to get up and exercise.

Indication in incorrect seating positions:

- There is no force on the lumbar support.
- The upper part of the backrest is not in contact with the body.
- The user is sliding forward in the chair, there is too much pressure on the front of the seat
- Asymmetrical load: two sides of the body are not subjected to the same load.

Each of the alarms can be switched on and off according to the user's needs, the sounds used for the signal can be selected from one folder. You can choose to signal only in the case of a particularly bad posture, or even in the case of a slightly suboptimal posture.

Smart Seat	Ø
ALERTS	
Time selector	
45 min 🔻	
Select sound	
·····	
Snooze time	
5 min 🔻	
Time selector	
Select sound	
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SITTING IN BAD POSITION Time selector 5 min	
Select sound	

MODULAR SYSTEM





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