



Ergonomics Assessment of the Sum Chair

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Executive Summary

An ergonomics assessment of the Allsteel Sum chair has been completed by a Certified Professional Ergonomist. The results indicate that the chair offers several beneficial ergonomics features, the primary benefits are as follows:

- Free floating and locking seat back promotes healthy motion
- Weight balanced recline offer simplicity
- Self adjusting lower and upper back support using air transfer
- Highly adjustable armrests (fore/aft, up/down, variable width)
- Adjustable seat pan depth
- Shock absorbing seat pan (pneumatic cylinder)
- Sized to fit a beyond the 5thile female to 95thile male
- Comfortable pressure distribution characteristics

The Sum chair offers intuitive self-adjusting fit, adhering to the current best practices in ergonomics seating.

The Sum chair streamlines and simplifies the adjustment process by reducing the total user adjusted settings. Users adjust seat height, seat pan depth and armrest position. The recline mechanism is weight balanced and a single lever is provided to lock or unlock the recline mechanism.

While the Sum chair is simple to use, users of all types of seating should be educated in the adjustment features and the principles of healthy seated postures.

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1.0 Overview

An expert ergonomics review has been completed on the Allsteel Sum office chair by a Certified Professional Ergonomist (CPE) with over 20 years of product testing experience. The purpose of the assessment was to examine the design and features offered by the chair to determine if it meets with best practices and applicable ergonomics seating standards. The evaluation included a qualitative assessment of the chair features in addition to a pressure distribution measures of the support offered by the seat.

2.0 Ergonomics Review

The Allsteel Sum chair comes in both a high back and mid back model (see below). There is also a stool option. Armrest options include adjustable, fixed or no armrests.



A description of the seat features and results of the ergonomics review are provided in the following sections.

2.1 “Free floating” Seat Recline

The free floating, weight balanced recline eliminates the need to adjust recline tension. The seat reclines 15° creating a 105° angle defined by the knee-hip-shoulder. The seat back also provides a few degrees of flex. This healthy motion promotes blood flow and provides relief of spinal disk pressure.

The recline tension provides adequate resistance to support the users upper and lower back in the upright position. There is an optional lock to maintain the seat in the reclined or upright position.

2.2 Self Adjusting Back Support

The chair possesses an effective lumbar curvature as evidenced using pressure mapping. An air bladder is used in the seat back to distribute support resulting in increased contact surface area. The self adjusting support extends to the lower and upper back regions as well as offering some lateral support. The effect promotes comfort and accommodates a wide range of user anthropometry.

2.3 Adjustable Armrests

The sum chair offers highly adjustable and cushioned armrests. The adjustability range is adequate to accommodate beyond the 5th percentile female to 95th percentile male. The adjustability range is as follows:

Adjustment	Minimum	Maximum
Vertical (from center of seat pan)	6.5"	11.25"
Fore/aft (front edge from seat back)	9"	12"
Width (space between)	16.5"	19"

The contours and padding of the armrests minimize the potential for ulnar nerve contact stress at the forearm or elbow (image below). Armrest height is adjusted using a well placed button. The fore/aft and width adjustments are friction adjustments allowing the armrest pad to be pushed into position without the need of a separate release lever. The fore/aft adjustability enables the user to push them full back far enough to pull the chair up to the edge of the worksurface.



Side view of armrest

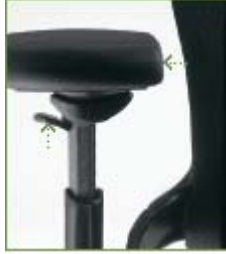


Illustration of
Armrest Adjustment

2.4 Seat Pan Width, Depth and Height

The seat pan possesses an 18" width that extends the full length. The seat pan provides a slight upturned contour at the sides that provides some lateral support. The forward side edges of the seat pan are padded and contoured so that they should accommodate individuals beyond the 95th percentile hip breadth.

The seat pan possesses approximately 3.25" of depth adjustment. The forward edge of the seat from the lumbar area is adjustable between 16.75" and 20" in approximately 0.5" intervals. The adjustability will accommodate the 5th percentile female to 95th percentile male user population. The forward edge is well padded and tapered downward to minimize contact stress at the thighs. This is an important ergonomic feature that supports blood flow to the lower legs.

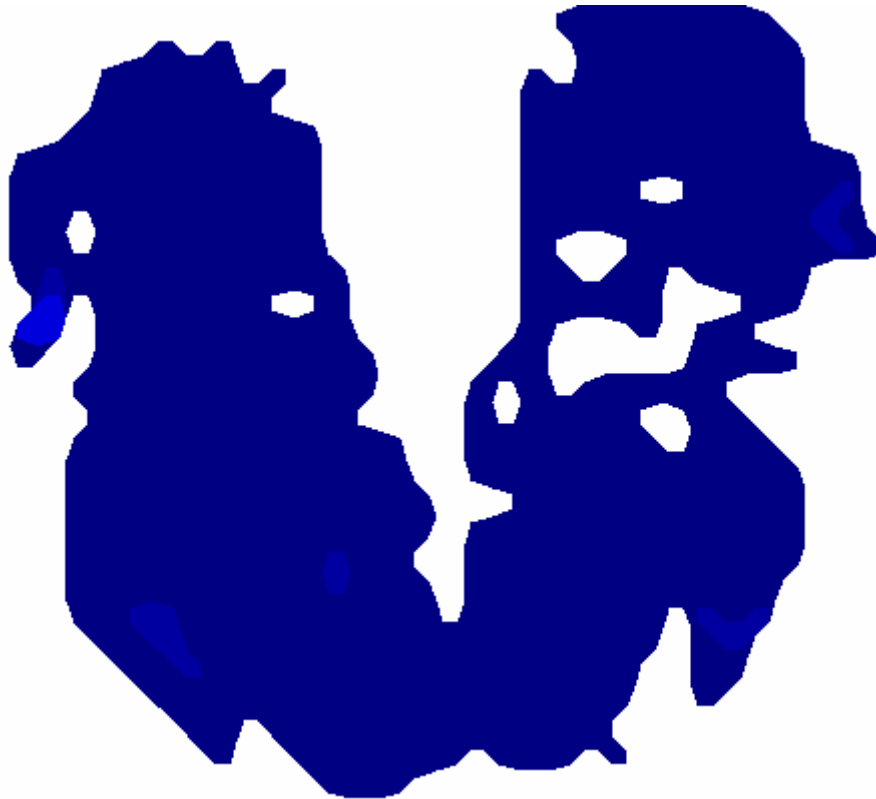
The seat pan height was adjustable between 17.25" and 22.25" measured from the center of the seat pan. Based on current practice, users are typically adjust the seat height to a point approximately 2" above popliteal height (the height of the point behind the knee). The high setting will accommodate the 95th percentile male. The forward edge of the seat pan compresses to a height of approximately 16" in the low setting. This indicates that the 5th percentile female will be accommodated. For smaller users a low range seat cylinder is available that adjusts 15" to 18.5".

2.5 Shock Absorbing Cylinder

The chair tested possessed shock absorption that provided a noticeable "soft landing" in the seat. This is a desirable feature that will benefit heavier individuals or users that are frequently in and out of the seat. The soft landing reduces the peak deceleration forces on the body and is likely to minimize spinal disc pressures. The shock absorption was achieved through the height adjust cylinder.

2.6 Support

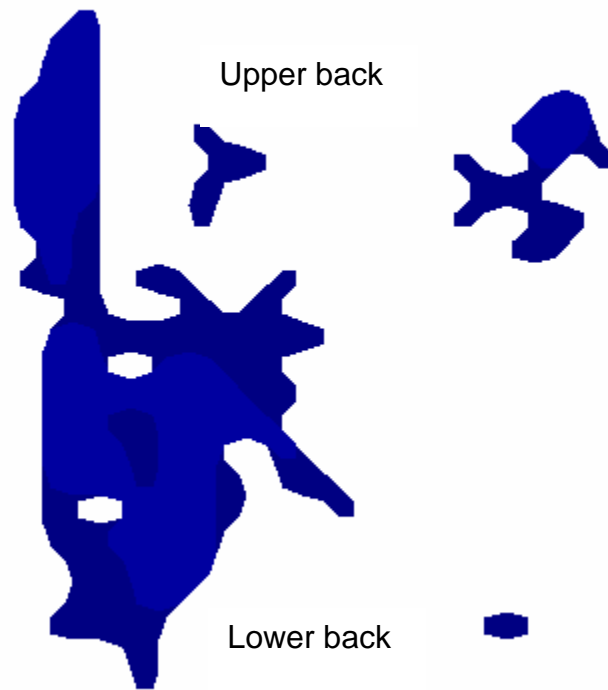
Sample pressure measurements were obtained from a single male subject of approximately 70th percentile (height=71.0" weight=180 lbs). The contact pressure was measured in the upright and reclined positions. The pressure profiles revealed characteristics associated with comfortable support. Average pressure levels were recorded between 6mmhg to 9mmhg in critical regions of the seat pan. The gradients of pressure were also desirable with no aggressive peaks or "hot spots" identified. The transfer of pressure over the front edge of the chair was evenly distributed (see below). Peak pressures were below 35mmhg, well below the thresholds that may lead to contact pressure issues.



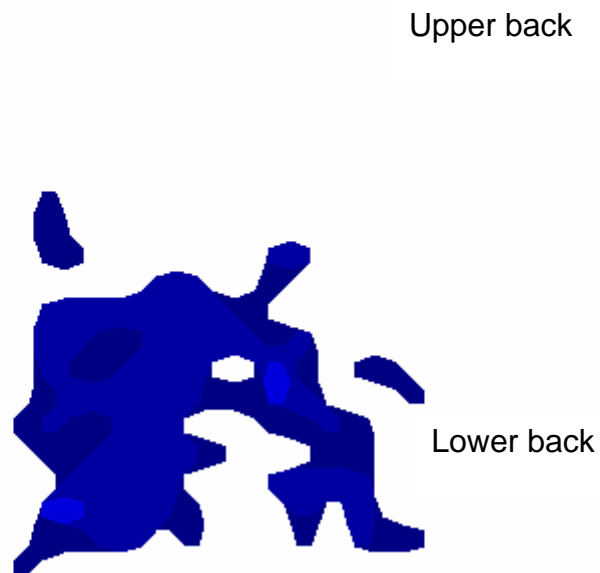
Seat pan pressure distribution for large (70th percentile male)

The back support was effective in both the upright and reclined positions. The seat back supported the lower back (lumbar) in the upright positions and the lower and upper back in the reclined position.

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Seat back pressure during recline 70th percentile male



Seat back pressure during recline 70th percentile male

3.0 Conclusion

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