



ELITECAD MECHANICS 15

Innovations of the new version

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Innovations of the new version

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Locally efficient, globally proficient: This is what ELITECAD Mechanics 15 can be summarised as. The comfort in daily workflows now stretches far beyond the desk of the individual. In times of evergrowing digitalisation and globalisation the continuous collaboration and connection provide a foundation for modern construction. The open data exchange is as essential as ever. This means a seamless and lossless transfer of ideas, concepts and the resulting data in various applications is the key in today's construction world. The more details can be transported, the more efficient is the collaboration and the more successful the entire project.

With this in mind, a main emphasis in ELITECAD Mechanics 15 is placed on **connectivity**. This motto encompasses a wide range of interfaces and integrations which connect ELITECAD to a number of essential upstream and downstream processes. Common direct interfaces to other products have been updated and a focus was also put on working in BIM projects using Mechanics by providing import and export of IFC files. Beneficial integrations of well-known 3D object platforms as well as an extended ELITECAD PARTS module allow for easy access to millions of 2D and 3D CAD files in order to comfortably detail construction projects. Furthermore, ELITECAD Mechanics 15 provides many new possibilities for digital architectural surveying, especially for processing and editing point clouds and terrain data.

Additionally, another major focus of ELITECAD Mechanics 15 is on **usability**, i.e. on simplifying the daily work of engineers and planners. With every extension and adaptation, the team of ELITECAD has always been putting a strong focus on providing the user with even faster, simpler and more efficient workflows. Within the development of the new version 15, this endeavour was given especially high priority. At first glance, users will enjoy a modernised user interface, but the innovations go much deeper. Many optimisations for manipulations and working with objects have been implemented, which allow for easier rotation, mirroring and scaling using point input with an immediate graphic feedback. Revision clouds for 2D drawings as well as graphical depiction of 3D operations using CSG trees improve daily workflows. One of the highlights of the new version is the improved plan depiction, which now features a coloured depiction of attributes and provides endless possibilities for ELITECAD users. In short: as easy to use as users are accustomed to, but even more efficient – that's ELITECAD Mechanics 15.

The following pages provide a detailed description of all the extensions and innovations. The team of ELITECAD would like to wish you a lot of joy getting to know the new version, as well as a lot of success using it regularly with your projects.



Dr. Wolfgang Stöger
CEO

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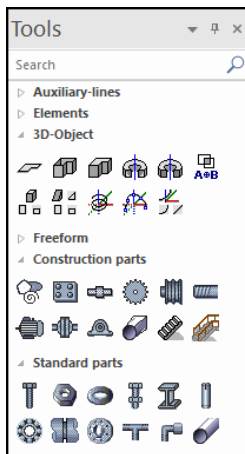
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Usability

User interface

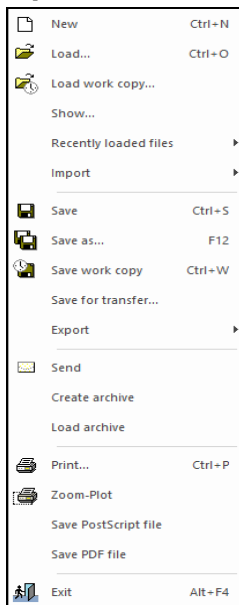
Ergonomic and efficient workflows are the basis for an optimised working process. Changes on existing layouts are always implemented with care, not to change existing habits and workflows of experienced users too much. Nevertheless, sometimes it makes sense to implement some changes to improve usability. After a short period of adjusting to the change, the reduced number of clicks and the shortened mouse movements improve the working pace. This principle also applies to the optimised menu workflows in ELITECAD Mechanics 15. In addition, the new version provides countless advantages through clearly structured menus and helpful extensions in the user interface.

New search bar for the tools box



The tools manager with open or closed toolbars provides practical access to the most important functions. Many users prefer to add many closed toolbars to the tools-menu for quick access. The new search functionality allows users to search for a specific function or toolbar using the first letter of the name. The displayed elements and toolbars are then reduced to the corresponding functions and toolbars. That way, not only the desired toolbar but also functions can be found in an instant.

Optimised menus for import and export



The continuously growing number of supported interfaces kept increasing the size of the interfaces menu. For that reason, and to get a clearer structure, the new version features a clear separation of the functions into two separate menus for import and export.

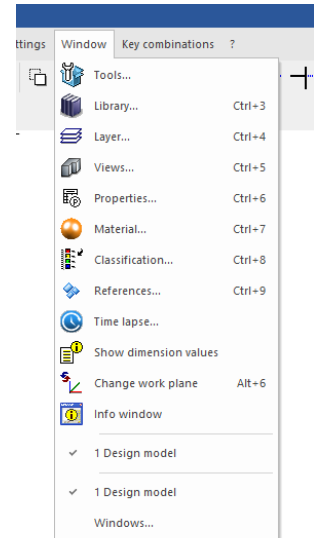
In general, it is more intuitive to separate functions for loading and storing files into groups in the file menu. The functions for “save”, “save as” as well as export functions now create a small group. “File open” and recently used files have been grouped together as well. Furthermore, those groups are now located in the topmost section of the menu, so that they can be accessed faster.

Improved workflows in menus

Some terms in the user interface, especially in menus have been improved and unified to provide a more intuitive and understandable user experience.

Measurement functions are commonly used, and therefore are no longer located in a submenu.

The access to manager windows is now in the main menu instead of being a submenu under “View” and therefore are more accessible to the user.

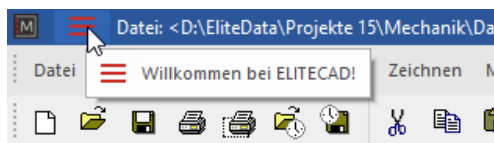


More icons

Images improve the recognition of functions. Therefore, countless icons were introduced in addition to the function names.

More information in the title bar

The window „Welcome to ELITECAD“ can now be opened quickly with a



small icon on the top left and features access to the recently opened drawings as well as project templates. An additional symbol indicates whether there is any new information in this area.

Quick access to notifications

The notification window (information window) can now be accessed via a small icon in the top right.

Display of the number of notifications

The new symbol in the title bar, which can open the information window now also can display the number of notifications. This convention is also known from other applications like mobile apps. It allows to quickly check the status about important notifications for the user.



Optimised area selection

Selecting objects in ELITECAD can be done using a rectangle selection, which is defined by two diagonally opposite points. Entering the points per click in the graphics window sometimes has the side effect, that instead of the rectangle, an object is selected especially in the case that the point is very close to an object. As a result, a normal object selection is performed instead of starting a rectangle selection. Selecting an area can now also be done using click and drag functionality. Therefore, in very dense drawings with many objects it is now possible to select elements using area selection without zooming into the desired area first. The workflow is now faster and more intuitive.

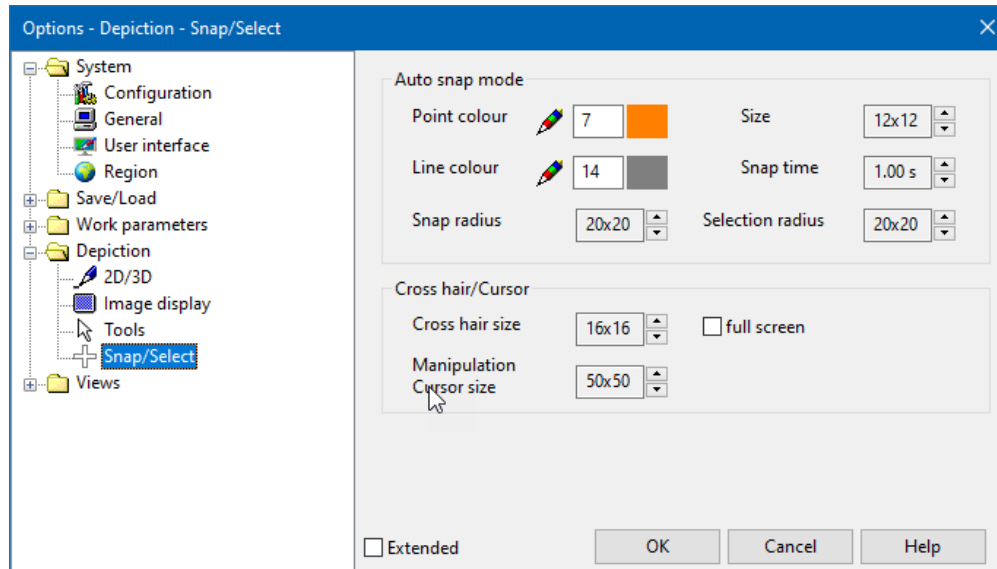
Improvements in the graphics window

Better visibility for handles and gripper

Handles and grippers for selected objects are drawn on top of the object and overlap with other information in the model. The better the visibility of those tools, the easier the manipulation of

objects. For that reason, the graphical depiction of handles and gripper was further optimised. They are now displayed slightly thicker and with colours that feature more contrast, so they clearly differ from the rest of the model. Handles can also be displayed with fillings and borders, which further increases visibility.

Configurable snap radius and selection radius



The snapping of points and the selection of objects are some of the most commonly used functions in ELITECAD. The size of the area, for example the snap radius as well as the selection radius can now be configured in the options menu. This wish came mostly from experienced users, who wanted to reduce the area or make it configurable. On the one hand, this requires a more precise style of working, but in denser plans less zooming is required which further improves the efficiency. At the same time, the probability of accidentally selecting multiple objects at once is reduced.

Configurable cross hair size

Different users have different preferences, especially when it comes to the crosshair size. Therefore, this property was turned into an option and now the size can be configured individually. It can be increased up to the size of the screen.

Navigator toolbar



The new navigator toolbar combines several existing as well as new functions for setting the camera position into one toolbar. The change of the viewing direction to a front view, side view, etc. was only possible by selecting the corresponding standard view, or by defining a free camera position. Changing to a different view is generally not necessary if one only wants to change the viewing direction of the model. Besides the new buttons to change the standard viewing direction, the new toolbar also features buttons for browsing through the standard viewing points as well as the stored cameras or snapshots (previous/next).

Improved graphical feedback for dimensions

The new graphical preview for deleting and adding dimension points provides better feedback for users and simplifies user input. In addition, when moving a dimension text, the dimensioning text is displayed at the cursor, so that the result of the manipulation can be judged on the fly before actually updating the dimensions.

Deleting

Backspace

Now BACKSPACE keys can be used for deleting a selection. Deleting via the keyboard works in the same way as using the CTRL or DEL keys.

Manipulating

New handles for objects

Simple manipulation of objects is one of the key aspects in ELITECAD. Additional handles in the centre of an object were supplemented, e.g. for the profiles, so these mechanical objects can be aligned in the centre more easily. Also the 2D rectangle now features a new handle in the centre.

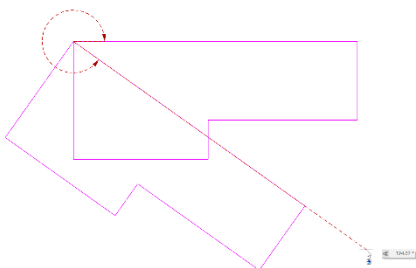
Copy with Ctrl-key

In many situations, pressing the CTRL key will result in copying the current selection during a manipulation. This possibility was extended for even more cases, and now allows the generation of copies, independent of the previously activated copy function (e.g. during rotation, mirroring or scaling).

Depiction of handles

The possibility for switching between the various handles of an object (only 2D / only 3D / 2D and 3D) using the TAB key was adapted to work not only for 3D objects but also for some mechanical objects. This unlocks easier manipulation possibilities for complex objects with many handles.

Rotating with point input



For the rotation of a selection, it is necessary to provide a rotation point and an angle. The function for interactive angle input using the initial direction and end direction of the desired straight can now be activated and deactivated.

The available rotation functions are now also provided via the input assistant.

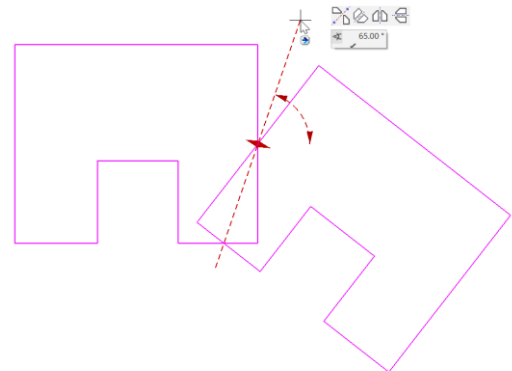
The graphical preview of the inputs for the points and angles makes the application of the function even more intuitive.

Mirroring with point input

Mirroring a selection in 2D requires a mirror axis. The function for interactive input of a mirror axis through two points can now be activated and deactivated.

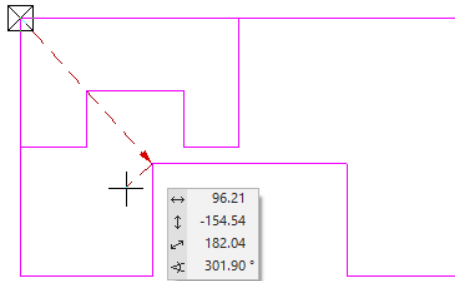
The available mirroring functions are now also provided in the input assistant during mirroring.

The new graphical preview of the mirror axis and the mirrored result make the application of this function even more user friendly.



Scaling with point input

Expanding and reducing via a scaling factor is very intuitive in theory when working with integers (double, half, etc.), but if a desired size has to be reached, it is necessary to first measure the distances and then calculate the scaling factor. The new graphical scaling with point input makes this process much easier. Simply select a start point that will be scaled to a target point. The resulting scaling factor is calculated automatically by the software. In addition, the result is shown interactively in a graphical preview, so scaling can be done as easy as never before.



Graphical preview

Visual feedback during the execution of functions is the best support during drawing, measuring and all other graphical activities and actions. The improved highlighting of point input, the preview of results during functions, as well as the graphical display of measurements (e.g. angles) are only some of the examples, where previews were added or extended to make working with ELITECAD even more convenient.

Light-/camera-dialogue

New design of the user interface

Similar dialogs and UI elements improve the easy operation and learnability of the software. For this reason, the user interface for light and camera settings was redesigned now features a more logical structure. Similar to other dialogues, the functions are listed in the topmost bar. The parameters in the bottom are grouped together in register cards, sun and timer intervals are part of the parameters as well. New icons and labels simplify the recognition of the meaning of certain settings.

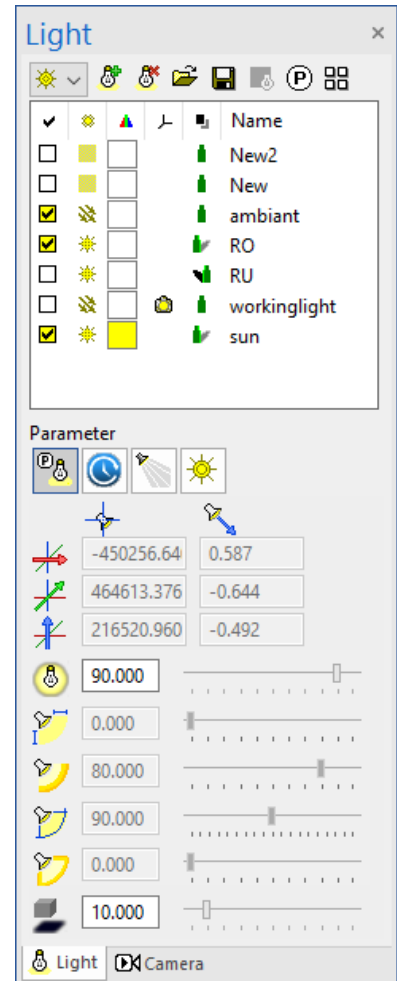
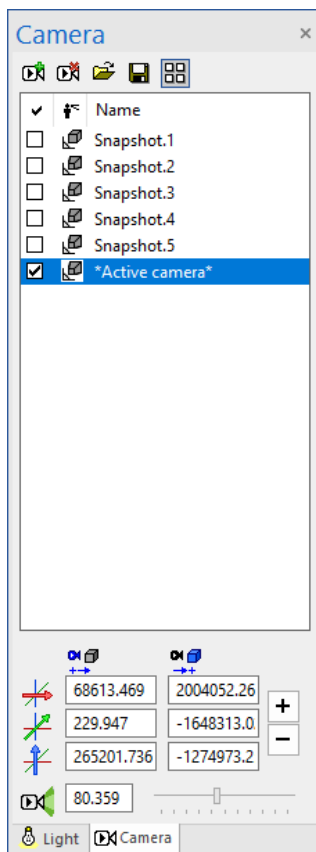
Dockable dialogue windows

Since the manager windows for light and camera not necessarily are closed after finishing a configuration, they are now dockable windows and therefore improve the simple and clean design of the user interface.

Light-/camera configuration without 4 views mode

Changing settings no longer requires switching to the 4 views mode. Parameters of the light and camera can be modified at any time, since the dialog can be visible at all times. Only geometric changes, like the direction of the light require the 4 views mode.

Changing light parameters immediately affects the graphics output and can be verified and further adjusted in real time.



Extended sorting possibilities

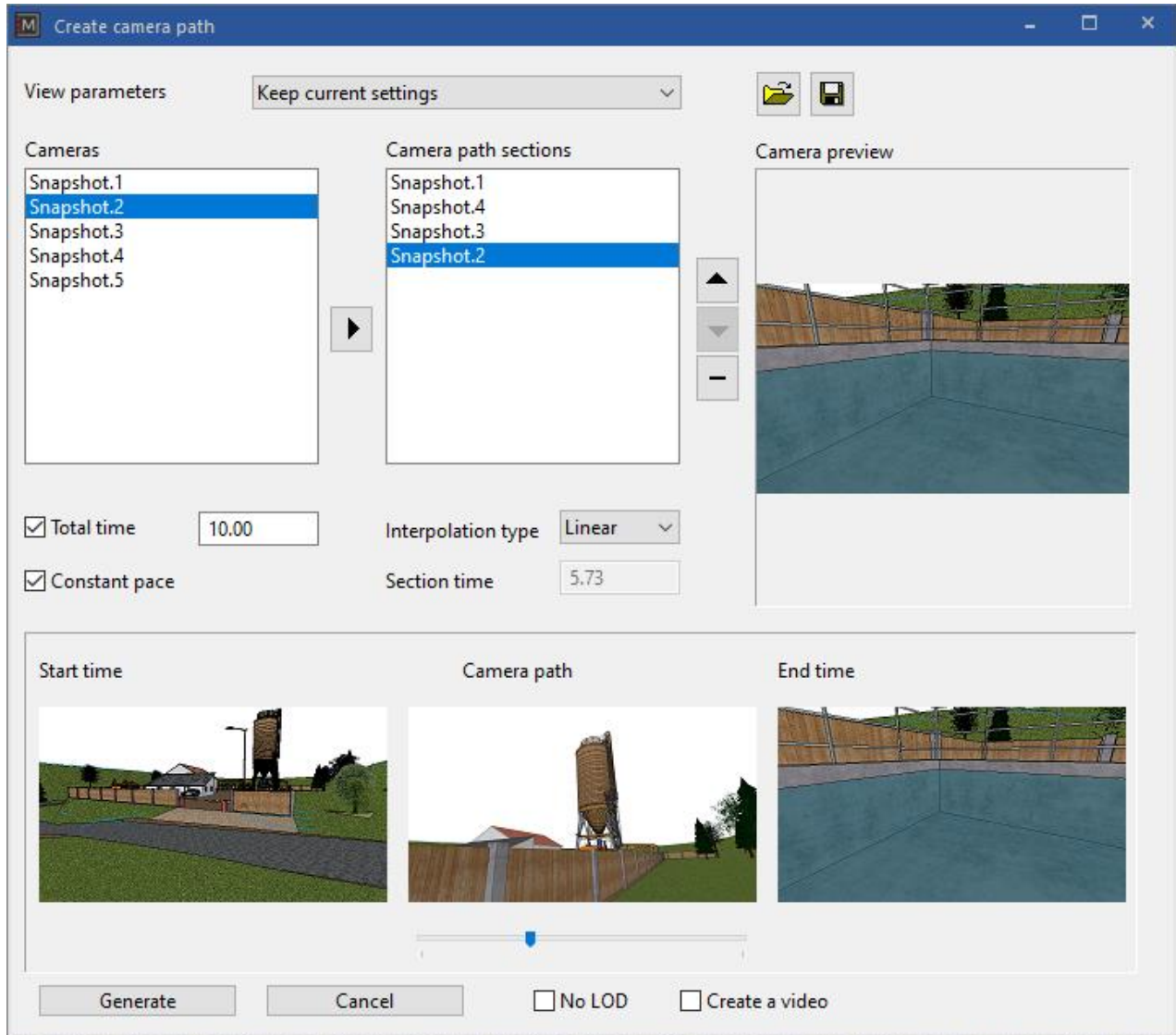
Until now, ascending and descending sorting of cameras and light sources was possible with a click on the column header. In addition, it is now possible to sort cameras and light sources manually using drag and drop in the table. The result of the manual sort is defined as a user-defined sequence. A click on the column header now switches between ascending sort, descending sort and manual sort.

Camera

Definition of camera paths

Camera paths are the foundation for creating videos. Until now, it was only possible to create camera paths by recording the movements in

virtual walkthroughs. The new version offers a completely new approach to this by defining camera paths through saved camera positions. The camera movement between the positions is interpolated and the time between points or the total duration can be set by the user. With only a few clicks, it is possible to create a sequence out of snapshots intuitively, which then turns into a configurable camera path. This practical and easy way of defining a camera path is the basis for a smooth video with steady camera movements.



Camera path export / import

In order to transfer defined camera paths, they can be exported to external files and reimported from there.

Save

New function: Save drawing for transfer

As a one-file-system, ELITECAD stores the entire project state. Nonetheless, in some cases files may be stored outside of the file, like materials in a centralized database, external references, external background images, large bitmaps, etc. When transferring an ELITECAD file to someone

outside of your working environment, it might happen that information is missing if it is not specifically transferred.

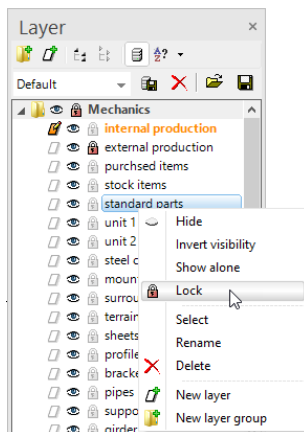
To avoid this scenario, we developed a new function called „save drawing for transfer“, which saves all external data into one ELITECAD file, independent of the current settings in the options. That way the integrity and completeness of the data is guaranteed and problems can be avoided.

Layer

Change of current layer when editing objects

When editing existing objects up until now, the according layer was activated upon selection of an object. In some cases, it makes sense to maintain the current layer when editing an object. This behaviour can now be activated and deactivated optionally. The new setting is called “change current layer when editing” and is available in the context menu of the layer manager. It supports both workflows.

Actions for the current layer



The current layer is always visible and editable and therefore can never be locked or deleted. In order to hide, lock or delete the current layer, it was necessary to select a different layer before executing the desired action. Now this step is done automatically. If there is at least one other visible and non-locked layer, one of the eligible layers is activated automatically and the workflow is reduced by several clicks.

ELITECAD configuration

The ELITECAD configuration is not only available from the start menu anymore, but can now also be launched from the ELITECAD user interface via the menu settings.

Free scale

When entering a free scale, it is now possible to use colons (for instance 1:15).

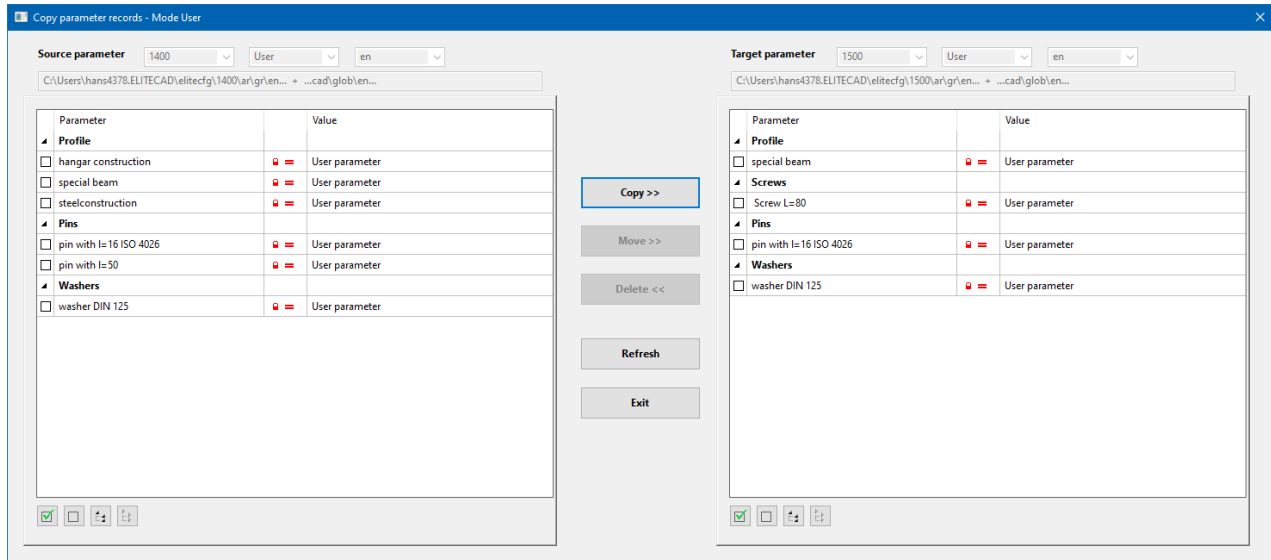
Management of parameters

Overview of the stored parameters

Managing parameters and configurations is a key factor when working in a team. The new parameter management function not only provides more structure for administrators, through the clearly structured user interface, one can see which stored parameters are available. Parameter sets for different functionalities like texts, dimensions, hatches or arrow parameters, but even pre-configured parameter sets for mechanical objects are listed with their names. The parameter management tool can be launched via the ELITECAD configuration. The selection of the version

and region as well as the distinction between global and user-defined parameters can be configured using simple filters.

Easy adoption of parameters to a new ELITECAD version



The advantage of this new management tool is not only the structured overview, but also the possibility to copy parameter sets. This feature can be used right after installation, because many companies have defined their custom standards, which have to be migrated to the new ELITECAD version. The new parameter management tool makes the migration of parameters between ELITECAD versions easier than ever. User-defined parameter sets are simply copied from old versions to new versions and can be used in combination with the shipped parameters of the new version.

Adoption of parameters between regions

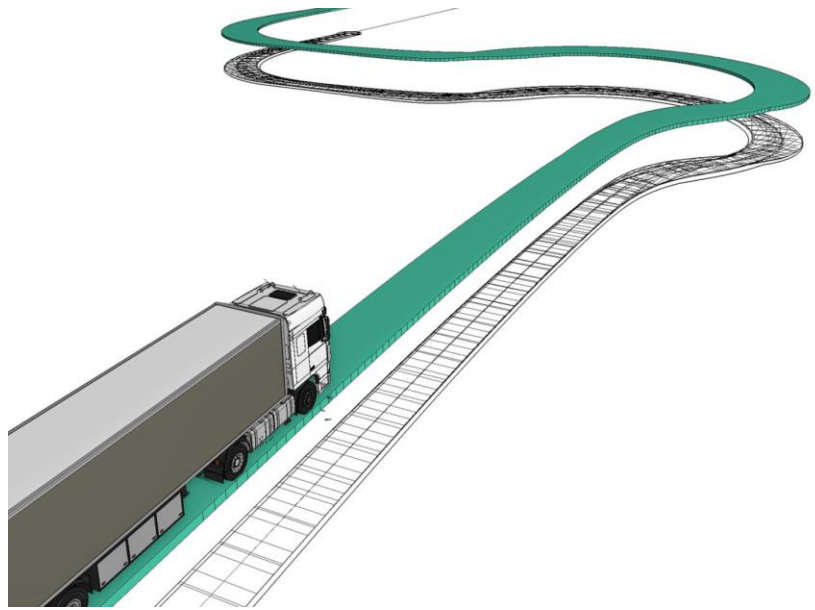
Besides copying parameters between different versions, it is also possible to copy them in-between regions. This is especially important for customers working on international projects and spread across multiple regions. Copying between regions is as easy as copying between versions.



Tractrix curve

Animated vehicles

Besides the depiction of driving paths in the plan, it is also important and informative to interactively be able to analyse the driving behaviour of certain vehicles along the given path. For that purpose, a new function allows the user to drag the vehicle across the given path with the mouse. The interactive animations show the position of the vehicle with all of its components, as well as the required space of the vehicle in real time.



The vehicle dynamically follows the mouse in forward and backward movements, and the important information can be observed in an instant.

New vehicle types

In addition to the standardised vehicles of the FGSV (Forschungsgesellschaft für Straßen- und Verkehrswesen) the new version features more vehicles, especially important for US standards.


2D extensions

Working in 2D still remains a crucial part, even for a 3D oriented BIM software. Many complex construction parts are generated from 2D contours, and of course, plans have to be generated fast, easy and in high quality. For those reasons, a continuous improvement and simplification of 2D functions will always be a high priority. Easy workflows and new functions lead to fast results and therefore make daily work easier.

Orientation of lines and poly lines



Geometrically speaking, lines and polylines are basically a connection of several individual points. Nevertheless, sometimes it is necessary to know in which order the points were entered, or what the drawing direction was. The starting point is the reference point, which for instance stays at a fixed position when the length changes.

If a polyline is created with a certain line type, which consists of sections with fixed length, then the starting point is crucial for the graphical depiction. The function for changing the drawing direction  can be accessed via the property bar and enables an even more precise plan generation.

Display the reference points

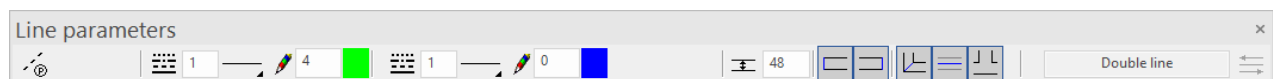
For some objects, the direction of drawing is relevant. A single line for instance, has a start and an end point. If the length is changed by adjusting the value in the property bar and not in the graphics window, the start point (reference point) is fixed and the end point changes.

In order to distinguish these reference points in the graphics window from other points, similar to mechanics objects, 2D objects now also feature a handle for the reference point in the shape of a filled rectangle.

Move reference point

The function for moving reference points was unified for all objects. The unified function further improves recognition of the function.

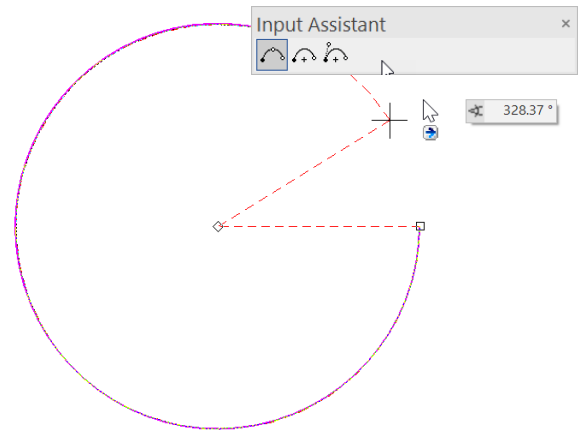
Double line with options



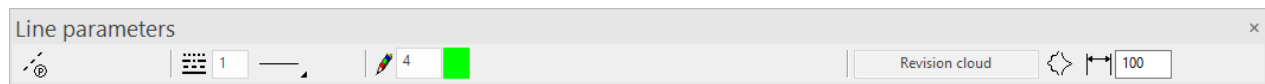
The double line is a lesser known help tool to create 2D contours. With new implementations in version 15, this will change in the future. The generation of a double line was completely redesigned, so now it is very easy and intuitive to handle. In the beginning a property bar is shown which provides numerous options, including several new settings. The user can for instance decide whether the double line should be closed at the beginning and at the end, if there should be a centre line, or how the corners should be generated.

New arc function

The arc function using start point / point on arc / end point was adjusted to work like the general drawing functions for polygons and now enables drawing of arcs via radius / start point / end point or start point / tangent / end point. Unified user guidance for the input assistant functions (display using the TAB key) further eases the drawing of arcs in several locations.



Revision cloud



The revision cloud is a 2D element, which usually is used to add annotations about changes in the model. Drawing cloud-shaped contours is now simpler than ever, because there is a dedicated object. This new 2D element can be used analogue to other drawing functions.

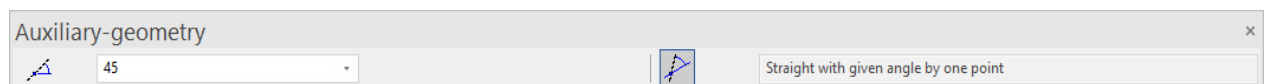
The shape of the arcs as well as the direction (inside to outside) can be configured using the property bar. Changes of the colour, line type, arch parameters etc. can be performed via the property bar later on by selecting the revision cloud. Furthermore, the revision cloud features handles to manipulate the contour.



The data exchange via the DXF interface also supports revision clouds and can import and export native objects.

Auxiliary lines

New auxiliary line



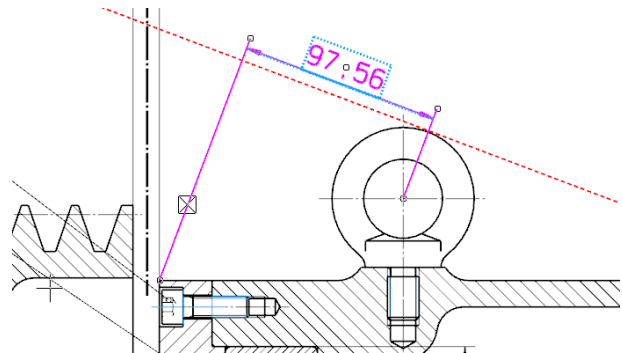
There are new possibilities to draw an auxiliary line through a point and an angle relative to an existing line. In the property bar, you can specify whether the angle of the auxiliary line is entered in absolute or relative coordinates.

Handles and gripper for auxiliary lines

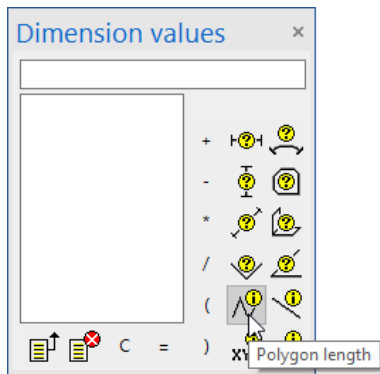
Auxiliary lines now feature handles and gripper. Using these tools, auxiliary lines can be manipulated even easier. Selecting the handles at the corners of the screen allow for changing the direction. Dragging the lines results in a parallel shift.

Linear dimensions parallel to line

Up until now, linear dimensions were exclusively positioned horizontally, vertically or parallel to the dimensioned points. A new addition is the option to define a direction, independent of the selected points, parallel to a selected line. In the past, a few intermediate steps were necessary to achieve this. Now the generation can be done easier and faster.



Simplified measurement of polylines

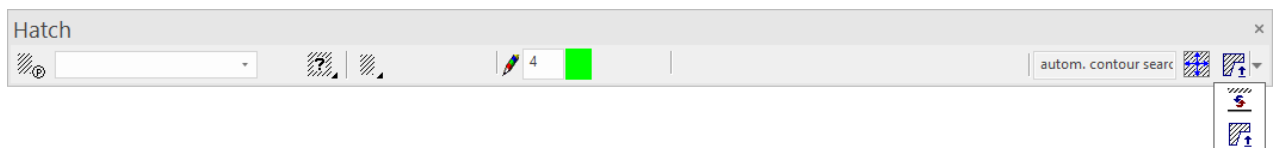


Measuring is one of the most basic functions in ELITECAD. The extensive function “Measure area” includes numerous options and provides countless details about the result, for instance the length of lines. Sometimes it is only necessary to calculate the length of a single polygon. Therefore, this function was introduced as a separate measurement function and included into the measurement window.

Create objects from parallel contour

Countless objects can be defined with contours that are either selected as an existing contour or created when generating the object. Using a parallel contour of an existing contour as input was not possible in either method up until now. In the new version, it is possible to select the newly generated parallel contour for the new object right away using the variant “Create objects from parallel contour”. As a result, parallel contours do not have to be drawn in advance.

Reconstruct polygon from hatch



Hatches are usually generated using a closed polygon, but sometimes this polygon does not exist anymore. A new function called “Create boundary contour”, which can be activated from the property bar, can recreate the boundary contour as a 2D polygon.

Hatch

Unification of hatch and covering hatch



Up until now, the covering hatch was an independent function, where you had to draw a polygon, which was then defined as the covering area. By merging the generation function for hatches and the covering hatch, now there is almost no difference between the two variations. That way, the covering hatch can also use an already existing contour or determine one with the contour search. Both variations now use the same property bar for setting the options, the type of input and the type of hatch.

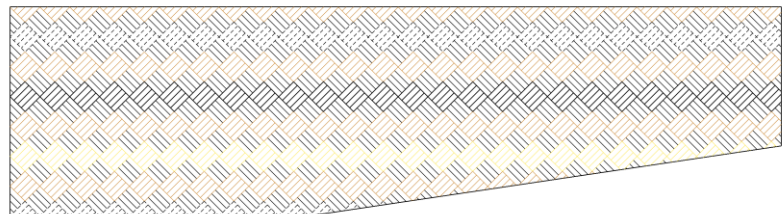
Interactive alignment of hatches

Line and model hatches are also used to depict pavements and tiles. In these situations, it is sometimes necessary to adapt the alignment of the hatch in the drawing to the geometry. Until now, this adaption of the alignment was only possible in the hatch parameters, which happened without any graphical reference to the drawing.

The interactive alignment of hatches now allows moving the hatch in the drawing. Selecting the elements and points of the hatch is as easy as manipulating the geometry. Using handles, the hatch elements can be moved within the hatch contour and aligned precisely in the drawing.

Multi-coloured hatch

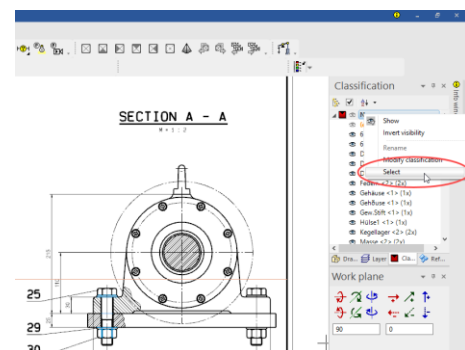
The model hatch uses predefined or custom created 2D contours, to stitch them together in a repetitive way to create a hatch. Until now, the model hatch was drawn with the colour selected in the hatch parameters, ignoring whether the hatch definition used different colours.



With the new version, the colours are preserved if more than one colour was used. Otherwise, the model hatch still uses the predefined colour from the parameters.

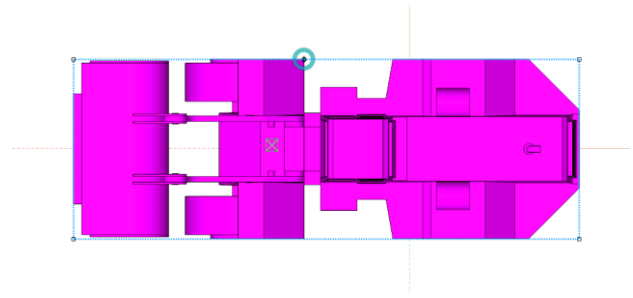
Select classification (MGCL) in drawing

When selecting classifications (MGCL) it is now possible to select the desired classification in the drawing. That way arbitrary selections can be made via SELECT in the context menu.



Library parts – graphical depiction of the reference point

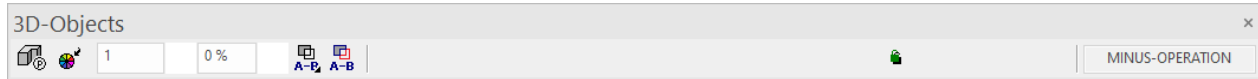
Selecting a library part automatically highlights the reference point graphically. This allows an easy visual validation and provides information about the behaviour when it comes to changes



3D extensions

Boolean operations

Easier creation



The creation of 3D objects usually displays the 3D property bar, where the most important settings can be set in advance. The generation of Boolean operations (intersection, union and minus-operation) now works analogue to the basic 3D objects. Settings like the operation type, or if the result should be frozen, or if the original object should stay changeable can now be set in the property bar. In contrast to the basic objects, the detailed parameter dialog cannot be opened before the object creation. The reason for that is that the settings such as classification for the resulting object are adopted from the original object. Therefore, it is not necessary to modify those settings.

Easier deletion

One click on the result of a Boolean operation makes the property bar for Boolean operations appear again. The delete function can be activated via the property bar and only deletes the result of the operation, not the object itself. Alternatively, a Boolean operation can be selected via ALT-click (this corresponds to a partial selection) and via the delete function or DEL key, it can be deleted. As a result, the Boolean operation will be deleted and the original objects are visible again.

Join 3D objects

The new version of ELITECAD Mechanics provides two new functions that allow to join 3D objects. The functions can be accessed using the toolbar „Extras“.

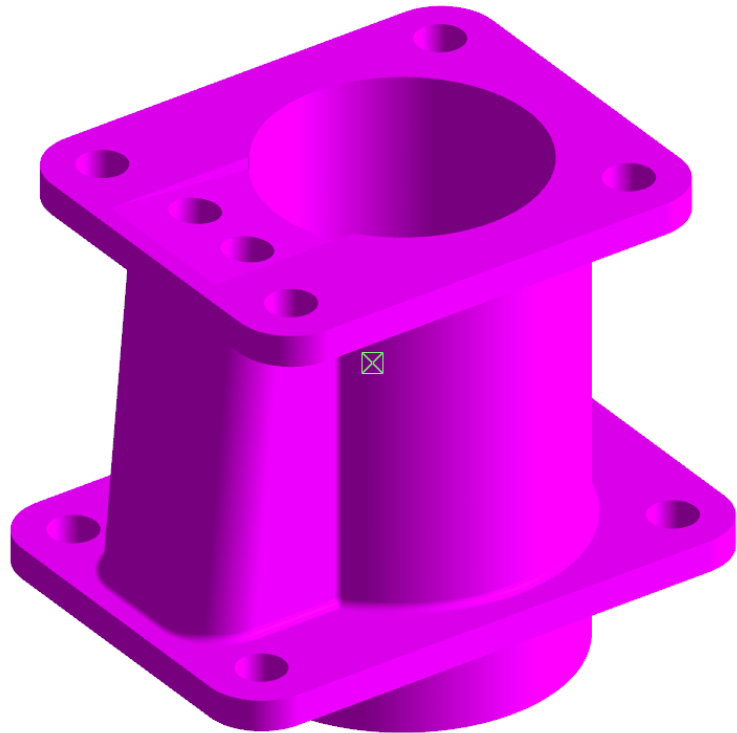
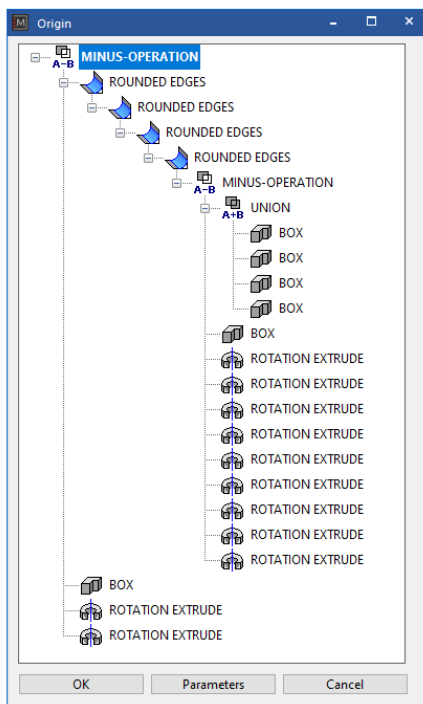


This function allows to join an arbitrary number of 3D objects into a single 3D object. The result is a single 3D object which is optimised in size and can be handled easily. All definitions and 2D structures are eliminated and the 3D is frozen and cannot be changed anymore.



This function allows the assignment of a 3D object to a 2D model. It can be used for kinematics to attach 3D structures to the kinematics definitions (2D models).

Graphical depiction of 3D operations (CSG tree)



Complex 3D objects often are modelled via multiple steps. For instance, by using Boolean operations or blending operations on the edges, which consequently turn a basic object into an edited object, which can be regenerated by changing the original objects. This process is also called Constructive Solid Geometry (CSG) and the steps of this process that lead to the desired result can be depicted as a tree. The 3D origin dialogue was completely redesigned and now graphically shows the CSG tree, so the history of operations on the 3D object. The dialog displays the necessary modelling steps, which were used to create the selected object in a tree. The intermediate steps or basic objects can be selected directly in the tree and are highlighted in the graphics window. That way it is easy to navigate between the modification steps and the individual parameters of the original objects and the intermediate steps are always accessible. As a result, this new function allows for easy modifications on complex objects.

The 3D origin dialog can now easily be activated via the 3D property bar.

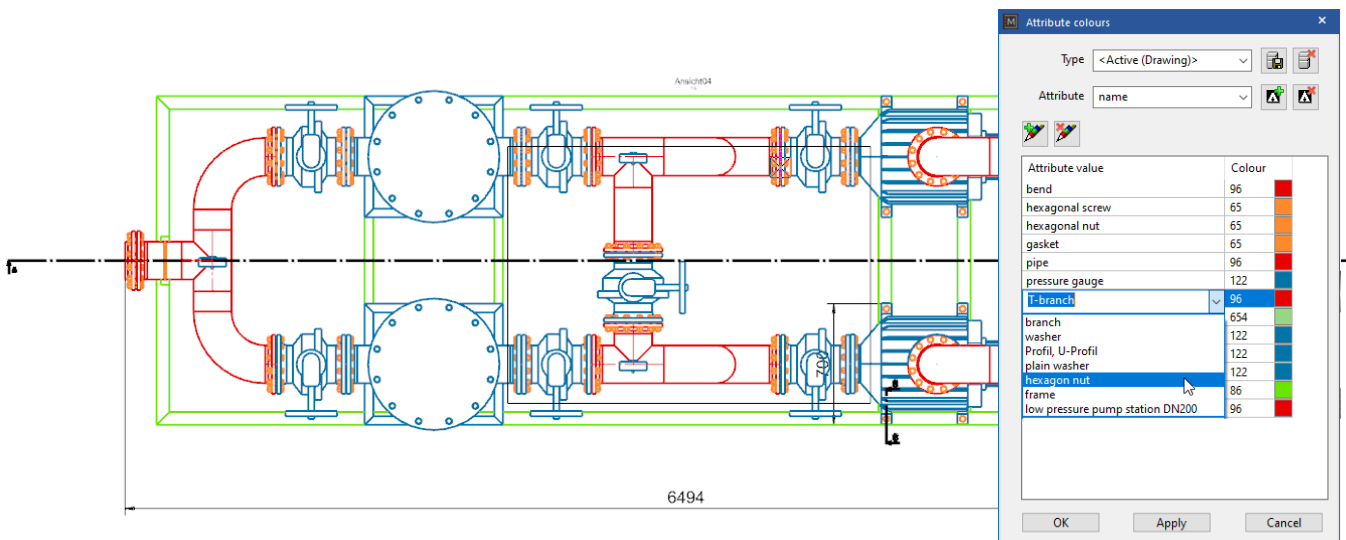
Coloured depiction of attributes

Visualisation of properties and data

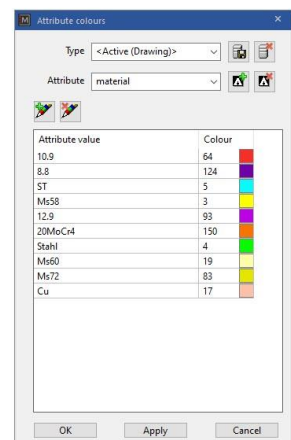
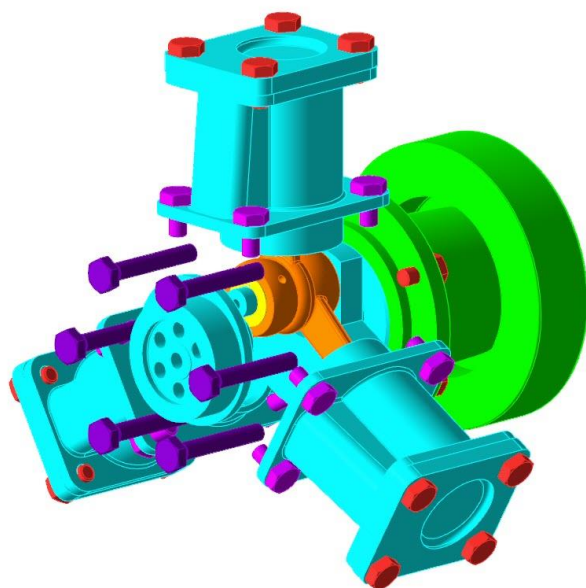
Just as important as the modelling and plan depiction, is the information that is linked to the construction parts and the model as a whole. Information is the central element in the model and 2D drawings, because without data, no bill of material can be created, no masses and no quantities can be calculated. In ELITECAD, this information is linked to the objects as attributes. Attributes are created in different ways and are essential for the data exchange with other applications and programs.

Countless areas of application in 2D and 3D

In this example, the attribute „name“ is used for visual grouping of a plant. The assignment of the desired values of the attribute can be done in a pull-down menu, which provides information about the used attributes.



Another example shows the used materials in a 3D model in different colours.

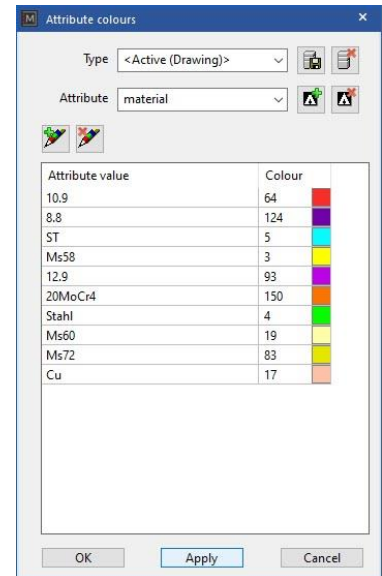


The quote “A picture is worth a thousand words” sums up very well that data and values in lists and piece lists are not as appealing to humans as a graphical representation or depiction of information. This knowledge inspired a new function in ELITECAD, the ability to graphically visualise information of attributes.

This tool allows for quick and easy verification and control of various scenarios which further increases the quality of constructions and models created with ELITECAD Mechanics. The coloured depiction of attributes is an extensive tool, which allows to graphically visualise object properties and opens up a whole world of real-world applications. One example is the coloured depiction of materials and the resulting graphical verification of the model. The possibilities are endless, since any kind of information can be used for the depiction, independent of whether the information was generated by the program or added by the user.

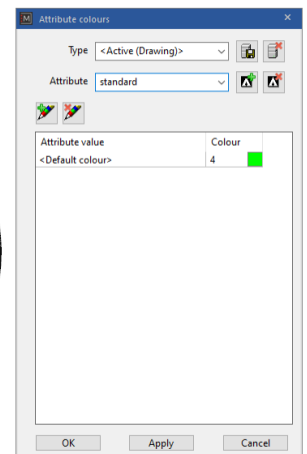
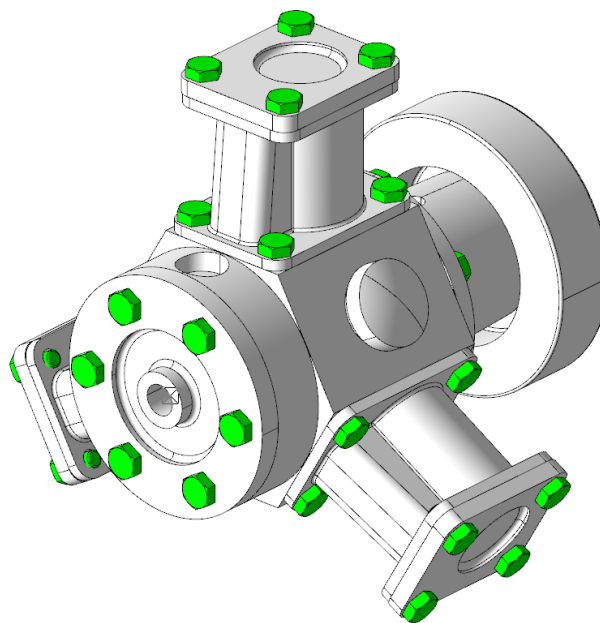
Free configuration of colours

A new dialog allows the user to configure the colours for every attribute value of a certain attribute. This does not necessarily have to be configured for every possible value, only for the values that should be coloured. The depiction according to attributes is a setting in the view parameters, including the model view. It is possible to choose an attribute for every view that defines the colours of the objects. The coloured depiction can also be used for the plan views, because it is not only depicted on the screen, but can be printed as well.

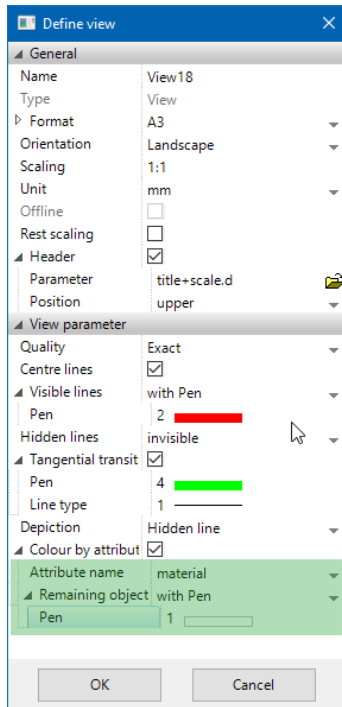


Searching objects by attributes

Another area of application is to search objects that have a certain property or attribute, independent of their value, for instance colouring all objects that have the information of an article number. In the attribute configuration, a default colour can be selected for every attribute. The default colour will be applied for every object that has the information of the attribute but does not have a colour assigned to its value. So, if there is only a default colour configured for a certain attribute, all objects that have this attribute will be coloured in the default colour and are clearly visible to the user.



View parameters for objects without attributes

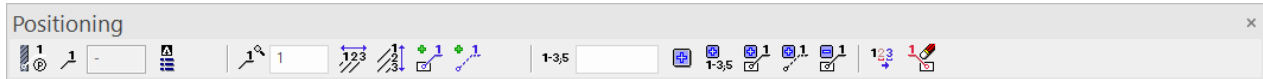


In the view parameters, it is possible to choose what should happen with objects who do not have information about the configured attribute. The standard setting is a normal depiction without any specific colour. If the objects with the selected attribute should be clearly visible, there are two options: if the focus is on the objects with individually assigned colours to the corresponding attribute values, it might be advantageous to display objects without the attribute in the default colour as well. In this case, all object that have information about the attribute and that have an attribute colour linked to their value are displayed with the configured colour and all other objects, regardless whether they have the attribute or not are displayed in the default colour. In order to distinguish between objects that have or lack a certain attribute, it is also possible to set a fixed colour in the view parameters for objects that do not have the given attribute, which differs from the default colour. That way, all objects without a certain attribute will be depicted in a defined colour and can be distinguished from the objects that have the attribute, no matter if it the value was set explicitly or it still has the default value.

Extension mechanics objects

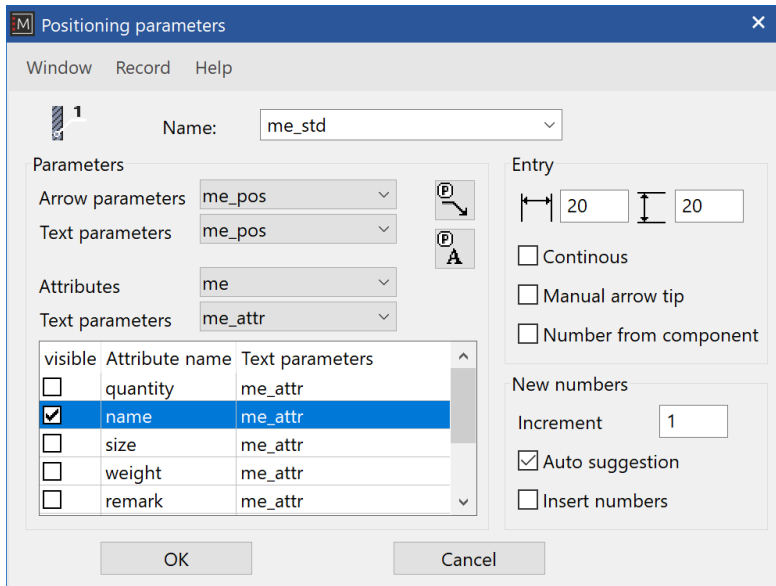
Positioning function

Property bar



The positioning function now features a property bar, which now seamlessly integrates into the ELITECAD user interface. That way additional windows are eliminated and more screen space is available for the drawing.

Parameters



The dialogue window for the positioning parameters was redesigned and extended so it is easier to distinguish between the depiction parameters and the options which are used for the generation of positioning numbers. Furthermore, it is now possible to add attributes as texts to the positioning number symbol.

Modifying position numbers

Position numbers can now be selected and modified within the drawing. Whenever a position number or an object that has a position number is selected, the property bar is loaded. Using the parameter dialogue, the depiction of the object can be changed later on. In addition, attribute texts can be added or removed. The position number is now as flexible as any other mechanical object.

Since the property bar also provides functions to create new position numbers, it is essential that there is a difference between the selected number and the number which will be used for new position numbers. The position number of the selected object or symbol is displayed in a non-editable text field, whereas the field for new numbers can be edited freely. Various checks are only executed when the objects are selected (e.g. if the number is already in use).

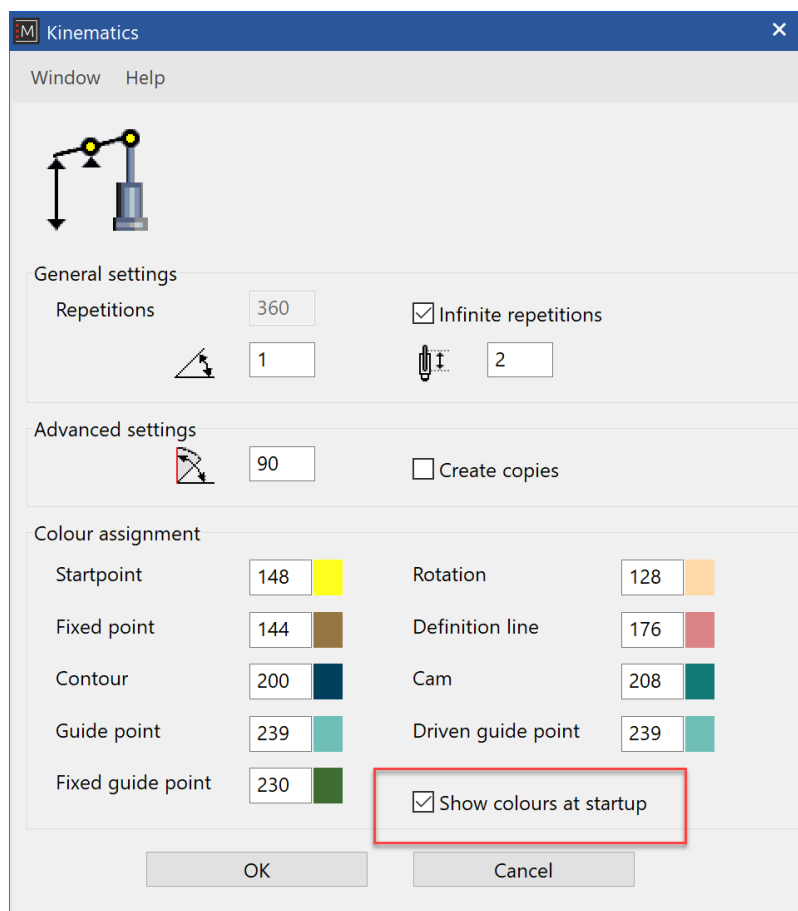
Kinematics

Selectable colour mode

At startup of the kinematics, it was previously switched to a black background. The current colour mode is now retained, so the kinematics can also be used in the printer colour mode and thus enables a completely new display variant for the animation.

Optional coloured display

A new option has been added to the kinematics parameters, which defines whether or not the coloured display is to be activated when the kinematics is started. The switch is only effective when the kinematics is launched; the coloured display can be switched on or off at any time via the property bar.



Saving current settings

The current settings in the parameter mask are saved in the user parameters when you confirm with OK and are therefore available again the next time ELITECAD is executed.

Attaching 3D objects to kinematic elements

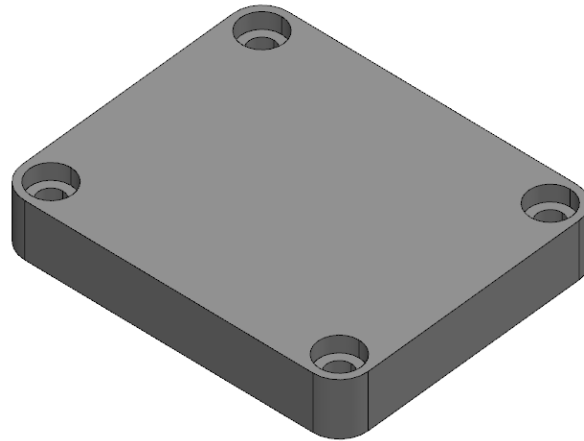
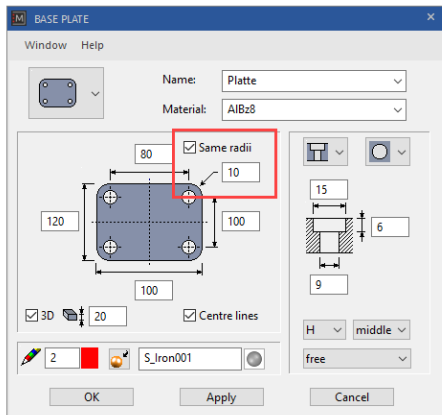
The new function JOIN 3D OBJECTS allows the assignment of a 3D object to kinematics definitions (2D models).

Base plate

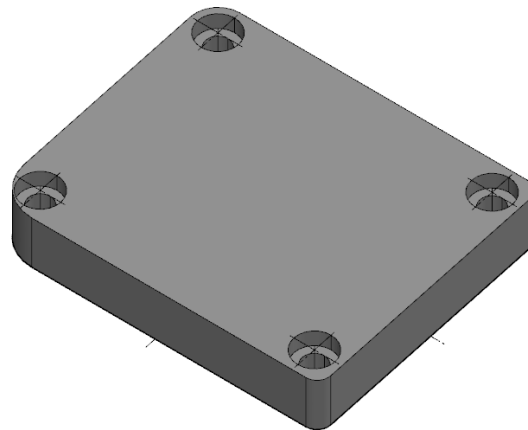
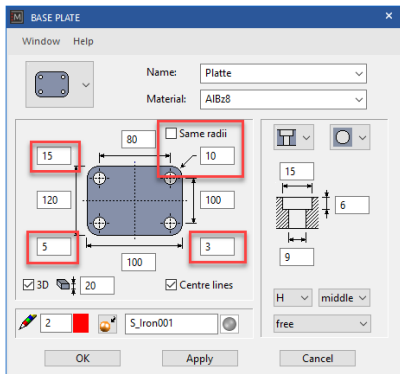
Different radii

The functionality of the base plate was extended, so that the radii on the edges can be configured individually. Now every corner can be set to a different radius.

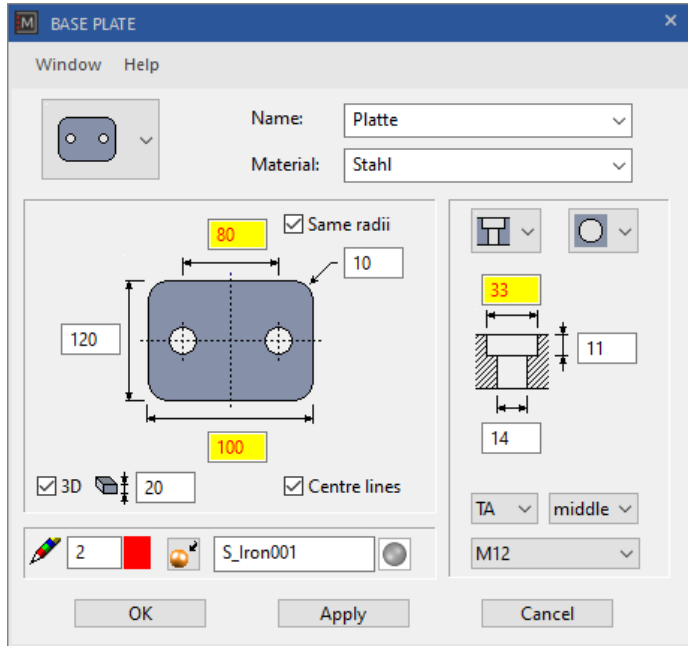
Base plate with the same radius in every corner:



Base plate with different radii in all corners:



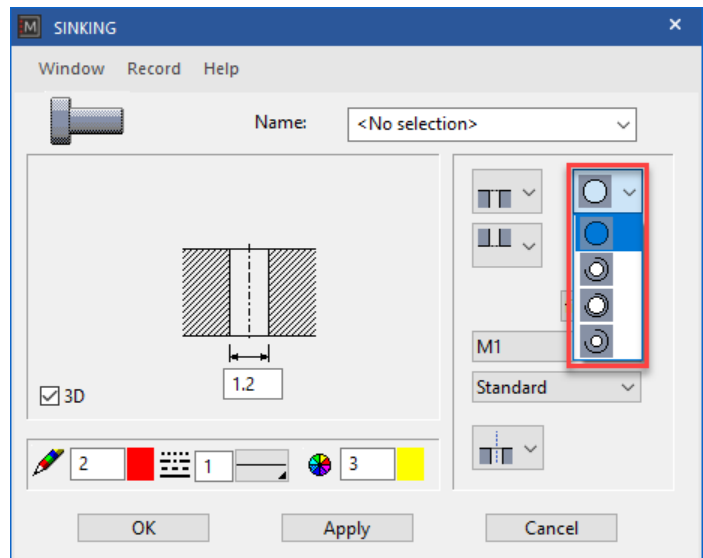
Feedback for invalid values



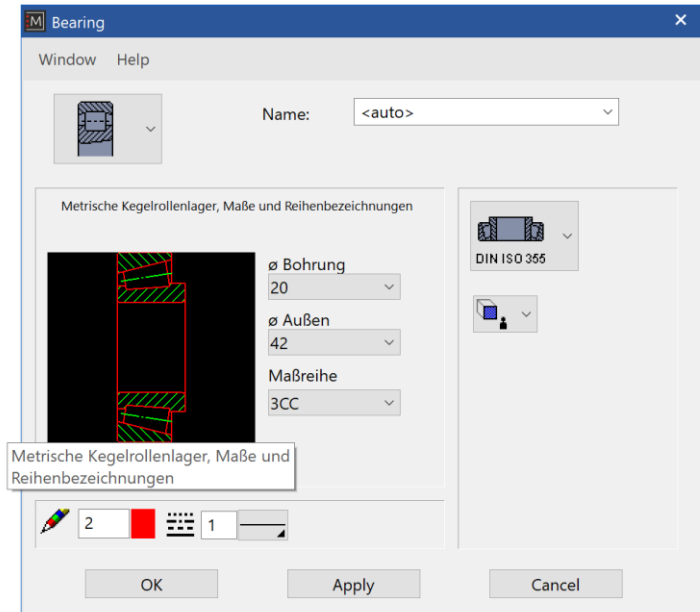
When defining a base plate and the values are not valid, they will now be highlighted using a red font in the yellow text field. That way it is easier to find the invalid input and correct the corresponding values.

Extended selection for sinkings

Sinkings now allows to configure the type of thread - no thread – standard thread – fine thread – pipe thread - using a pull-down menu. This reduces the potential for errors.



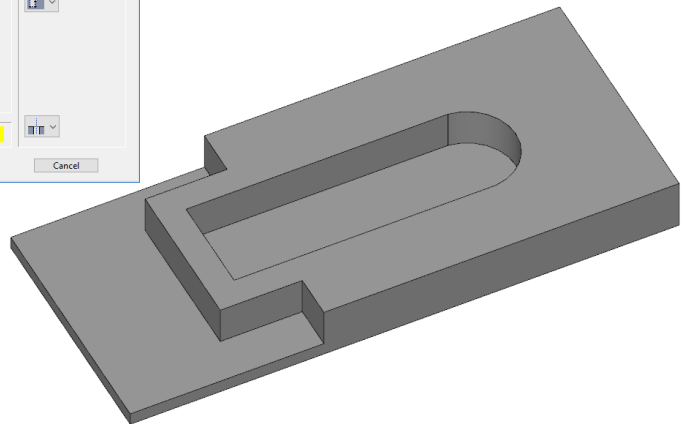
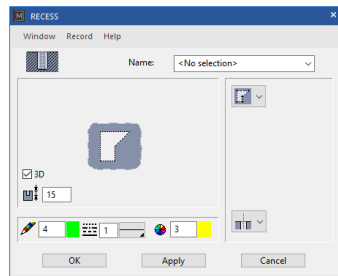
Description of standards in tool tips



Now the standard title for all standard parts is displayed as a description using tool tips in the preview window. This solves problems with standard names that vary in length. There are no more cut off texts and all descriptions are displayed accordingly. All displayed texts for standard parts are provided by the German DIN organisation and are not translated.

Recess with contour input

In ELITECAD Mechanics 15 it is possible to create a recess using a contour as input. This contour can be modified later on using handles and gripper.



Connectivity

Implementing countless plug-ins and interfaces to external platforms, ELITECAD Mechanics 15 was developed with a main focus on improving connectivity.

DXF

With ELITECAD Mechanics 15, it is possible to import and export AutoCAD data up until version 2021. In addition, revision clouds from DXF will be imported as new ELITECAD objects.

IFC

ELITECAD Mechanics 15 supports the import and export of IFC files. The still commonly used file format IFC 2x3 as well as IFC 4 can be imported and exported.

SolidWorks

ELITECAD Mechanics 15 supports the import of SolidWorks files. This interface is an optional add-on. SolidWorks is a trademark of Dassault Systèmes.

NX

ELITECAD Mechanics 15 supports the import of NX files. This interface is an optional add-on. NX is a trademark of Siemens.

SketchUp

Export/Import

The SketchUp export and import interface was updated to the latest version and now allows data exchange with SketchUp models up to version 2020. The export function also features the possibility to export older versions for compatibility reasons.

Export of materials

For the SketchUp export, materials are now exported using unique names. That enabled us to improve the update mechanism of the model in Lumion.

Lumion

Lumion is the preferred application for generating photorealistic images and videos for highly professional presentations. With only a few simple steps, it is possible to create impressive visualisations from digital building models. ELITECAD Mechanics 15 further simplified the data exchange of the design model with Lumion. Using a dedicated Lumion export interface, data can be passed to Lumion even more efficiently.

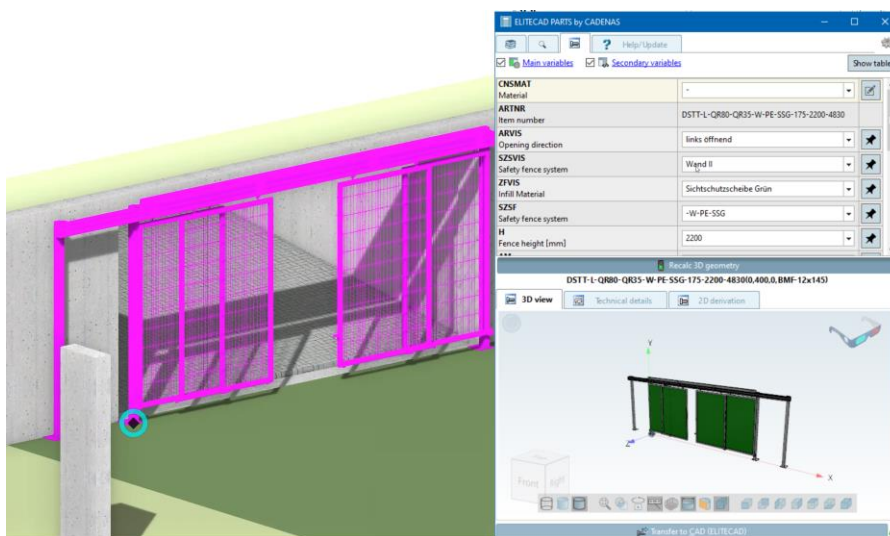




Another improvement is the optimised update mechanism of the design model, when changes occur in ELITECAD by using unique material names for the model export.

ELITECAD PARTS

parts4cad, the well-known platform that was already featured in ELITECAD Mechanics 14, was now extended by numerous catalogues. Through the direct integration, it is possible to load millions of CAD objects by accessing product information of internationally renowned manufacturers. Using the parts4cad plug-in 2D and 3D data can be easily imported, which saves precious time and at the same time provides detailed information for the finished model.

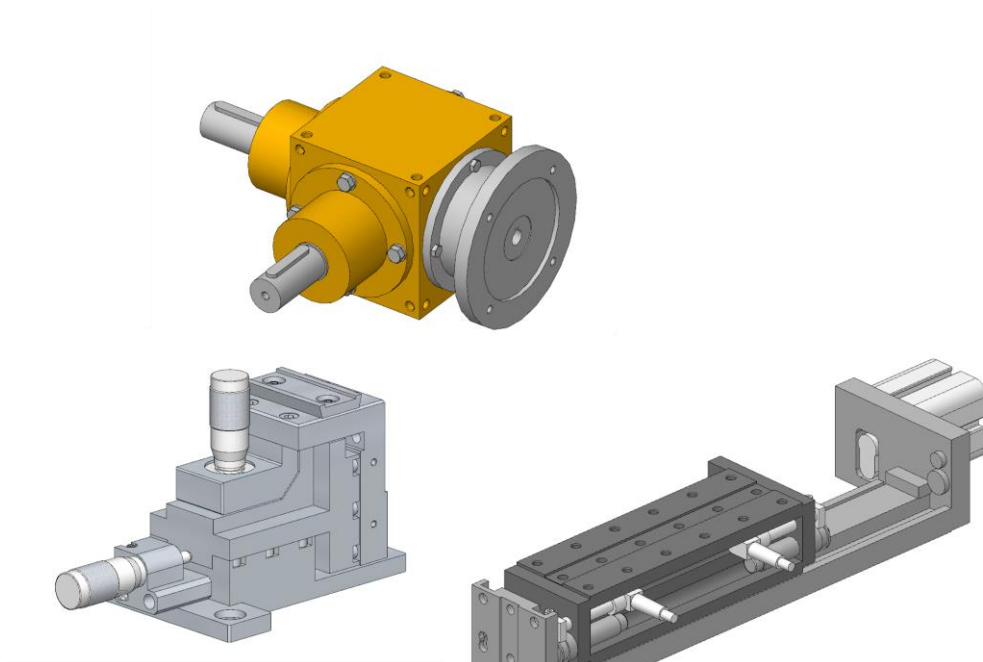
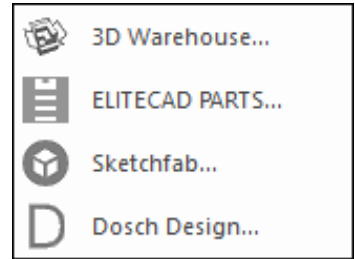


The imported library parts from the ELITECAD PARTS by CADENAS module are more than just library parts. With a double click on the object, the parts4cad configuration dialog opens again and shows the current configuration and parameters. This makes it possible to perform adjustments later on and change component

variations or the level of detail, in order to perfectly integrate manufacturer parts into ELITECAD.

3D platforms

An important step in the process of designing a digital building model is the integration of library parts. Besides the integrated ELITECAD library, there are countless web platforms that provide 3D models. The content on these platforms is developed continuously and they sometimes provide millions of objects. In order to make it easier and more efficient to browse library parts, a new toolbar and menu entry now provide quick and easy access to some of the most common platforms. Some of those platforms include parts4cad, BIMobject, 3DWarehouse, Sketchfab, DoschDesign.



Real-time-visualisation – Virtual Reality

Support of additional VR devices (HTC Vive, Windows Mixed Reality ...)



ELITECAD now includes the native integration of **SteamVR**. SteamVR, also called OpenVR, is a platform-independent runtime library for supporting countless VR devices like the Oculus Rift, HTC-Vive and Windows Mixed Reality. Furthermore, it unlocks many new features including the use and operation of various VR hand controllers.

Now ELITECAD better supports the **VR Room-Scale Setup**, so that VR users can physically move around more efficiently. After completing the setup, virtual borders are depicted with the VR, so

that real world collisions with objects can be avoided.

In order to be able to use SteamVR, it is necessary to create a Steam user profile. Furthermore, the runtime library has to be installed separately so it can be enabled in the input device dialog.

VR-Hand-Controller (Touch)

In addition to the well-known gamepads like PS4, XBOX, etc., now VR hand controllers like Oculus (Touch) and HTC, as well as all Windows Mixed Reality devices including controllers are supported as well. Depending on the device type, touch areas, joysticks and buttons are available for intuitive interaction.



Improved depiction of the round VR menu

The option “menu relative to VR controller” shows the corresponding VR menu relative to the hand controller, on which the menu was opened. If this option is deactivated, or if no VR controllers are active, the round menu is displayed in the viewing direction as usual. The new feature is that the VR menu is not static anymore, but instead follows the head of the user. That way, the open menu can never get out of sight if movements in the real world occur.

Interaction pointers

The interaction pointers of the VR hand controllers provide a native and playful way to perform interactions and selections. Using coloured rays for depiction, it is immediately clear what is selected and interaction is as easy as never before. Thanks to the option “show cross hair”, the user can switch between the well-known VR cross hair, which is located at the centre of the view, and the interaction pointers.



VR status notifications

It is now possible to show important notifications directly in the VR mode via VR status notifications.

Direct call of VR functions

New functions for the walkthrough mode were added, which especially benefit the VR scenarios. They can be configured analogous to the other functions in the VR menu as well as on VR controllers and gamepads. These specialised interaction functions can be used directly without additional user input (direct library part exchange, material change, selection or display of object information).

Pausing audio output

The new option for activating/deactivating audio output can be controlled via the VR menu.

Teleport

The teleporting function was adapted to VR best practises and now works more direct and intuitively using direct flights without additional rotations. The function can be used to combine virtual walkthroughs with physically moving in the real world (room scaling). That way the user has three different ways to move around in VR, depending on the situation.

VR flashlight

Flashlights can be enabled for the left- and right-hand controllers. The light bulb on the left side is soft, wide and less intense light. On the right side, a more focused, stronger and colder light is available.



These options are practical if there are no light sources in the model, but you want to experience the effects of the real-time-visualisation, for instance in interior rooms with dim lighting. Flashlights are dynamically generated as light sources (spots) and can be configured like any other light source.

Improved image quality in shader mode

The image quality in render mode was improved dramatically. New technologies and optimisations enhance the quality in the normal graphics output as well as in VR devices. The newly integrated Fast Approximate Anti-Aliasing (FXAA) improves edge-smoothing as well as trilinear texture filtering and reduces the transitions of mip mapping steps. Furthermore, the depiction of soft shadows, ambient occlusion (SSAO) and adaptive transparency were improved which has a drastic effect on the visual results.

Beside improvements in quality, the new version also includes several adaptations that increase the frame rate, so models can be experienced much more smoothly. Especially in VR environments and in the walkthrough mode, this high frame rate is important because it leads to more comfort and better immersion.

Digital surveying

Every construction or plant is located at a certain place, which might be a specific terrain or an existing construction. It influences the surroundings, and vice versa. Therefore, the import of data representing the real world is an important basis for the depiction and the modelling of terrain and buildings. Depending on the situation, the processing of the surveyed data can be done in different ways, therefore it is important to provide flexible and efficient possibilities to handle this real-world data. ELITECAD Mechanics 15 features countless innovations and improvements to further improve and optimise the handling of terrain and point cloud data.

Terrain module

In general, a construction project only requires one dedicated terrain model, therefore in the past it



was only possible to create one terrain model for every project. Nevertheless, the practical application has shown that there also are useful applications for multiple parametric terrain models. Therefore, the new version now supports an unlimited number of terrain objects within a drawing. This makes it possible to create copies of existing terrain data and design variations of the same terrain, which can be

independently edited. The separating of terrains now also allows to split the terrain into individual parts, which are within the property and outside the property, without having to freeze one of the areas. Furthermore, the entire project can consist of multiple separated terrain sections.

The multi-terrain mode enables a series of advantageous workflows for terrains, especially for copy and manipulation operations. Furthermore, it also leads to new possibilities for geo-referencing.

Multi-terrain mode

The multi-terrain mode can be enabled in the terrain parameters. If the mode is switched ON, a new terrain is generated whenever a terrain function is activated. If the mode is switched OFF, an existing terrain is loaded for edit operations, and only if there is no existing terrain in the drawing a new terrain will be created.

In other words: When multi-terrain mode is enabled, the activation of terrain functions behaves like the functions of other mechanics objects – at the beginning a new object is created, and upon selection, the existing object is manipulated. If the user only wants to use a single terrain



model, the mode can remain switched off, and the existing workflow does not have to be changed.

The advantage, that the activation of a terrain function looks for the terrain model and activates it for modification can still be used nonetheless.

Copy terrain objects

Terrain models can be copied just like any other object, without losing its parametric properties. Besides the creation of variations, another use case is the separation of a terrain into two parts, the area outside of the property and the terrain within the property. After copying the terrain, the two resulting objects are congruent. One object receives the property border as its outside contour and the other one has to use the border to create a deduction body. The two areas can then be modified individually.

Terrain - georeferenced import

When terrain data is imported, the first terrain object will be placed in the centre of the drawing and the project origin for georeferencing is stored in the terrain parameters. Starting with version 15, the terrain origin is valid for all terrain objects in a drawing. When multiple terrain models are imported later on, the terrain object is automatically positioned relative to the existing terrain origin, and therefore is relative to the existing terrain objects.

Terrain – georeferenced copying and adjusting

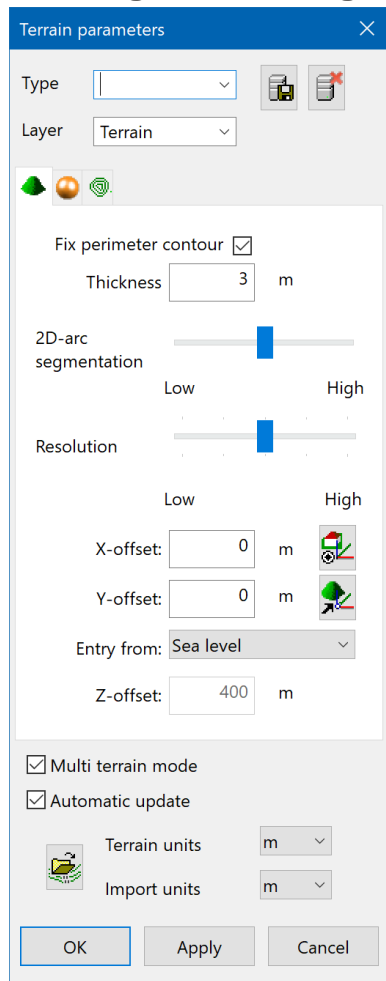
If a terrain model is adjusted relative to another object, it does not affect the terrain origin. On the other hand, if all terrain models in a drawing are moved horizontally, the terrain origin is adjusted as well. This allows adjusting an imported terrain relative to the model.



Terrain georeferencing – select terrain origin

The terrain origin for all terrain objects is displayed in the terrain parameters and can be modified using numeric values. A new feature is the possibility to select the terrain origin (x/y coordinates) with a mouse click in the top view. That way the terrain origin can be set without measurements or manual value input.

Terrain georeferencing – select model origin



The terrain origin is valid for all terrain objects and serves as a reference point for the coordinate depiction of terrain points and curves. In order to show georeferenced coordinates for points of the design model, the reference point for measurements has to be set equal to the terrain origin. A new function in the terrain parameters creates a coordinate system at the terrain origin and adjusts the model reference point accordingly. This reference system also visually differs from other rotated coordinate systems by using a yellow rectangle. If this reference system is enabled, the coordinates of the entire model are georeferenced analogue to the coordinates of the terrain points. Using the function to reset work plane, the reference system can be set to centre of the page.

Adjust terrain in height

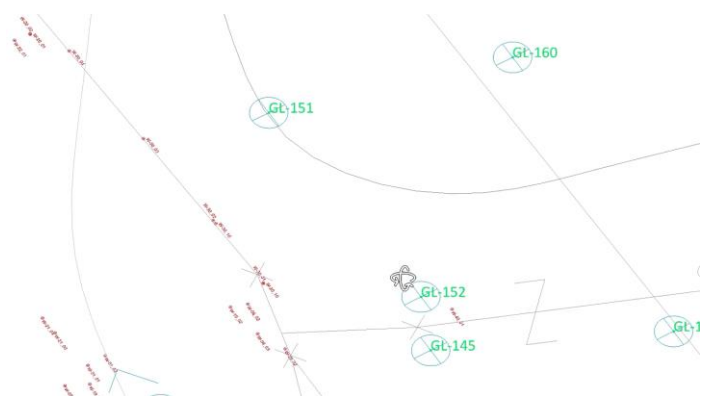
When a terrain object is adjusted in z direction using the manipulation functions, the 2D data of the terrain object will remain in the work plane at a height of zero. In contrast to the function “Move points and curves in Z-direction” of the terrain property bar, the “normal” adjustment of the terrain will also move the terrain modifications (excavation, etc.). That way it is now also possible to correctly adjust terrain objects in the height direction.

Multi selection and deletion of terrain points

A new function in the height point property bar allows the selection of multiple points using area selection. The selected points are visually highlighted and can be deleted together. This allows for a quick removal of unwanted areas.

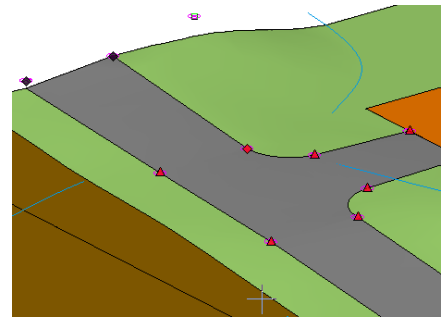
Optional depiction of height point symbols

Some terrain models contain a huge number of points, which are graphically depicted with a height point symbol. In cases where the terrain model is not in the focus those points sometimes might be distracting. Now it is possible to optionally disable the height point symbols using the image properties.



Improved depiction of terrain handles

In order to improve the visibility of terrain points in dense drawings or drawings with many terrain points, the graphical depiction of handles was optimised. That way, the necessary details are always clearly visible, no matter the depiction, wireframe or solid model.

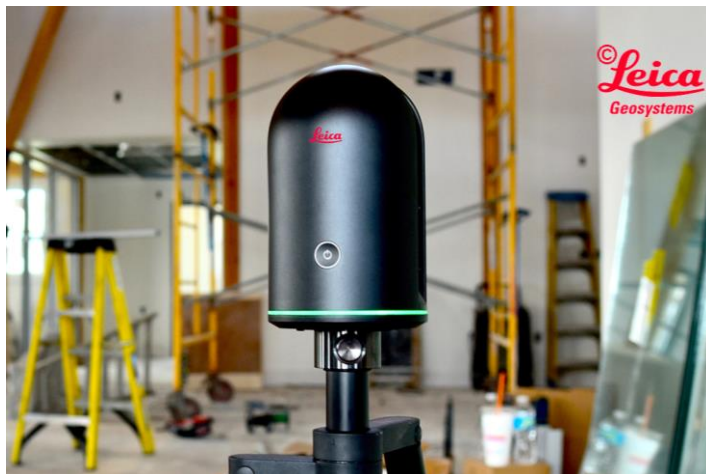


Configurable units for terrain points

The unit set in the parameters for terrain parameters and height parameters of all terrain modifications now also affects the display of the coordinates in the property bar for terrain points and the height in the height curves. The unit is displayed in the property bar next to the coordinate fields. The reference to the terrain is improved, since the input unit is not the currently active CAD unit.

Point clouds

E57 file format for import of point clouds



Besides the import of point clouds from ASCII files, it is now also possible to read data in the E57 format. The E57 file format is a compact, vendor-neutral format for storing point clouds, images, and metadata produced by 3D imaging systems, such as laser scanners. The file format is specified by the ASTM, an international standards organization.

LAS and LAZ file formats for import of point clouds

Furthermore, it is now possible to read point cloud data from LAS and LAZ formats. The LAS format is a binary format for point cloud data, which is produced by LIDAR systems (light detection and ranging, similar to radars) which is state of the art for point cloud scans. The format is defined and developed by the American Society for Photogrammetry and Remote Sensing (ASPRS). The LAZ format is a specially compressed version of LAS data.

Area selection for point clouds

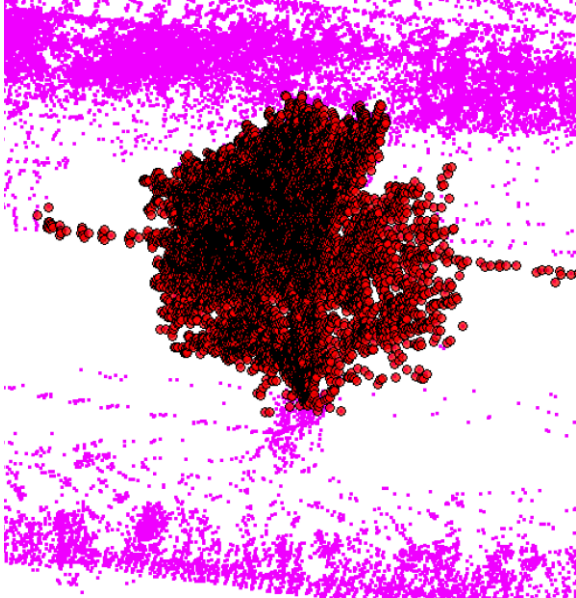
A new function in the point cloud property bar allows the selection of multiple points using area selection. The selected points are visually highlighted. In contrast to the terrain, the area selection of height points also allows for a selection in z-direction. As a result, the area of selection is a cuboid with an arbitrary contour.

Deleting points of point clouds

The selected points from an area selection can be deleted at once via the property bar or using DEL key. That way unnecessary points can be eliminated and the file size is reduced. Furthermore, errors during scanning, for example distracting objects like cars and people can be corrected easily.

The focus on a certain section in z direction allows the deletion of plants, or power lines without changing the important features of the floor for instance.

Separating points in point clouds



By using a function from the property bar, the selected points of an area selection can be split into a new point cloud. Using this feature, a large project can easily be divided into smaller sections. If not, all points are visible, the performance of image display as well as a clear overview is greatly improved. After splitting a large point clouds into several sections based on the height, it can be correctly assigned to the individual storeys.

Unification of point clouds

Divided point clouds, or even independently loaded point clouds can be unified into a single point cloud at any time. For that purpose, multiple point clouds can be selected using the SHIFT key. If multiple point clouds are selected, the property bar shows a

function to unify the selected objects. All selected objects are combined with the point cloud, which was selected first.

Configurable point size in point clouds

The size of the depicted points on the screen can be configured in the options under depiction. The depicted point size can now be larger than one pixel. For point clouds with only a few points, this makes it easier to find single points. Another advantage for point clouds with only a few points is, that with larger points, the individual points cover a larger surface and therefore the image still looks dense, even though there are fewer points.

Depiction of point clouds

If the depiction of the model is switched to perspective projection, the points are displayed with varying intensity, depending on the distance to the observer. The perception is increased closer to the viewer, and decreased the further away the points are. This leads to a more natural impression and effect for the observer.

Point clouds and terrain – import of info text

In addition to coordinates and colour, it is now possible to read another column, which contains text information during import. This data is stored as “Info-text” for the corresponding point. The functionality is only intended for smaller point clouds, not for projects with millions of points, because in such cases it is not necessary to distinguish between individual points. The maximum number of imported texts is currently set at one thousand. The info text might be a number which can be used for identification purposes or it might be a type information in order to assign points to certain categories.

	A	B	C	D
1	W-01_01	-0.327	-14.734	3.758
2	W-01_02	-0.013	-0.842	3.249
3	W-02_01	-0.504	-0.462	6.192
4	W-02_02	-5.689	-0.403	8.792
5	W-03_01	-0.009	-0.263	3.303
6	W-03_02	0.03	6.932	3.39
7	W-04_01	0.267	6.944	2.796
8	W-04_02	2.79	7.091	2.773
9	W-04_03	5.278	7.225	2.746

Point clouds and terrain – graphical depiction

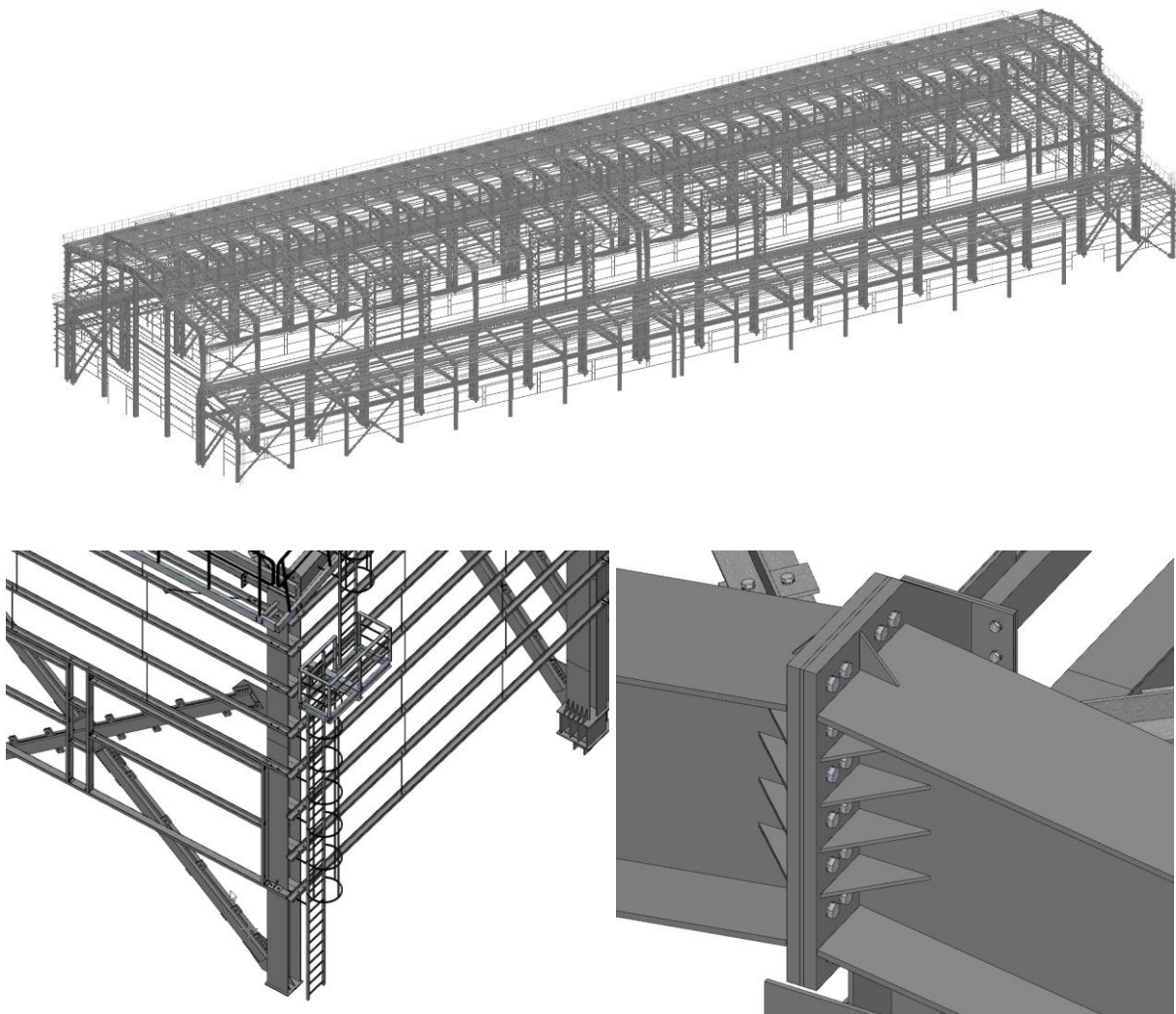
Using the image properties, the info text can be optionally displayed for the points. This is only a temporary graphical information and not part of a plan. As a result, the inserted info text cannot be printed. The graphical depiction of the info text also occurs if the point clouds or terrains are not selected.

ELITECAD Mechanics and BIM

Use ELITECAD Mechanics in a BIM environment

A major part of a building is provided by additional trades like steel construction, installation, etc. In order for other trades to work seamlessly together and exchange information a BIM environment is required. Most of those trades work in a structured way using assemblies, individual parts and bill of materials. This workflow differs from the standard way that architects and planners work in. Here ELITECAD Mechanics fills a gap, because drawings that were created with ELITECAD Mechanics can be read in ELITECAD Architecture without losing information. Furthermore, ELITECAD Mechanics also features the import and export of IFC files and which is a key requirement in a BIM environment. ELITECAD Mechanics allows to load planning data from all kinds of trades into a BIM structure. Therefore, the ideal collaboration in BIM projects with any kind of stakeholder is ensured and ELITECAD Mechanics is the ideal tool for working in a BIM process.

Example – Steel construction of a storage hall



System and configuration

Supported operating system

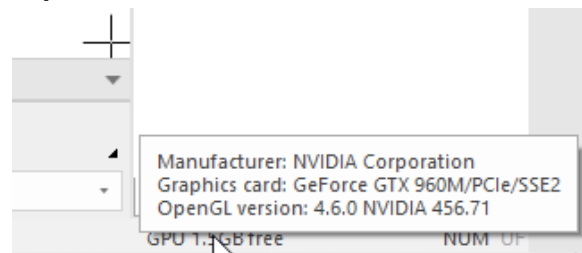
Similar to the previous version ELITECAD Mechanics 14, the current version is available as 64-bit edition as well. The supported operating systems for ELITECAD



are based on the Windows versions officially supported by Microsoft. At the time of release, Microsoft provides support for Windows 8.1 and higher, therefore the minimum requirement for ELITECAD is also Windows 8.1 or higher. The recommendation is to always use the latest Windows version, and also ensure that the latest updates for the operating system are installed.

Display of the active graphics card (GPU)

Sometimes it is important to know which graphics card (GPU) is currently active. This information is now displayed via a tooltip in ELITECAD Mechanics. The information can be accessed if the cursor is left on the GPU status bar. The knowledge which card is used is especially useful for laptops with two graphics cards.



Database upgrade to MySQL version 8



Storing information in ELITECAD, for example data about quantities, is done using a MySQL database. As Oracle Gold Partner ELITECAD 15 also installs the latest version 8 of MySQL as an integrated part. The existing data from previous installations and older MySQL versions is automatically migrated without any data loss.

Database optimisations

Using various optimization steps, it was possible to achieve large performance gains for database access via network interfaces. Organizations that use a central installation on a server will profit from drastically reduced waiting times during the evaluation of quantities.

Easier and faster internet update

The Welcome Screen provides information about available updates. By improving the workflows, now even less steps are necessary to download and install new updates. In addition, the performance of the entire process was improved, so the latest version is installed and set-up even faster.



Improved performance for calculations and in the graphics window

Countless optimizations in various functions lead to shorter calculation times, for instance the import of large drawings. The graphics output for larger models is now even smoother and features higher quality. Users will notice the performance improvements and time-saving in the daily work rather quickly.

UNICODE file names

Opening drawings with UNICODE characters in their file name now works for almost every file type, with only a few exceptions. This feature has to be specifically enabled in the region settings. This allows for opening files with Chinese names etc.

Stereoscopic graphics output

The new possibilities for graphics output allow to experience three-dimensional perception even without VR glasses. The stereoscopic graphics output generates two images, that are separated according to the exact distance between the eyes. This is the main requirement for three-dimensional perception. The spatial vision in ELITECAD is further enhanced because tools like the cursor or markers are optimised for this purpose and are displayed in the correct depth.



Support for stereoscopic hardware

An easy way to observe stereoscopic graphics

output is to use Red/Green glasses. An even better result can be achieved by using stereoscopic screens. With our partner Schneider Digital, stereo-screens were evaluated. ELITECAD is now optimised and pre-configured for stereoscopic devices.

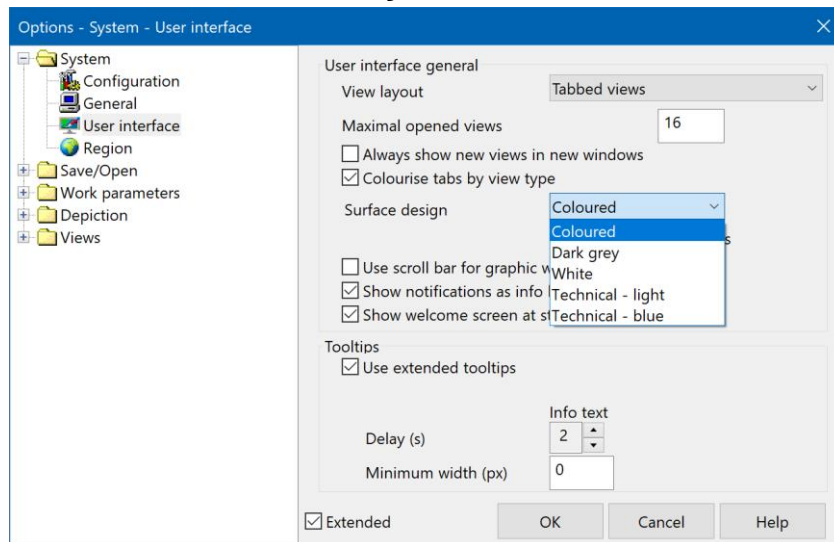
Usage of optimised graphics hardware

Some workstations and laptops feature an on-board graphics card as well as a second, high quality graphics card. In order to get the most potential out of ELITECAD it is recommended to always use the high-performance graphics card. With the new version, ELITECAD now automatically detects the high-performance device and, independently of the windows settings, tries to activate the NVIDIA/AMD processors.

New OpenVR library

By supporting the latest OpenVR library, it is ensured that the latest VR hardware can be used. So there is nothing in the way of having the perfect VR experience in ELITECAD.

New user interface styles



The user interface styles of ELITECAD were adapted to match the Microsoft Office 2019 styles, so the user has a familiar experience. Apart from the new predefined Office style, many more styles can be selected in the options menu of ELITECAD.

German spelling

The German letter sharp S (ß) is only used in Austria and Germany, but not in Switzerland. Up until now the double S (ss) was used for the German-speaking regions.

The way words are spelled in texts in the user interface (menus, dialogs, queries) is now dependent on the current region setting. For instance, in Austria and Germany the words are spelled with ß, and in Switzerland with ss.

Note: For some special words, there are different spellings within Germany. For instance, the word storey is spelled “Geschoß” in the south and “Geschoss” in the north. In those cases, the double-s spelling was preferred.



Unification of terms

Many terms of the user interface have been unified, which leads to a clearer understanding for the user. For instance, the German word “Kennung” (property) has been changed to attribute, so that there are not several different terms which have the same meaning.