XSENSOR Desktop PRO
Feature: AutoSeat Mode
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This document discusses the AutoSeat tool used for evaluating the design and performance of automotive seating surfaces.
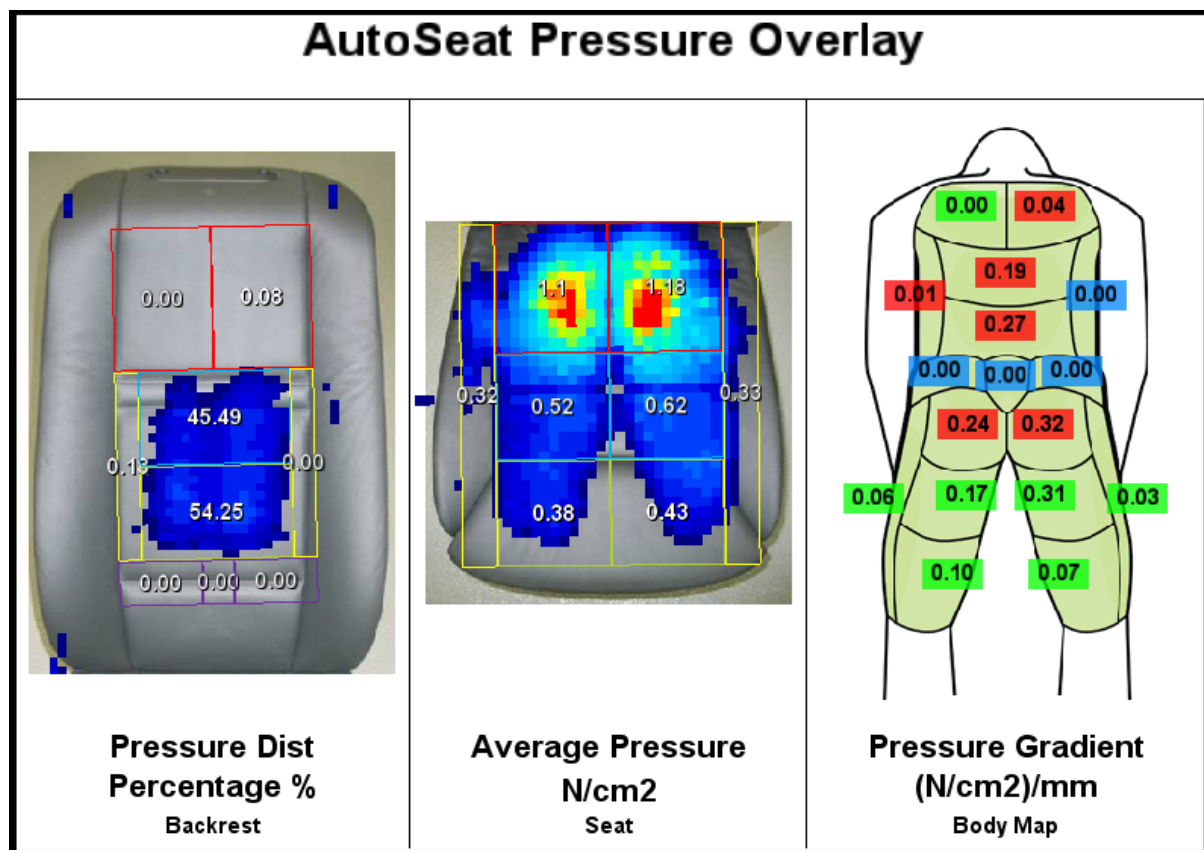
AutoSeat Mode

The AutoSeat feature is a mechanism for visualizing the pressure applied to automotive seating surfaces, and an aid for determining if pressure is within acceptable levels on various areas of the body.

Once a session file is configured for the AutoSeat mode, the main view displays the AutoSeat Pressure Overlay.

The Overlay shows one or two chair background images with pressure maps, and a body map image with boxes using color to indicate whether the area is within acceptable levels.

The Overlay always shows the current pressure frame and updates dynamically as the frame changes.

The view can also be printed using the standard XSENSOR printing methods, or captured to a graphic image file.

Configuring AutoSeat Mode

To use the AutoSeat feature, first open an existing file or start a new session and select **Configure AutoSeat Mode** from the **Tools->Automotive Tools** menu, or select AutoSeat Mode from the 2D toolbar droplist.

There are several things that need to be configured before the mode can be properly used. These include:

- Chair and Sensor Configuration
    - Seat background image selection
    - Sensor selection
    - Identification of two anchor points on the background image
- Support Zone Configuration
    - Zone Configuration Selection
    - Zone Editing
- Body Map Configuration
- Viewing Options

Chair and Sensor Configuration

Select the **Seat** and **Backrest** tabs to configure either surface. Both surfaces do not need to be configured. For each chair surface, select an image file using the browse (open folder) button and a sensor (via its serial number) from the drop list. The sensor list only shows the sensors that have been configured for the session file.

The **Save** button is for saving the attached background image as an image file.
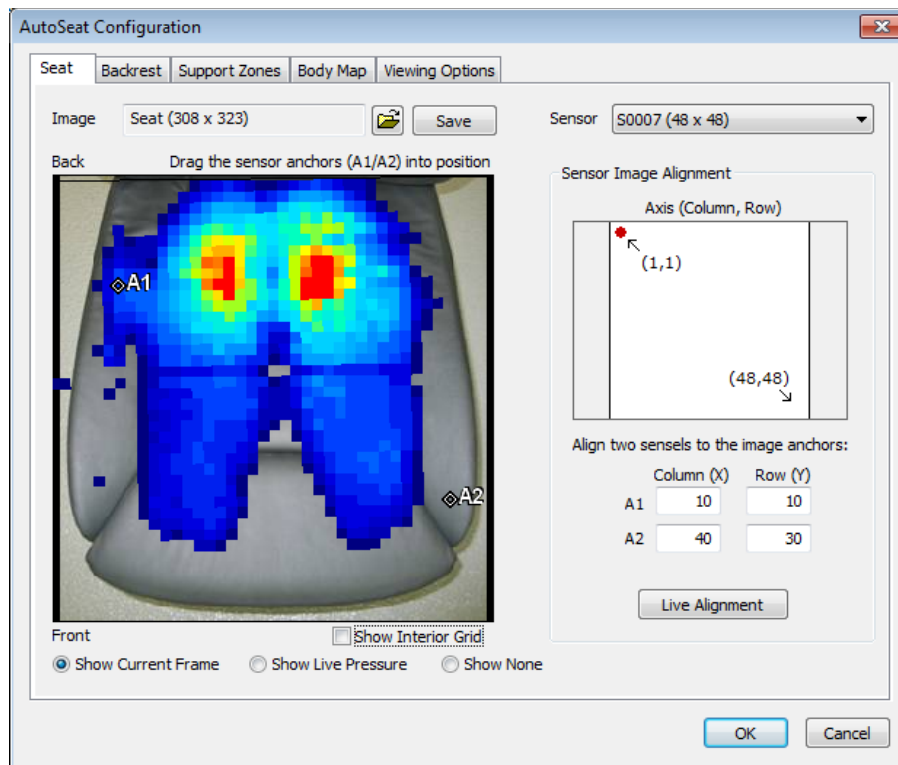
Once a sensor and image are selected, two anchor points (**A1/A2**) may be placed on the image. These are used for properly scaling and aligning the sensor pressure map over the chair image. The anchor points should correspond to two known locations on the seating surface that are covered by the sensing area of the sensor.

The **Seat/Backrest** tabs can show either the current frame of the session file (if any frames have been recorded), or a live pressure image if the sensor is connected.

The **Sensor Image Alignment** window shows a white version of the selected sensor. This displays the sensor in its default orientation and acts as a guide to interpreting what the rows and columns mean.

> NOTE: Some of the longer sensors have a default sideways orientation and so may appear in an orientation different from actual usage on the chair surface.

The anchor point sensels can be manually identified by entering the row/column fields directly, or by using live pressure data via the **Live Alignment** option.

Live Alignment Of Anchor Points

The **Live Alignment** window guides the process in identifying the anchor sensels. The instructions appear in the **Status** field. The center of pressure for each point is used to identify the sensel that lie over an anchor point.
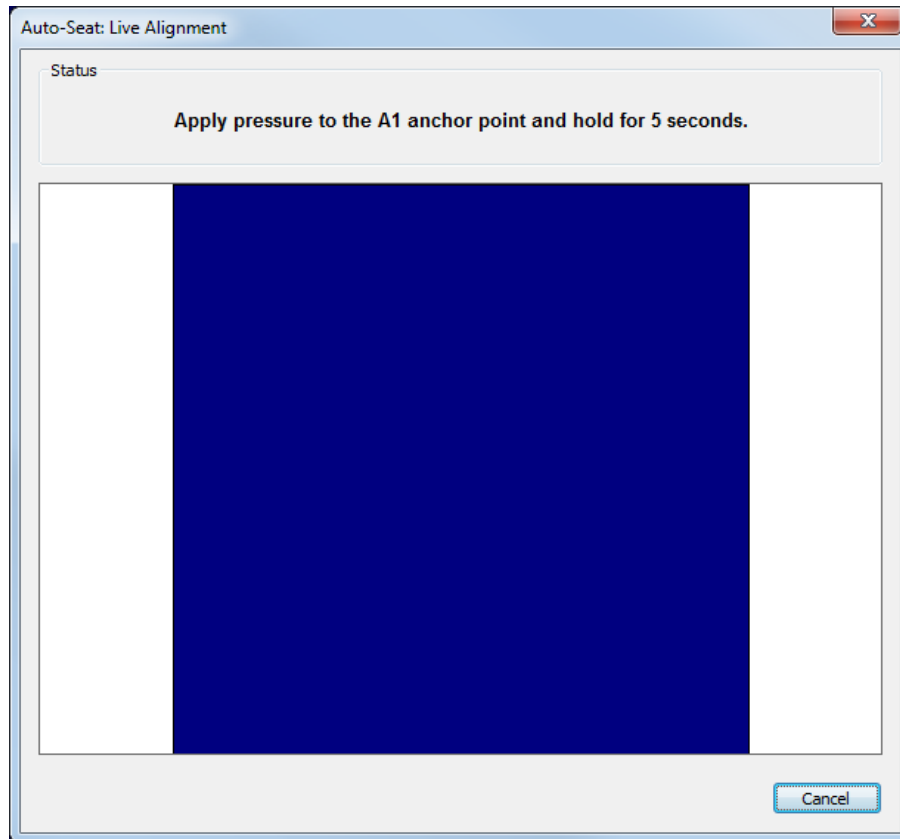
Support Zone Configuration

The software comes pre-configured with the standard 17 or 19 support zones for backrest and seat. Each zone is a rectangular area of the pressure surface in which a statistic of interest is calculated. The zone configurations are selected via the **Support Zones** tab.
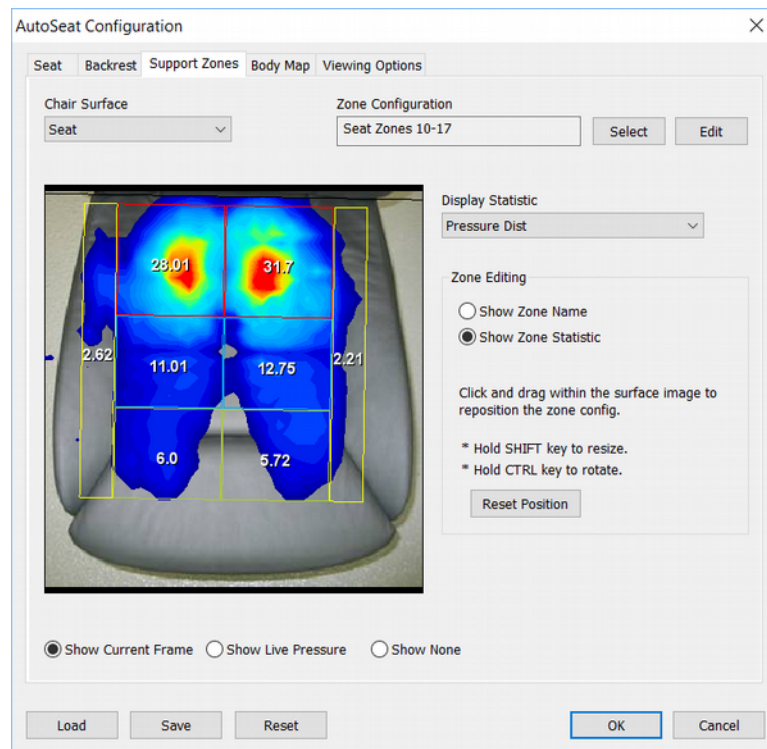
To specify a zone configuration, select Seat or Backrest from the **Chair Surface** drop-list, then press **Select** next to the **Zone Configuration** field to open the **Zone Config Selection** window. (See **Zone Config Selection** below.)

The **Support Zones** tab shows a preview of the support zones overlaid on the chair image. If available, the pressure map is also drawn. This aids placement of the zones for proper statistical calculation.

The **Display Statistic** is the value shown over top the pressure image on the main window. Both seat and backrest can be configured independently to show a different statistic.

Zone Editing

The entire group of zones can be repositioned, rotated or resized. This allows alignment of the zones to the pressure map.

Position the mouse pointer over the zone and hold the left mouse button down. Dragging the pointer re-positions the zones over the surface image.

Hold the SHIFT key while dragging the mouse to resize the zones. The zones are resized with respect to the center of the zone group. The entire group is affected by the operation and the software preserves the height and width ratios of the zones. (IE.: If a zone takes 12% of the width of the entire group, then resizing the group by its zone will have no effect on that 12% amount.)

Hold the CTRL key while dragging the mouse to rotate the zones. The zones are rotated around the center of the zone group.

The **Reset Position** button restores the original position, rotation and size of the zone configuration.

The **Zone Editing** field contains an option to show either the **Zone Name** or the selected **Zone Statistic** on the preview window. This setting only affects the preview window, as the software does not show the Zone Name on the AutoSeat Pressure Overlay.

> NOTE: The preset Zone configurations are read from text files (using the **xzc** file extension) stored in the software install folder under the sub-folder "Bin/AutoSeat".
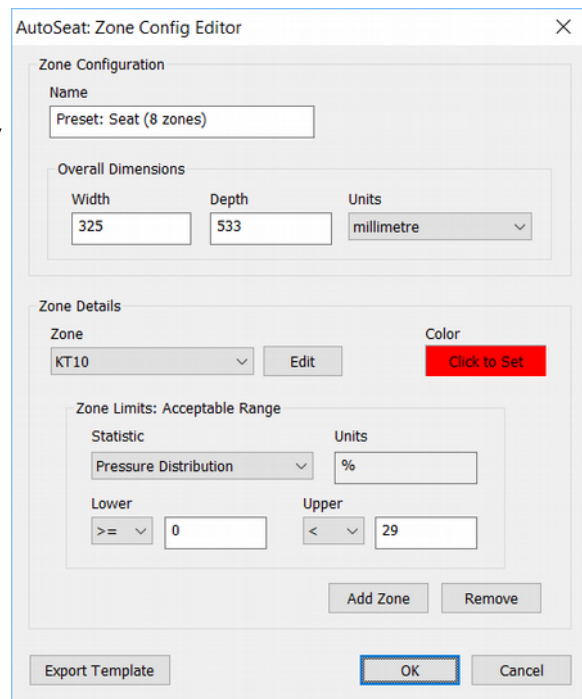
Zone Config Selection
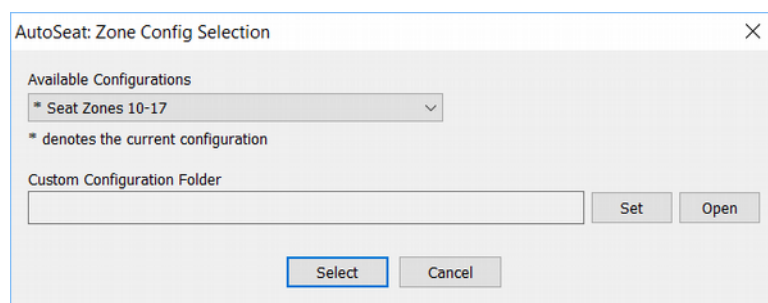
This window shows the available configurations. Select a configuration from the drop-list. The active configuration is demarcated with an asterisk (*). Configurations created by the user are stored in a custom configuration folder. Select the **Set** button to specify the location of this folder. The **Open** button opens the folder.

Zone Config Editor

The **Edit** button opens the **Zone Config Editor** window. The editor allows changing the configuration name and the overall dimensions of the area taken up by the zones. The Add Zone button adds new zones to the configuration, and the Remove button removes them.

Use the Zone drop-list to activate a zone for editing. Select the Edit button to open the **Zone Editor**.

For each zone, the acceptance range of numbers can be entered for all of the available statistics. The relationship operators can also be selected. For example, suppose for Zone KT10's "Pressure Distribution" statistic the following values are selected:

       Lower   Upper
       >= 5   < 29

This would mean that an acceptable pressure distribution for the zone would be any value at or above 5% and below 29%. Values outside of this range are either below or above the acceptable range.

The **Color** box is used to set the color of the Zone's outline when drawn on the pressure image.

The **Export Template** button allows saving the entire zone configuration. The configuration is then available for selection for other sessions. The exported configuration is saved to the Custom Configuration folder and will appear for select in the **Zone Config Selection** window. If the folder has not been set, the software will prompt for one. The **Zone Config Selection** window has an option for changing this folder.

> Note: Changing the folder from an existing one will make any configurations in the original folder unavailable. However you can manually copy the files from one folder to another using Window Explorer. The configuration files have an .xzc extension.

Body Map Configuration

The **Body Map Configuration** is used to show approximately where the support zones are located on the body. A configuration consists of a background image for the body, a default placement for the zone results boxes, and the **Display Statistic**. The **Display Statistic** is the value whose limits are used to decide whether the zone is within an acceptable range.

The body background image is selected via the **Body Map Configuration Select** option which opens the **Body Map Config Selection** window. This picks a body image that has been divided into the various body zones.

> NOTE: The Body Map Configuration should be selected **after** the Support Zones have been configured. Otherwise the Selected Zone list does not populate correctly.
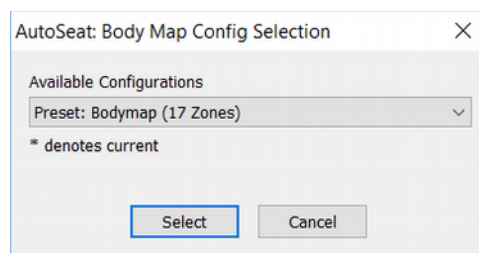
The **Body Map** image shows the numbered zone result boxes. These boxes are drawn in the color of each zone. The numbers in the zone boxes correspond to the bracketed number (x) next to the zone name in the **Selected Zone** drop-list. These numbers only appear on this configuration tab as an aid for positioning.
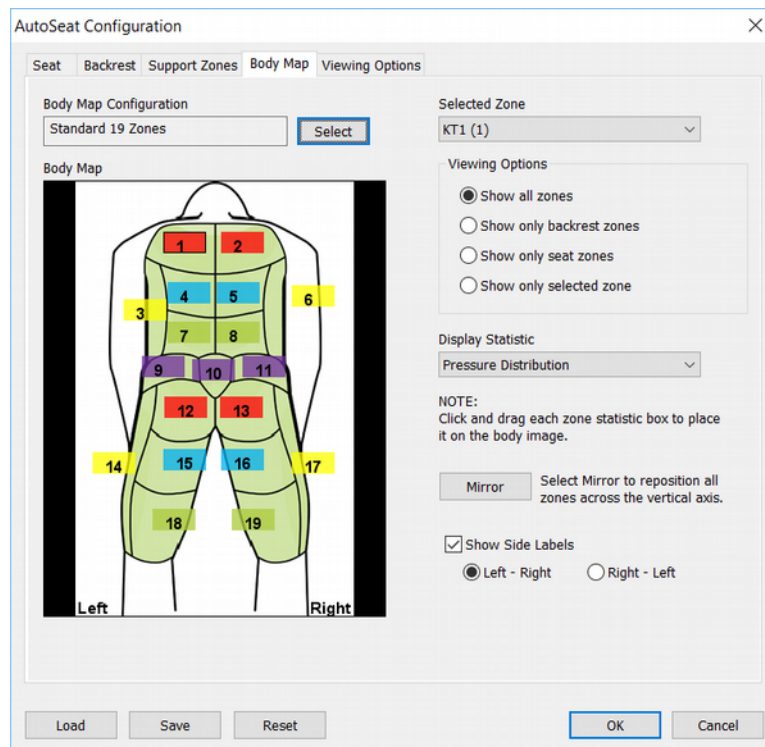
The zone result boxes can be moved from their initial positions. To move a zone box, select and drag it into position using the mouse.

The body map image can be labeled with **Left** and **Right** side labels. This helps with determining the orientation of the pressure zones along the body. Use the **Show Side Labels** option.

The **Mirror** option moves each zone to the opposite position along the central vertical axis of the body map.

Viewing Options

The **Viewing Options** tab contains settings for adjusting some of drawing settings of the AutoSeat Pressure Overlay view.

The general layout can be selected between stacked and horizontal. The stacked layout draws the backrest image over the seating image. The horizontal layout draws them side-by-side.
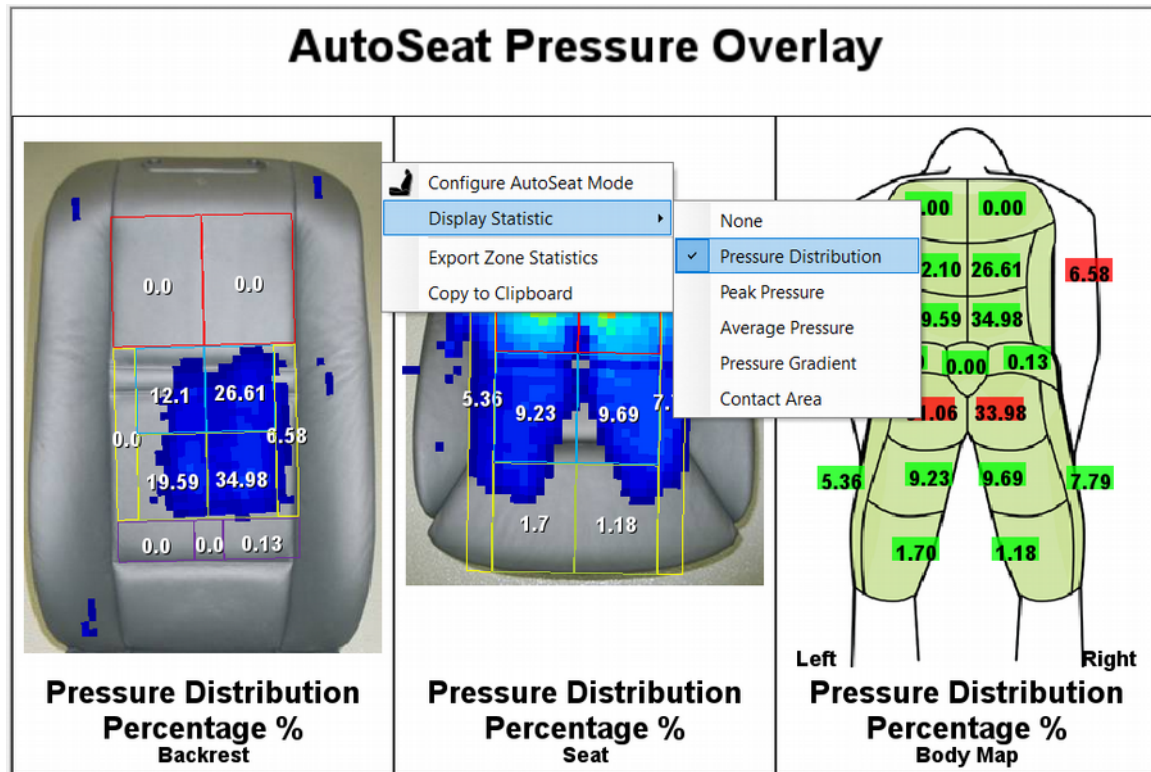
The colors used to indicate if a zone is in or out of limits can be selected.

The **Show sensor outline on Overlay** option is used to show the outline of the pressure map sensor.
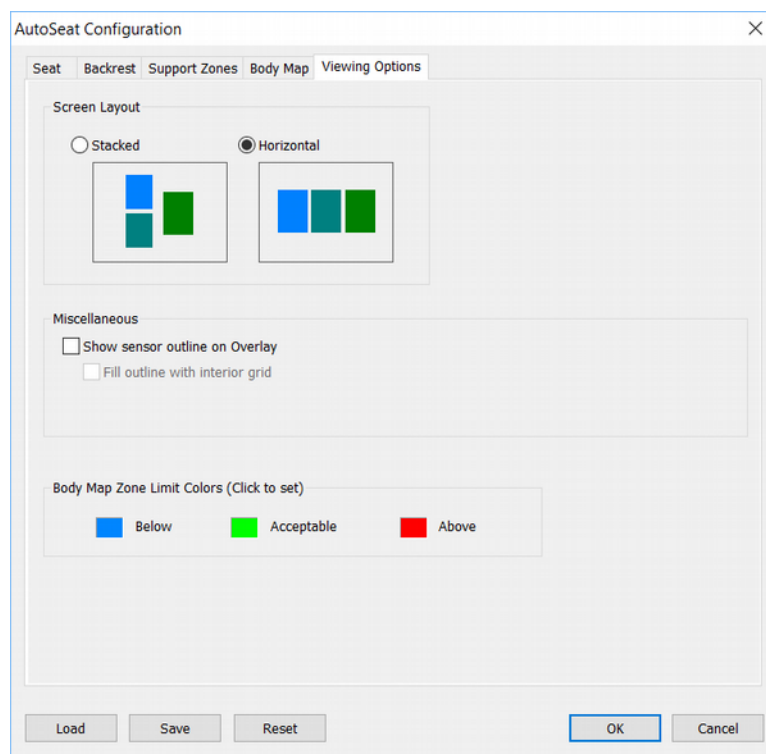
Context Menu

The AutoSeat Pressure Overlay view supports a right-click context menu with various options.

Configure AutoSeat Mode

This option opens the AutoSeat Configuration window.

Display Statistic

The displayed statistic for the three areas (seat, back and body map) can be changed directly from this menu.

Export Zone Statistics

This feature is used to export the zone statistics to a text file which can then be imported into a spreadsheet. A range of frames can be specified for export.

Copy to Clipboard

The statistics shows on the Pressure Overlay can be copied to the clipboard and pasted to a spreadsheet program or text file. To copy the data right click on the AutoSeat Pressure Overlay and select **Copy to Clipboard**.

Pressure Gradient Statistic

This section briefly describes the calculation involved to calculate the pressure gradient statistic.

The pressure gradient for a zone is the largest pressure difference (or delta) between rows in the zone divided by the length or height of a sensel.

The rows are defined as being slices through the zone from top to bottom when the zone is in a normal non-rotated orientation. The rows are as wide as a sensel height. If the zone is rotated, the row slices are also rotated and the gradient is computed along the rotated vertical axis of the zone.

Basic algorithm:

For each row in the zone:
1. sum the pressure across the row
2. compute the pressure delta between this row and the last one
3. Calculate the slope of the row by dividing the delta with a sensel height. Track if this slope is the maximum

Return the maximum slope.

Managing AutoSeat Configurations

The complete AutoSeat configuration can be saved to disk and reused in subsequent sessions.

Select the **Save** button at the bottom of the **AutoSeat Configuration** window. This prompts for a location and file name. The extension on the file is XAC (XSENSOR AutoSeat Configuration).
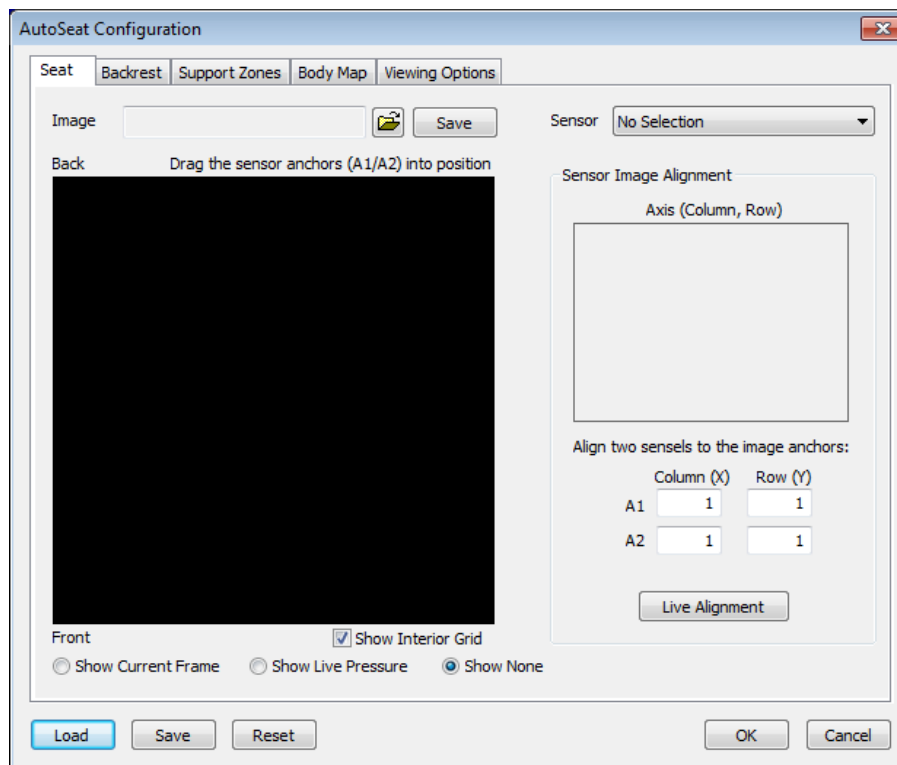
To load a configuration, select the **Load** button. The software attempts to best match the configured sensors with the session file. If it cannot resolve any conflicts, the software prompts the user to select the seating sensor surfaces.
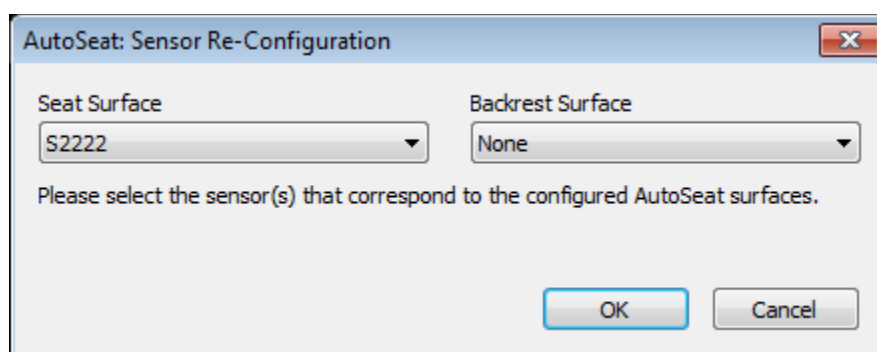
The entire configuration can be cleared using the **Reset** button.

AutoSeat 3D

The software is able to render the seat configuration in 3D. This feature is meant for presentation purposes.

To use this, first ensure the **OpenGL** option is selected on the general software options menu **3D->Renderer**. Then select **AutoSeat 3D** from either the 3D toolbar droplist or from the **View->Current View->3D Modes** menu.