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1 Introduction

The ICEM Viewer is a freeware provided together with ICEM Surf to present ICEM Surf data independently from the software. In an ICEM Viewer file (*.vf) can be displayed in addition to a 3D view of the geometry data all Rendering settings like e.g. Light, Shadows, Reflections, Material, Environment, Textures, etc., active in ICEM Surf when exporting the data base.

The ICEM Viewer includes functions for view manipulation, navigation and creation of clipping planes and highlight diagnoses as well as for the modification of display parameters, material colors and light source positions. The Realtime Renderer for creating animations and displaying transparency, reflections, lens flares, and soft shadows is also supported.
2  Installation and Start

2.1  Installing the ICEM Viewer

Unix Platforms
Carry out the following steps for installing the ICEM Viewer:

1. Insert the CDROM into the drive.
2. Start the installation tool with /cdrom/setup
3. Switch on the check button ICEM Viewer and click Next.
4. Follow the installation instructions.

Linux Platforms
The Linux version of ICEM Viewer is available as rpm and deb package. For the installation, proceed as follows:

- For all systems using rpm (RedHat Package Manager), such as SuSE:
  Login as root and execute rpm -i <package name>.rpm.
  On a SuSE distribution you can also click on the rpm package in the file browser and enter the root password. The installation will then be started automatically.
- For Debian:
  Login as root and execute dpkg -i <package name>.deb.

The installation directory cannot be choosen by the user on Linux platforms. ICEM Viewer is always installed at /opt/icem/icemviewer<version>.

Windows Platforms
Carry out the following steps for installing the ICEM Viewer:

1. Insert the CDROM into the drive.
2. Start setup.exe, if it is not automatically started.
3. Switch on the check button ICEM Viewer and click Next.
4. Follow the installation instructions.

2.2  Starting the ICEM Viewer

The executable program for starting the ICEM Viewer is called icemviewer on Unix/Linux platforms and Viewer.exe on Windows platforms. After a default installation, it is located in the following directory:

- Unix/Linux: /opt/icem/icemviewer<version>/viewer/bin
  (/opt/icem/icemviewer<version> = default installation directory)
- Windows: C:\icemviewer<version>\viewer\bin_nt
  (C:\icemviewer<version> = default installation directory)
Unix/Linux platforms

To start the ICEM Viewer on a Unix/Linux platform, the search path in .login, .cshrc, or .profile has to be extended as follows:

```
set path = ($path /<install.dir.>/viewer/bin)
```

(For a default installation you have to enter the path /opt/icem/icemviewer1.0 for <install.dir.>.)

Program start: icemviewer <file>.vf [-ul <language>] [-g <Width>x<Height>]

Windows platforms

The ICEM Viewer is started as follows:

```plaintext
<drive>:\<install.dir.>\viewer\bin_nt\Viewer.exe [-ul <language>] [-g <Width>x<Height>]
```

On a Windows platform you can also create a link on the desktop, and start the program by a double-click or by drawing a vf file on the icon. A start by double-clicking a vf file in the file manager is also possible.

Start options for icemviewer and Viewer.exe

- **-ul <language>**
  
  Language of user interface. For <language> you can enter the following values:

<table>
<thead>
<tr>
<th>Language</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>en</td>
<td>English (default)</td>
</tr>
<tr>
<td>de</td>
<td>German</td>
</tr>
<tr>
<td>fr</td>
<td>French</td>
</tr>
</tbody>
</table>

- **-g <Width>x<Height>**

  Setting the screen size.

  The screen size reported by the operating system will be overridden by setting the start option -g. This is required to realize distortion-free 1:1 images on any kind of monitor, via beamers, or with special resolutions.

  Application example: A1:1 image (zoom factor = 1) shall be displayed on a powerwall via three beamer. Using -g you can exactly specify the size of the wall so that the display is distortion-free.

  For <Width> and <Height> you can enter values within the following range:

  
  [300,65000]x[225,45000]

  **Note:**

  The values are to be indicated in millimeters.
3 Operation

3.1 The Icon Bar

In the table below you will find an overview of the icons and their functions. For a detailed description of the functions please refer to the corresponding sections.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="reload.png" alt="Image" /></td>
<td>Reload</td>
</tr>
<tr>
<td><img src="clipping-plane.png" alt="Image" /></td>
<td>Clipping Plane (see also section 3.4.6 “Display – Clipping Plane” on page 22)</td>
</tr>
<tr>
<td><img src="rotate.png" alt="Image" /></td>
<td>Rotate (see also section 3.2 “View Manipulation by Mouse” on page 10)</td>
</tr>
<tr>
<td><img src="material.png" alt="Image" /></td>
<td>Material (see also section 3.4.7 “Display – Material” on page 23)</td>
</tr>
<tr>
<td><img src="translate.png" alt="Image" /></td>
<td>Translate (see also section 3.2 “View Manipulation by Mouse” on page 10)</td>
</tr>
<tr>
<td><img src="display-options.png" alt="Image" /></td>
<td>Display Options (see also section 3.4.9 “Display – Options” on page 28)</td>
</tr>
<tr>
<td><img src="zoom.png" alt="Image" /></td>
<td>Zoom (see also sections 3.2 “View Manipulation by Mouse” on page 10, and 3.4.5 “Display – Navigation” on page 19)</td>
</tr>
<tr>
<td><img src="animation.png" alt="Image" /></td>
<td>Animation (see also section 3.4.3 “Display – Animation” on page 16)</td>
</tr>
<tr>
<td><img src="navigation.png" alt="Image" /></td>
<td>Navigation (see also section 3.4.5 “Display – Navigation” on page 19)</td>
</tr>
<tr>
<td><img src="turn-table.png" alt="Image" /></td>
<td>Turn Table (see also section 3.4.4 “Display – Turn Table” on page 18)</td>
</tr>
<tr>
<td><img src="select-zoomed-detail.png" alt="Image" /></td>
<td>Select Zoomed Detail with Equal Scaling Magnification of a detail with equal scaling by region selection.</td>
</tr>
<tr>
<td><img src="highlight.png" alt="Image" /></td>
<td>Highlight (see also section 3.4.8 “Display – Highlight” on page 27)</td>
</tr>
<tr>
<td><img src="auto-min-max.png" alt="Image" /></td>
<td>Auto Min/Max Scaling the geometry to fit the screen.</td>
</tr>
</tbody>
</table>

3.2 View Manipulation by Mouse

Using the mouse buttons and the **Shift** key the view can be manipulated as follows:

**Left mouse button**

Rotate the view. If the icon ![Image](rotate.png) is active, the view can also be rotated without pressing the Shift key.

The position of the center of rotation can only by changed by moving the symbol ![Image](point-symbol.png) in the graphic area (see also section 3.3.4 “The Point Symbol” on page 15).
3.3 The Symbols in the Graphic Area

In the graphic area symbols for light sources, clipping planes, turn tables, and the center of rotation are available which can be manipulated with the mouse. In general, they can be moved along axes or rotated on circles. If a symbol can be manipulated in different ways, the manipulation possibilities can be controlled apart from the mouse buttons by different pick points. The cursor shape changes depending on the symbol and the pick point.

3.3.1 General Usage of the Mouse Buttons

When manipulating the symbols in the graphic area the mouse buttons generally have the following functions:

- **Left mouse button**
  - **Rotate**
    
    The symbol can only be rotated around an axis of the coordinate system set in the context menu. The center of rotation cannot be changed. As manipulation orientation are displayed two circles showing the rotation direction. The dashed part of the circle lines indicate the hidden area.
  
  - **Translate**
    
    The symbol can only be moved along the axes of the local or model coordinate system. The direction of the axes is indicated by lines.

- **Middle mouse button**
  
  - **Rotate**
    
    The symbol can be rotated around an arbitrary axis. Also in this case the center of rotation cannot be changed.
  
  - **Translate**
    
    The symbol can be freely moved in the view plane.

**Middle mouse button**

Translate the view. If the icon is active, the view can also be translated without pressing the Shift key.

**Right mouse button**

Zoom/Move/Focal Length and Rotation. If the icon is active, the view can also be manipulated without pressing the Shift key.

- **Zoom/Move/Focal Length:** Move cursor up and down
  
  - **Zoom:** Setting in the function **Display – Navigation** (see page 19)
  
  - **Move:** Setting in the function **Display – Navigation** (see page 19)
  
  - **Focal Length:** Setting in the function **Display – Navigation** (see page 20)
  
- **Rotation:** Move cursor to the left and right
3.3.2 The Clipping Plane and Turn Table Symbol

These symbols are activated with the functions Display – Turn Table (see page 18) and Display – Clipping Plane (see page 22).

For the clipping plane and turn table symbol the following manipulation possibilities are available:

**Rotate**

To rotate the symbol click onto the tip of the normal vector arrow. The cursor has the shape 🔄.

**Invert**

To invert the direction, click onto the arc symbol in the middle of the normal vector arrow. The cursor has the shape 🔄.

**Move**

To move the symbol, click onto its origin. The cursor has the shape 🔄.

3.3.3 The Light Source Symbols

In ICEM Surf four light source types are available, the settings of which can be imported into the ICEM Viewer file.
3.3.3.1 Beam

Beam light sources produce parallel light from a defined direction (like the sun). The wave angle on a determined plane is constant.

The parallel light source Beam can only be rotated. The cursor will have the shape of a parallel light source.

3.3.3.2 Point

Point light sources radiate light symmetrically from a defined position into all directions (like a plain light bulb). The light beams have different wave angles on a determined plane.
The **Point** light source can only be moved. The cursor will have the shape 🌟.

### 3.3.3.3 Spot

Spot light sources are point light sources with a determined dihedral angle. Spot light does not radiate into all directions, but creates a light cone. The light is similar to a flashlight.

For the **Spot** light source the following manipulation possibilities are available:

**Rotate**

Click onto the rear end to rotate the symbol. The cursor will have the shape 🌟.
3.3.4 The Point Symbol

Move

Click onto the front end to move the symbol along the coordinate axes or freely. The cursor will have the shape  \( \text{\textbullet} \).

Move along the Light Beam

Click with the left mouse button the middle of the symbol to move it along the light beam. The cursor will have the shape  \( \text{\textbullet} \).

3.3.3.4 Ambient

Ambient light sources create dispersed light which uniformly shines from all sides. The light intensity is always equal, surfaces are displayed equally colored without shaded sides. Ambient light sources are not displayed by a symbol. The setting exported from the original ICEM Surf database cannot be modified.

3.3.4 The Point Symbol

A point symbol represents a coordinate point in model space. In ICEM Viewer the point symbol is used for the display of the center of rotation.

The point symbol can only be moved. The cursor will have the shape  \( \text{\textbullet} \).
3.4 The Functions in the Pull-Down Menu

3.4.1 File – Reload

The current ICEM Viewer file is reloaded. This function can also be carried out using the icon.

3.4.2 File – Quit

Terminate ICEM Viewer.

3.4.3 Display – Animation

This function can also be activated by clicking the icon.

With this function you can create an animation composed from different views. When executing this function, Central Perspective will automatically be switched on.

The function Display – Animation includes the tabs Animation and Parameter, as well as the navigation bar described in the following sections.

3.4.3.1 Animation

In this tab are managed the views from which an animation shall be created.

List of the Inserted Views

In this list, all inserted views from which the animation will be created, are displayed as icons. By clicking onto the corresponding icon the views can be activated in the graphic area. The icon will then be highlighted.

The inserted views are only preserved during the current session.

Insert

The current view is inserted into the list of views.

Update

The view of the highlighted icon will replaced by the current view.
Delete

The highlighted icon will be deleted from the list of views.

Delete All

All inserted views will be deleted from the list of views.

3.4.3.2 Parameter

In this tab you can set parameters concerning the properties and quality of the animation.

Steps

This value specifies the number of steps with which the running animation will be moved from one view to the next one. The more steps are specified, the slower will run the animation.

Playback

With this popup menu different Play modes can be set.

• Stop at End

The animation runs from the first to the last view and then stops.

   NOTE:

   In this mode the animation can only be started, when the first view is active. Select the first icon in the List of the Inserted Views in the tab Animation or press the button .

• Loop

The animation will be repeated until it is stopped with the button .

• Swing

The animation will be played forward and backward until it is stopped with the button .

Smooth Factor

This value defines the transition quality between the views. The higher the Smooth Factor, the smoother the transitions between the views.

NOTE:

When using a high Smooth Factor the views in the animation may deviate from the original views.
3.4.3.3 Navigation

The following navigation buttons are available in both tabs:

- [Image] Go to the first view.
- [Image] Go to the previous view.
- [Image] Go to the next view.
- [Image] Go to the last view.
- [Image] Start animation.
- [Image] Stop animation.

3.4.4 Display – Turn Table

This function can also be activated by clicking the icon [Image].

With this function the geometry can be rotated continuously. After activating the function in the graphic area is displayed a rotation plane, the normal of which is used as axis of rotation. The axis of rotation vector can be manipulated graphically as described in section 3.3.2 “The Clipping Plane and Turn Table Symbol” on page 12.

After starting ICEM Viewer the origin of the rotation plane is set by default on the center of the block of extreme values, and the normal is adjusted in direction of the Z axis of the model coordinate system.

The Menu Turn Table

[Image]

- [Image] Start turn table.
- [Image] Stop turn table. The geometry will be reset to the original position.
3.4.5 Display – Navigation

NOTE:
When activating the turn table, the geometry will be moved in the space. Therefore, after stopping the turn table it will be reset to its original position, as otherwise its position in the model coordinate system would have been modified.

Angle of Rotation

This option controls the speed of rotation. The larger the angle, the higher will be the speed of rotation.

3.4.5 Display – Navigation

This function can also be activated by clicking the .

In this menu, different modes for geometry navigation can be set.

NOTE:
When using a Space Mouse or a Spaceball the navigation settings, their functionality depends on the navigation settings.

The Menu Navigation

Choose Navigation Mode

This popup menu only is active, if Central Perspective in the menu Display – Display Options is switched on.

The following navigation modes influence the view manipulation using the mouse buttons in combination with the Shift key and the left mouse button with activated icons , , or  (see also section 3.2 “View Manipulation by Mouse” on page 10).

- **Zoom**

  When manipulating the view the Angle Of View or Zoom Factor and thus the image size are changed.

- **Move**

  When manipulating the view Eye Position and Reference Point are moved, as if the observer moves himself in the space. Zoom Factor and Angle Of View are not changed. With this option, it is possible, for example, to move inside geometry objects.
• **Focal Length**

When manipulating the view **Eye Position** and **Reference Point** (= focal length) and thus the perspective of the view will be changed.

See also the glossary entries “Eye Position”, “Reference Point”, “Focal Length”, “Angle Of View”, as well as “Parallel Projection” and “Central Projection/Central Perspective”.

**Choose Rotation Mode**

This popup menu only is active, if **Central Perspective** in the menu **Display – Display Options** is switched on.

The following rotation modes influence the view manipulation type **Rotation** using the left mouse button in combination with the Shift key and the left mouse button with activated icon (see also section 3.2 “View Manipulation by Mouse” on page 10).

• **Rotation of the Eye Position**

When rotating the view the eye position is moved on an imaginary sphere around the reference point, i.e. the observer moves in the space. The radius of the sphere is defined by the distance between eye position and reference point.
3.4.5 Display – Navigation

- **Rotation of the Reference Point**

  When rotating the view the reference point is moved on an imaginary sphere around the eye position, i.e. the observer does not move himself, but only turns his head.

  ![Reference Point Diagram](image)

**Choose Rotation Center Mode**

This popup menu is only available, if the option **Rotation of the Eye Position** is active.

- **Permanent Center of Rotation**

  The center of rotation can be fixed on a point to be selected. It will remain unchanged until you change the position by moving the symbol in the graphic area (see also section 3.3.4 “The Point Symbol” on page 15).

- **Temporary Center of Rotation**

  When manipulating the view the center of rotation is positioned onto the geometry at the point with the shortest distance between geometry and cursor position.
3.4.6 Display – Clipping Plane

- Center of Rotation = Center of the Geometry

If this icon is active, the center of the extreme value block of the geometry is used as center of rotation.

Symbol

Switching on and off the symbol in the graphic area.

3.4.6 Display – Clipping Plane

This function can also be activated by clicking the icon .

Using this function the geometry can be “cut”, i.e. made invisible, at any desired plane. The clipping plane can be moved dynamically through the geometry. As the visible part of the geometry is always in normal direction of the clipping plane, only the Z axis (normal) is displayed.

A clipping plane is displayed as a symbol in the graphic area. For the description of the manipulation possibilities and context menus of the clipping plane symbol please refer to section 3.3.2 “The Clipping Plane and Turn Table Symbol” on page 12.

The Menu Clipping Plane

Clipping Plane Table

The clipping plane table contains all defined clipping planes. Apart from consecutive number of the clipping plane and the vector coordinates of the plane normal in this table is indicated whether the clipping plane and an offset are switched on as well as the distance in case of an activated offset.

New

A new clipping plane is created.

NOTE:

The number of definable clipping planes depends on the machine used. In most cases can be defined up to 3 clipping planes.

By default, the clipping planes are created as follows:

1. The first clipping plane is set to the origin of the model coordinate system with the plane normal in z direction.
2. The second clipping plane lies normal to the XY plane of the first clipping plane. The plane normal runs parallel to the X axis of the first clipping plane.
3. The third clipping plane lies normal to the XY planes of the first two clipping planes. The plane normal lies parallel to the Y axis of the first clipping plane.

In order to create a distance between the clipping planes, the origins of the second and third clipping plane are moved by the default offset value in direction of the corresponding normal.

If further planes can be defined, normal and origin of the current work plane are again used for the clipping plane definition.

**Delete**

The clipping plane marked in the table will be deleted.

**On**

The clipping plane marked in the table can be switched on and off.

**Symbols**

The display of the symbols of the defined clipping planes can be switched on and off globally.

**Offset**

Using this option only the geometry within the specified distance will be displayed. The distance is displayed by a second clipping plane symbol in yellow and can be modified numerically in the text field or graphically by moving the plane symbol in the graphic area. In addition, the symbol can be rotated and inverted synchronously to the clipping plane symbol (see section 3.3.2 “The Clipping Plane and Turn Table Symbol” on page 12).

### 3.4.7 Display – Material

This function can also be activated by clicking the icon. It can be used for temporary modifications of material settings imported from the original ICEM Surf database.

The function Display – Material includes the tabs Material and Colors described in the following sections.

The following displays and options are available in both tabs:

**Current Material:**

Display of the current material name.

**Material Properties**

![Material Properties Icon](image)

Graphical display of the current material properties.

**Select**

You can select a surface in the graphic area, the material of which shall be set as current material.

**Note:**

For the selection of a material all view manipulation icons, and must be inactive. By pressing the Shift key you can deactivate the icons.
3.4.7 Display – Material

3.4.7.1 Material
This tab contains a material list in which all materials imported from the original ICEM Surf database are displayed and can be activated as current material.

3.4.7.2 Colors
In this tab the material characteristics are determined.

Color Settings
With the following color buttons “The Submenu Color Selection” (see page 25) is activated, in which the color characteristics of the material can be set in the color models RGB and HLS. For each material, three colors are used:

- **Diffuse Color**
  The diffuse color is created by the light source types **Beam**, **Point**, and **Spot**.
• **Ambient Color**

The ambient color is created by the light source type **Ambient**.

• **Specular Color**

The specular color is the color of the reflections caused by the light source types **Beam, Point, and Spot** on shaded surfaces.

**Reflection**

In case of materials which have been defined in ICEM Surf with the capability to reflect environment images or a special reflection image, the reflection intensity can be adjusted by the slider or the text field.

**NOTE:**

The reflection is only visible, if the corresponding environment or reflection images from the original database have been saved in the directory of the ICEM Viewer file when being exported from ICEM Surf.

**Transparency**

In case of materials which have been defined in ICEM Surf with transparency, the transparency intensity can be adjusted by the slider or the text field.

**Shine**

This shine factor controls the extent of the light source reflection on the geometry.

3.4.7.3 **The Submenu Color Selection**
The submenu *Color Selection* can be activated by double clicking onto a color button of the options *Diffuse Color*, *Ambient Color*, and *Specular Color* in the tab *Colors*.

For color definition, in ICEM Viewer are used the color models *RGB* (Red, Green, Blue) and *HLS* (Hue, Lightness, Saturation) (see also glossary entries “*HLS Color Model*” and “*RGB Color Model*”.

The colors can be defined in the color fields in the left part of the menu or by the sliders and text fields in the right part. The two color fields on the top right show the modified and the previous color. With all modifications in the menu the display of the color fields, sliders, and text fields is dynamically updated.

### Color Selection in Color Fields

A color can be selected in the color fields, if the specification of exact numerical values is not necessary.

The narrow color field in the middle of the menu shows the range of values of the color channel activated in the radio box. In case of the R, G, B, L, and S channels the range of values is displayed as smooth gradient. In case of the H channel the color spectrum is shown. The channel value can be modified by moving the crossbar.

When activating the color selection the H channel (color angle) is set by default as active channel, as this channel offers the easiest way to select the desired hue. Lightness and Saturation can then be set in the large color field.

The large color field shows all colors, which can be defined with the current value of the color channel activated in the radio box:

- If an R, G, or B channel is active, the large color field shows all colors which can be defined with the fixed value of the active RGB channel within the ranges of values of the other two RGB channels.
- If the H channel is active, the selected hue is displayed with all lightness and saturation degrees.
- If the L channel is active, the complete color spectrum is displayed with all saturation degrees.
- If the S channel is active, the complete color spectrum is displayed with all lightness degrees.

In the large color field you can select a color with the cross hair cursor without changing the current value of the active color channel.

### Color Selection with the Sliders and Text Fields

With the sliders and text fields a color can be defined by specifying numerical values. The following table shows the values for the basic colors:

<table>
<thead>
<tr>
<th>Color</th>
<th>HLS Values</th>
<th>RGB Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>L = 0 %</td>
<td>0, 0, 0</td>
</tr>
<tr>
<td>White</td>
<td>L = 100 %</td>
<td>255, 255, 255</td>
</tr>
<tr>
<td>Red</td>
<td>0°, 50 %, 100 %</td>
<td>255, 0, 0</td>
</tr>
<tr>
<td>Yellow</td>
<td>60°, 50 %, 100 %</td>
<td>255, 255, 0</td>
</tr>
<tr>
<td>Green</td>
<td>120°, 50 %, 100 %</td>
<td>0, 255, 0</td>
</tr>
<tr>
<td>Cyan</td>
<td>180°, 50 %, 100 %</td>
<td>0, 255, 255</td>
</tr>
<tr>
<td>Blue</td>
<td>240°, 50 %, 100 %</td>
<td>0, 0, 255</td>
</tr>
<tr>
<td>Magenta</td>
<td>300°, 50 %, 100 %</td>
<td>255, 0, 255</td>
</tr>
</tbody>
</table>
3.4.8 Display – Highlight

This function can also be activated by clicking the icon .

With this function you can create a highlight surface diagnosis on shaded surfaces.

For the computation of the highlight diagnosis will be used the light source defined as first light source in the original ICEM Surf database.

The highlight surface diagnoses lines of equal lightness connect the surface points where the angle of incidence of the light is constant. These lines are called isophotes. The course of the isophotes illustrates the shape of the surface and the transition quality.

The Menu Highlight

On

Activation of the highlight surface diagnosis.

Highlight Types

For a highlight surface diagnosis you may select different display modes:

1. Highlight

Only one highlight line is displayed.

2. Colored

Several highlight lines are displayed in different colors.
3. Black and White

Several highlight lines are displayed in black and white

Parameter for the option Highlight:

H, S

Setting of the hue color value and the saturation.

Min. L., Max. L. 

(Minimum Lightness, Maximum Lightness)

If the brightness shading is set to flow from dark to bright (min. brightness < max. brightness), the brightness shading will correspond to a diffuse light source reflection.

If the brightness shading is set to flow from bright to dark (min. brightness > max. brightness), the brightest areas are at those spots, where the light touches the surface nearly tangentially. This bright area corresponds to the silhouette line in light source direction.

Shine

Setting of the highlight width.

Color Clip

Setting of the brightness or color transition quality. You can continuously change between a continuous brightness or color transition or a display of discrete brightness or color edges allowing for a visually sharp demarcation.

Parameter for the options Colored and Black and White:

Color Cycles

Setting of the number of highlights.

Color Clip

Setting of the sharpness at the transition to the highlight area.

The highlight type Split and the appertaining parameters Split Angle and Tolerance Angle are not available in ICEM Viewer.

3.4.9 Display – Options

This function can also be activated by clicking the icon.

With this function you can activate different display functions with their current settings.

**NOTE:**

The options Soft Shadows, Textures, Self Shadows, Reflection, Transparency, and Lens Flares can only be selected, if the corresponding settings have been imported from the original ICEM Surf database into the ICEM Viewer file.
The Menu Display Options

Central Perspective
Activating a perspective view (see glossary entry “Central Projection/Central Perspective”). You can change the perspective with the option Focal Length in the menu Display – Navigation (see page 20).

Soft Shadows
Activating the display of soft shadows in case of light sources creating shadows with soft contours.

Update
In case of light source movements the shadow will be updated dynamically.

Textures
Activating the display of textures.

Self Shadows
If this option is switched on, shadows created by geometry objects on geometry objects are displayed, e. g. shadows of an exterior mirror at the car body.

NOTE:
The display capability of self shadows depends on the graphics card of your computer.

Highlight
Activating the highlight surface diagnoses currently set in the menu Display – Highlight (see page 27).

Reflection
Activating the display of reflections on reflecting materials.
Transparency

Activating the display of transparency of transparent materials.

Lens Flares

Activating the display of lens flares in case of light sources creating lens flares (see glossary entry “Lens Flares”).

Light

Blanking and unblanking the light source symbols.

Center of Rotation

Blanking and unblanking the rotation origin symbol (see also section 3.4.5 “Display – Navigation” on page 19).

Full Scene Anti Alias

Activating an anti-aliasing which is not only applied to lines, but to the whole graphics scene displayed.
Glossary

Angle Of View

*Bildwinkel*  
*Angle d’ouverture*

The Angle Of View defines the size of the field of view. The smaller the Angle Of View is, the smaller is the detail of the displayed geometry. The Angle Of View is indicated in X direction.

![Diagram of Angle Of View](image)

**Anti Alias**

*Anti-Alias*  
*Anti-Alias*

Method which suppresses the so-called “staircase effect” and creates smoother edges. This effect results from the arrangement of the pixels at diagonal lines on screens.
Central Projection/Central Perspective
Zentralprojektion/Zentralperspektive

View mode creating a perspective view of the geometry. The projection center has a finite distance to the geometry, so that the projection beams pass through the plane with unequal angles. The image points are the intersection points of the projection beams with the projection plane. Parallel horizontal edges of the geometry meet in vanishing points lying on the horizon.

See also “Parallel Projection”.

Eye Position
Augenpunkt
Point d’observation

In central perspective views the eye position is the point from which you look onto the geometry (see figure in “Central Projection/Central Perspective”).
Focal Length

*Brennweite*

*Distance focale*

The focal length is the distance between eye position and reference point or projection plane (see figure in “Central Projection/Central Perspective”). The focal length determines the perspective effect of the central projection. The smaller the focal length, the greater is the perspective effect.

Highlight Lines

*Highlightlinien*

*Lignes de highlight*

See “Isophotes”.

![Central Perspective with large focal length](image1)

![Central Perspective with small focal length](image2)
HLS Color Model

HLS-Farbmodell
Modèle de couleurs HLS

In the HLS color model a color is defined by the parameters hue, lightness, and saturation. The HLS color model is represented by a hexagonal double pyramid. At the corners of the basic sexangle are the basic colors red, yellow, green, cyan, blue, and magenta, at the pyramids’ vertices the colors black and white.

- **Hue**
  The hue value is indicated as angle.

- **Lightness**
  The lightness of a color is defined by the height of the value on the black-white-axis. The color will be the lighter or darker, the larger the white or black portion is. The lightness value is indicated in percent. The pure color without black and white portions will be obtained with a value of 50 %.

- **Saturation**
  The saturation, i.e. the gray and color portion of a color, is defined by the distance of the value from the black-white-axis. This value is also indicated in percent: 0 % = gray, 100 % = pure color.

**Isophotes**

*Isophoten*
*Isophotes*

Lines of equal brightness connecting those points on a surface in which the light has the same angle of incidence.
Lens Flares
Lichtreflexe
Effets de halo

Photographs may show lens flares if incident light reflects between the lenses of a camera objective.

Parallel Projection
Parallelprojektion
Projection Parallèle

View mode with a projection center lying in infiniteness. The projection beams run parallel and pass with an equal angle through the projection plane. Parallel edges of the geometry remain parallel.

See also “Central Projection/Central Perspective”.

Reference Point
Referenzpunkt
Point de Référence

In parallel and central perspective views the reference point the origin of the view coordinate system, to which view rotations and scalings refer (The point onto which you look) and is located in the center of the view.
See figure in “Central Projection/Central Perspective” and “Parallel Projection”

**Renderer**

*Renderer*  
*Rendu*

A Rendering is the photorealistic display of a three-dimensional CAD model in an image environment. For the generation of a rendering are used different shading methods as well as the effect of the light sources used. In a rendering can be created effects like shadows, reflections, lens flares, or fog.

**RGB Color Model**

*RGB-Farbmodell*  
*Modèle de couleurs RGB*

In the RGB color model, a color is defined by adding the primary colors red, green, and blue to black (additive color mixing method). The RGB color model can be represented as coordinate system forming a cube with the basic colors red, yellow, green, cyan, blue, and magenta at the eight corners, and the origin of which is black with the coordinate values 0, 0, 0. Each color is defined by three coordinate values for red, green, and blue. The range of values is 0 to 255. Low values create dark colors, high values light colors. If the primary colors red, green, and blue have the same value, are created the colors black (0, 0, 0), white (255, 255, 255) or gray scales.

---

**Texture**

*Textur*  
*Texture*

Textures are two-dimensional images (normally with patterns of materials like rock, wood, glass, etc.) which are projected onto three-dimensional CAD objects for a realistic display of their surface character.
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