



Ergonomics Assessment of the Allsteel® Mimeo™ Chair

Prepared for:

Allsteel®

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Executive Summary

Allsteel's Mimeo task chair was evaluated by a Certified Professional Ergonomist at United States Ergonomics. The results of this evaluation indicate that the Mimeo chair offers very good dynamic support, comfort features and provides an effective range of adjustability to meet the needs of diverse users. A summary of the ergonomics benefits are as follows:

Beneficial features

- The adjustable weight balanced recline promotes healthy motion and accommodates users throughout the normal range of working postures.
- Mimeo supports a comfortable hip angle of approximately 100° and allows for recline up to approximately 140°.
- Sample pressure mappings indicate a comfortable distribution of pressures and support in key areas. Pressure data indicates the chair will promote proper seated postures and should be comfortable for extended durations.
- The flexible frame on the chair back provides good dynamic back support and the mesh provides support and ventilation.
- The flexible frame on the chair back supports a wide variety of postures and a wide range of users. The flexible material provides support for leaning over the top of the chair and to the sides for collaboration.
- The adjustable armrests provide stable and comfortable support throughout a good range of adjustment. They can be adjusted to prevent clash with the work surface and lowered out of the way if desired.
- The adjustable seat pan depth (standard) will improve the comfort and accommodation of a wide range of users.
- The chair's adjustments are well designed, clearly visible, intuitive and easy to operate.

1.0 OVERVIEW

An expert ergonomics review has been completed on the Allsteel Mimeo task chair by a Certified Professional Ergonomist (CPE) with over 25 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 complies with best practices and applicable ergonomic seating standards. The evaluation included a qualitative assessment of the chair features in addition to pressure distribution measurement of the support offered by the seat.

Pressure measurements were obtained from a male of approximately 70th percentile stature (height=71.0” weight=185 lbs) and a female approximately 50th percentile stature (height=65” weight=132 lbs).

2.0 EXPERT ERGONOMICS REVIEW

The Mimeo model evaluated was the task chair with fully adjustable armrests, and a cushion seat pan (see below).

The Allsteel Mimeo chair comes as a task chair or work stool. The chair has a 3D knit backrest. The external lumbar support is optional and able to be removed by the user. Armrest options include fully adjustable or fixed “T-Type”. We recommend the fully adjustable armrests for computer intensive tasks.



Front



Back



Side

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

2.1 Adjustments

The chair provides a full range of adjustability without overwhelming the user. The chair's adjustments are clearly visible, intuitive and easily accessible while seated. The adjustment levers present on the chair include:

- Seat height adjust
- Recline lock/release with weight balanced recline resistance
- Seat depth adjustment
- Armrest height
- Armrest width and fore/aft
- Armrest pivot adjustment

The seat height control is a comfortably sized lever located under the right side of the seat pan (pictured below). This is a common location for seat height adjustment levers making use intuitive. The lever is easily accessible and can be operated with one or more fingers.



Seat height lever

The recline lock lever is located under the left side of the seat pan and is adjusted by pushing the lever forward and backward (pictured below). The lever locks the back into an upright position and unlocks to allow the weight activated recline. The lock allows users who want to maintain an upright posture to do so without activating the recline. The shape of the lever implies a forward/backward motion making use intuitive. The lever also clicks into place making it clear when it is locked or unlocked.



Recline Lock/Release

The seat depth adjustment lever is a bar located under the front of the seat pan (pictured below). The minimum seat pan length is 15.5” to a maximum of 18” measured from the seat back. There are 6 notch adjustments that are made in roughly 0.5” increments. The depth is adjusted by pushing up the bar and scooting forward or back. The lever bar can be used with the right hand, left hand, or both.



Seat Depth Adjustment Bar

Once set, many of the controls will not require additional adjustment for an employee performing a consistent task.

2.2 Chair Back

The Mimeo chair back features include an adjustable weight balanced recline mechanism, a 3D knit back, a flexible frame, built in lumbar support and an external optional lumbar support. The recline mechanism provides firm support and was found to operate smoothly. Some users might find the weight balancing slightly stiff, however it supports the collaborative working postures, such as leaning over the back edge of the chair, effectively. The back flexes to provide good support throughout the range of recline and maintains the lumbar curvature. In the upright position, the chair supports a comfortable hip angle of approximately 100° and allows a recline up to approximately 140°.



Flexible seat back curvature

A review of the chair back fit and performance are summarized in the following sections:

2.2.1 Chair Back Fit

The size of the chair back is appropriate to accommodate the 5th percentile female to 95th percentile male. The back has an 18” width and a 21” height (measured from the seat cushion). The frame provides a built-in lumbar curvature for lower back support, which is maintained in recline, upright, and leaning postures. The back frame is contoured to effectively provide a smooth transition of pressure between the 3D knit and the frame.

There is also an optional adjustable lumbar support attachment (pictured below) that is easily adjusted by sliding it up and down with a range of 6” minimum to 11” maximum measured from the center of the seat pan to the center of the bar. This gives the back additional lumbar support accommodating a range of user preferences. The support may be easily snapped into the back frame for added support.



Optional lumbar support height adjustment range

Chair Back Flexibility

The seat back is constructed of a breathable 3D knit over a flexible polymer frame. The design provides comfortable support in a variety of seated postures including upright, reclined, leaning towards a side, and facing sideways. The curved flexible edge at the top of the chair provides support for leaning over the back for quick collaboration tasks like chatting.



Curved edge of back top

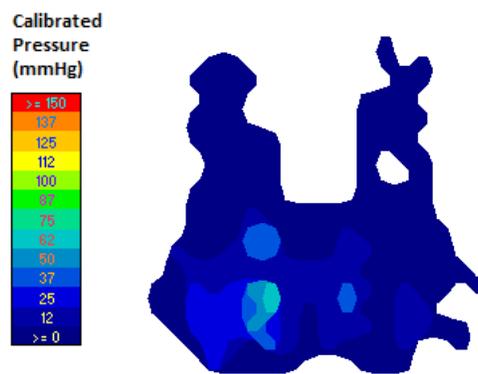


Flexible bolsters on back frame
(flex wings)

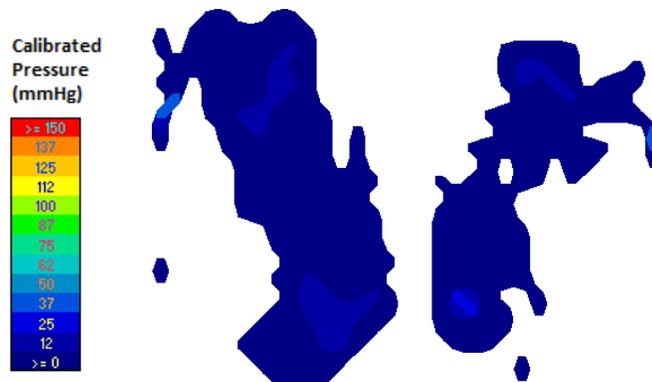
2.2.2 Chair Back Support

The back pressure mapping revealed considerable contact area and comfortable pressure levels (see pressure plots below), a desirable characteristic indicating good back support. The flexibility provided by the 3D knit backing and lumbar curvature contributes to this by keeping the backrest in contact with the user during postural variations. The average pressure levels ranged from 8 -13 mmHg and peak pressures between 25 mmHg and 63 mmHg for the large male and average female (respectively).

Seated Back Pressure



Average female (135lb, 5'5")



Larger male (185lb, 5'11")

2.3 Seat Cushion

The Mimeo seat pan is cushioned with different cloth fabric options, is adequately sized, and possesses depth adjustability (standard).

A summary of the fit and support of the seat cushion is presented in the following sections.

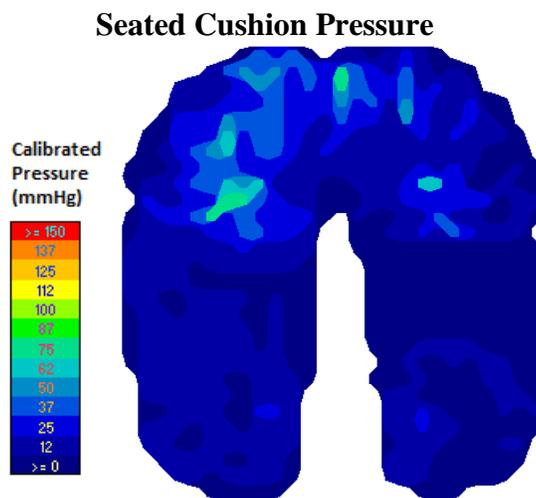
2.3.1 Seat Cushion Fit

The physical dimensions of the seat cushion are 20” wide by 18” deep. The 20” width will accommodate larger individuals (up to 95th percentile female) effectively. The depth of the seat cushion is adjustable from a minimum effective length of 15.5” to a maximum of 18”, in approximately 0.5” increments. This will fit the 5th percentile female to the 95th percentile male.

The seat cushion height was adjustable between 17” and 22”, measured from the center of the seat cushion. Based on current practice, users 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 cushion compresses to a height of approximately 16” in the low setting. This indicates that the 5th percentile female will be accommodated. A shorter seat cylinder is available to accommodate smaller users. The seat cushion also has a waterfall edge, which will prevent compression on the back of the leg. There is also a short cylinder option that will accommodate individuals of shorter leg length (smaller than 5th percentile female).

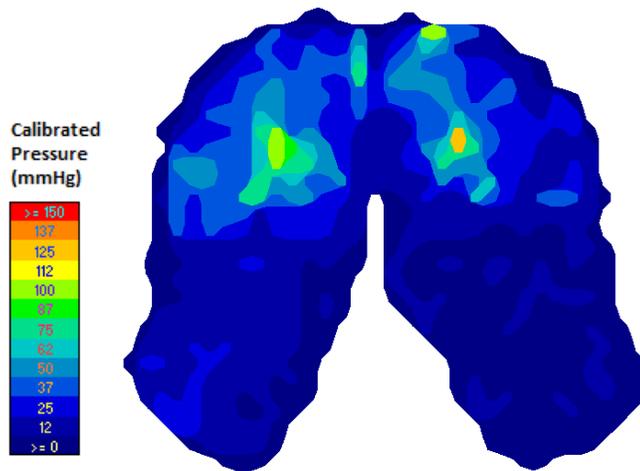
2.3.2 Seat Cushion Support

The seated contact pressure was measured in the upright seated posture. The pressure profiles revealed effective seat cushion support (see pressure profiles below). The adjustable depth seat cushion supported the thighs effectively without contact stress. The average pressure levels ranged from 17-19 mmHg for the large male and average female (respectively). Peak pressures were between 72 mmHg for the female and 107 mmHg for the larger male.



Average female (135lb, 5'5")

Seated Cushion Pressure



Larger male (185lb, 5'11")

2.4 Armrests

The armrests are cushioned and are highly adjustable. The adjustment range will accommodate beyond the 5th percentile female to the 95th percentile male. Adjustment controls are low force and intuitive to operate. The tension for the adjustments is at an adequate level to prevent inadvertent movement of the armrests, while still being easily moved. The pivot adjustment is achieved by simply gripping the armrests and pulling them inward or pushing them outward. The fore and aft adjustment is also made by simply pushing or pulling and can be made at all of the pivot angles.



Armrest



Button for Height Adjust



Pivot Out



Pivot In



Width Adjust

A summary of the adjustable armrest range are provided below:

Armrest Adjustability Range	
Adjustment	Range
Vertical (height off center of seat cushion)	6"-10"
Width (spacing between inner edge)	18"-21.5"
Max Internal pivot/External pivot	40°/ 20°
Front to back (minimum length, maximum length measured from back)	2" (8.5"-10.5")

The benefits of the adjustable armrests include:

- The adjustability and padding of the armrests minimize the potential for ulnar nerve contact stress at the forearm or elbow.
- The armrest vertical height adjusts low enough to allow the arms to hang free and can be raised high enough to accommodate the 5th to 95th percentile range comfortably. Height is adjusted in approximately 0.5" increments using an easy to find button underside the armrest.
- The fore/aft adjustability enables the user to set the armrest far enough back to prevent clash with the work surface. Without this feature, the potential for armrest clash can occur when working close to the workstation (common for smaller stature users).
- The width adjustment feature of the armrests allows for a closer placement of the armrest which can be useful for petite user populations. This feature also reduces the abduction necessary to reach the armrest, thereby aiding in keeping the limbs closer to the torso, minimizing the potential for shoulder stress.
- The pivot, fore/aft, and width adjustments are continuous (not notched) allowing users to easily fine tune arm rest adjustments to their various needs.

3.0 CONCLUSIONS

The Mimeo chair provides good dynamic support and provides an effective range of adjustability to meet the needs of diverse users. The geometry and range of adjustability of the chair will accommodate the 5th percentile female through the 95th percentile male effectively. The benefits of the Mimeo include:

- The flexible back frame and 3D knit materials move with the user providing comfortable support. The dynamics of the chair should promote a range of healthy working postures.

Ergonomics Assessment of the Allsteel Mimeo Chair

- The pressure analyses revealed effective support provided by the back and the chair cushion.
- The chair adjustments are well designed and intuitive and easy to operate. The design of the adjustments is intuitive and the simplicity of the chair control system should improve the likelihood of proper use.
- The adjustable armrests allow for a wide range of adjustment to accommodate more petite as well as large populations.

While the Mimeo 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.