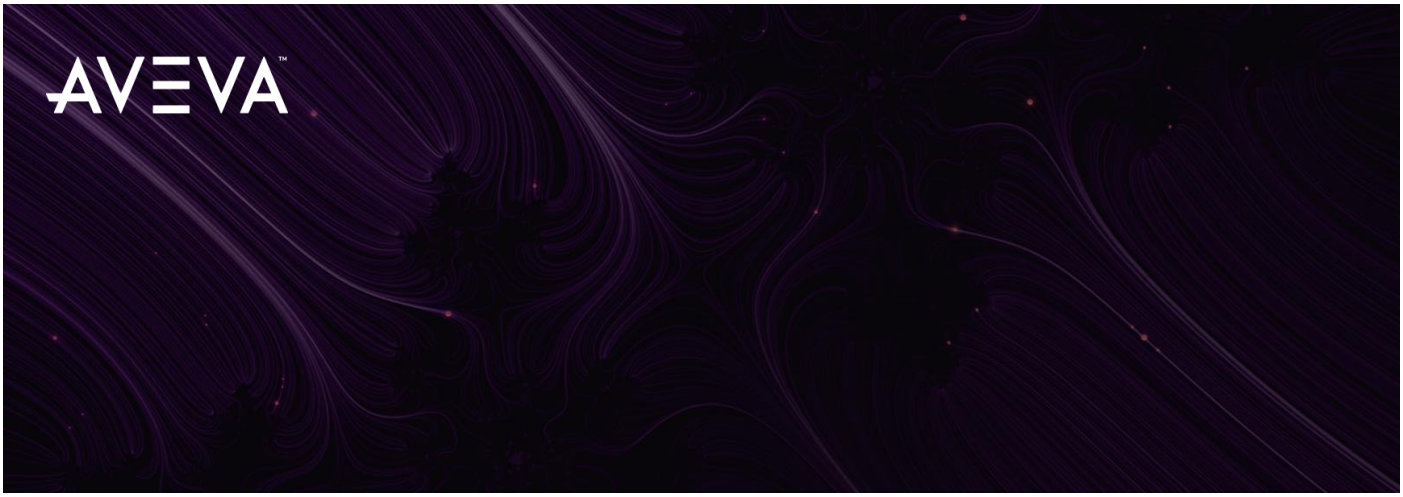

AVEVA Everything3D™ 3.1

User Bulletin

AVEVA E3D 3.1 Release Documentation

1.0 / 13 December 2019

Revision Log

Date	Revision	Description of Revision	Author	Reviewed	Approved
10.12.19	0.1	Issued for Review	SB et al.		
12.12.19	0.2	Reviewed	SB et al.	JG & SS	
13.12.19	1.0	Released with AVEVA E3D™ 3.1	SB et al.	JG & SS	NM & AC

Updates

Change highlighting will be employed for all revisions. Where new or changed information is presented section headings will be highlighted.

Suggestion / Problems

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Contents

1 Introduction

This document is intended to provide an overview of AVEVA Everything3D™ 3.1 and the features introduced.

1.1 Introducing AVEVA Everything3D™3.1

AVEVA Everything3D™ 3.1 (AVEVA E3D™ 3.1) is an innovative 3D design product from AVEVA covering the needs of Plant and Marine industries.

AVEVA E3D 3.1 provides a platform that enables lean construction principles to be adopted, increasing quality and speed of execution throughout the entire project. This is achieved through advanced usability for all design tasks which improves productivity by utilising latest technologies and best in class User Experience to enable innovative and ever more efficient project execution processes. This is demonstrated by the clean and intuitive user interface of the product that encourages graphical centric modelling and interaction.

AVEVA E3D 3.1 is based upon a proven platform of technologies used to support a wider family of products; supporting common capabilities such as multi-user, distributed and concurrent access to the design model, and the comparison and update of information. This allows global teams to collaborate in building fully detailed models, from which construction-ready drawings and BOMs can be automatically generated.

AVEVA E3D 3.1 contains the following principal modules:

- Model An interactive 3D design environment.
- Draw Facilitates the production of scaled, annotated drawings from the 3D Model.
- IsoDraft Used in the production of piping isometrics.
- Catalogue Used to define and configure Project Specifications and Standards.

As part of an integrated product solution, AVEVA E3D 3.1 may integrate with AVEVA Engineering and Schematics products through capabilities such as the Piping Integrator feature. Further, AVEVA E3D 3.1 may be integrated with AVEVA NET, epitomised by the Design in Context feature that allows the direct interrogation of the AVEVA NET Dashboard in the Model and Draw environment.

System administration and configuration, together with catalogue and specification capabilities, are provided by the AVEVA Catalogue and separate AVEVA Administration™ products respectively.

AVEVA E3D 3.1 has been designed from the outset to be compatible with AVEVA PDMS and Hull & Outfitting 12.1.SP5 and it uses the same database and data management technology, enabling the two products to be used in conjunction on operational projects.

AVEVA E3D 3.1 introduces a series of new developments for both Marine and Plant industries:

- Cross-discipline Space Management application.
- Introduction of the Hull Structural Design application.
- Support for large co-ordinate modelling.
- Improved integration of Laser data, including the introduction of Solid Point Cloud rendering and data highlighting.
- Multiple model enhancements to aid the design workflow in Plant and Marine industries including allowance for Grid Format positioning.

- Draw Improvements (incl. combination of Draw features and canvas in the Model module).

1.1.1 Hull Design

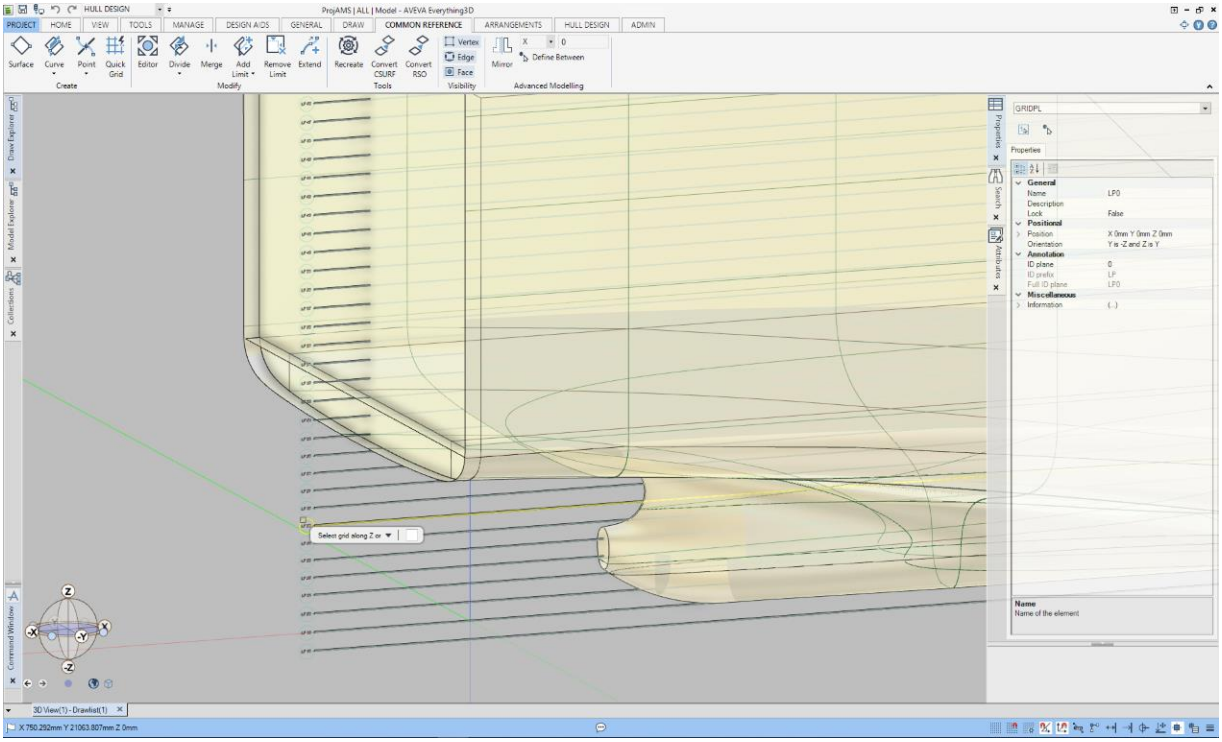
The Hull Design application, for Marine industries, facilitates the modelling of the hull steel design; primarily in ships and other floating structures. The hull steel model is highly topological and benefits from the model being formed by common references, i.e. surfaces, curves and points. Hull model properties can be inherited from information added to a functional arrangement i.e. space, area and curve arrangements. Hull specific drawings are created with specialized functions in the Draw module, now integrated as part of the Model module.

The main characteristics of the Hull solution are described below.

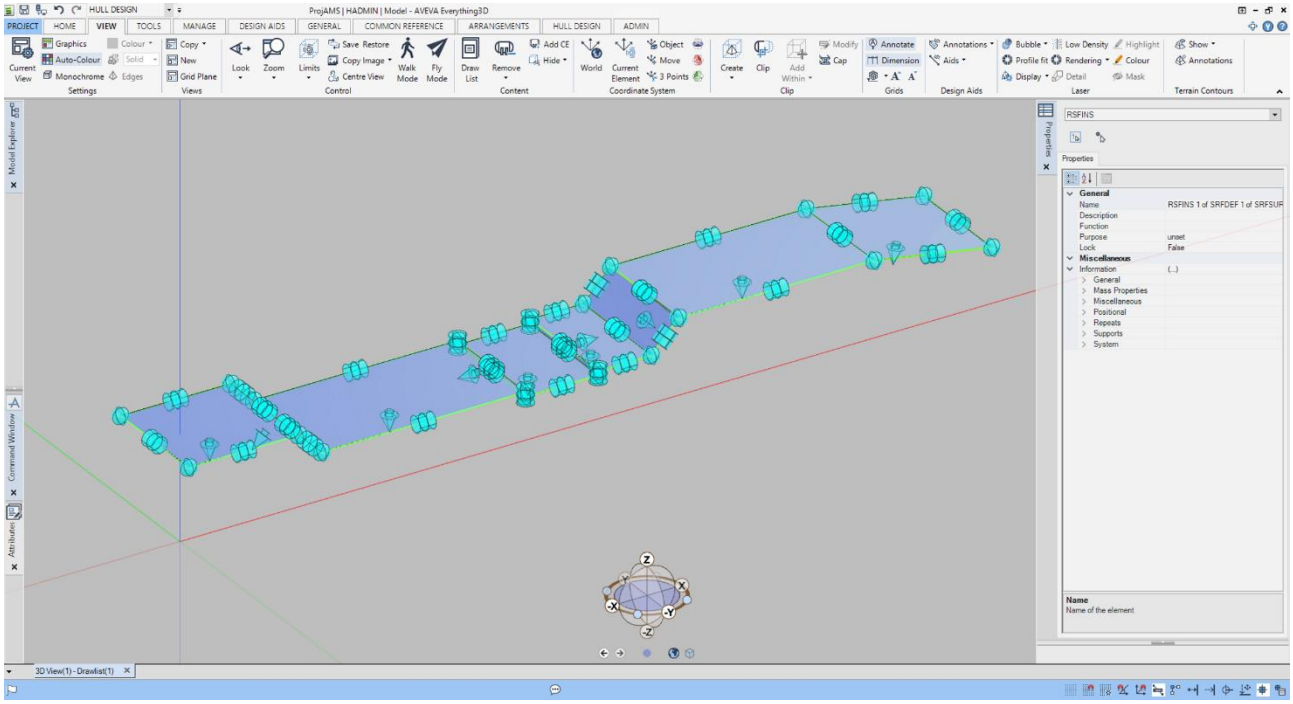
1.1.1.1 Hull Modelling in a context

- Easy modelling of Common Reference Models.
- Easy update to account for changes.

A hull modelling project is characterized by a high degree of change, e.g. when moving a complete deck, and there is a need for all dependent structures to easily adapt. To support this in AVEVA E3D, the hull model is defined by topological references. Robustness of the topological references is promoted where the Common Reference Model (Surfaces, planes, curves, points and grids) is used.



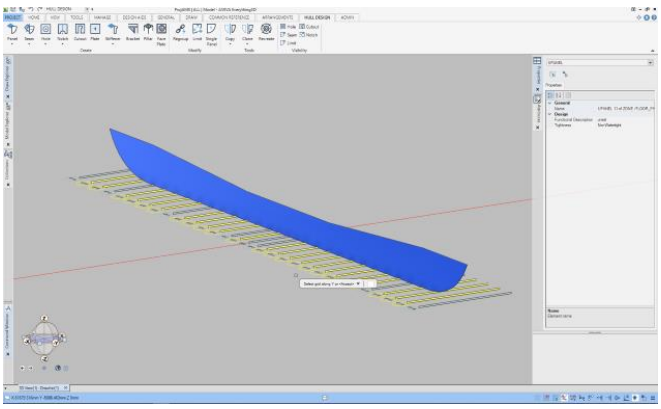
The modelling of the Common Reference Model in AVEVA E3D is completed using the introduced intuitive and interactive tools; allowing complex shapes to be easily modelled.

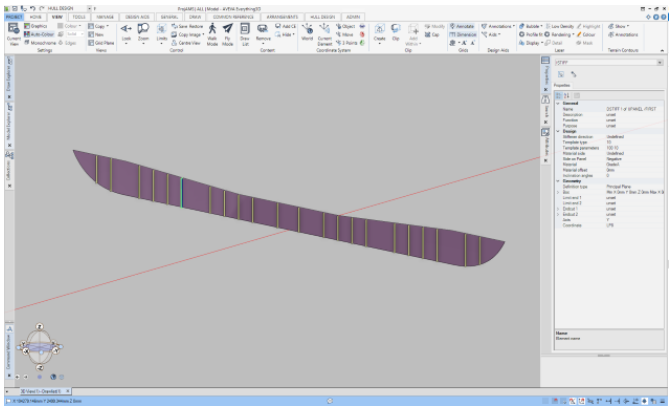


1.1.1.2 Fast Hull Modelling

- Easy and fast modelling.
- Topological models with stored definition data.
- Easy update to account for changes.

The modelling of a hull panel automatically, from a given location, derives its shape from the surrounding elements and can be easily modified with new or altered bounding elements. Detailing of the panel, such as adding seams, holes, cutouts and brackets, is then completed through a one-click philosophy; resultant hull components are visualized in the canvas with a minimum of user interaction.





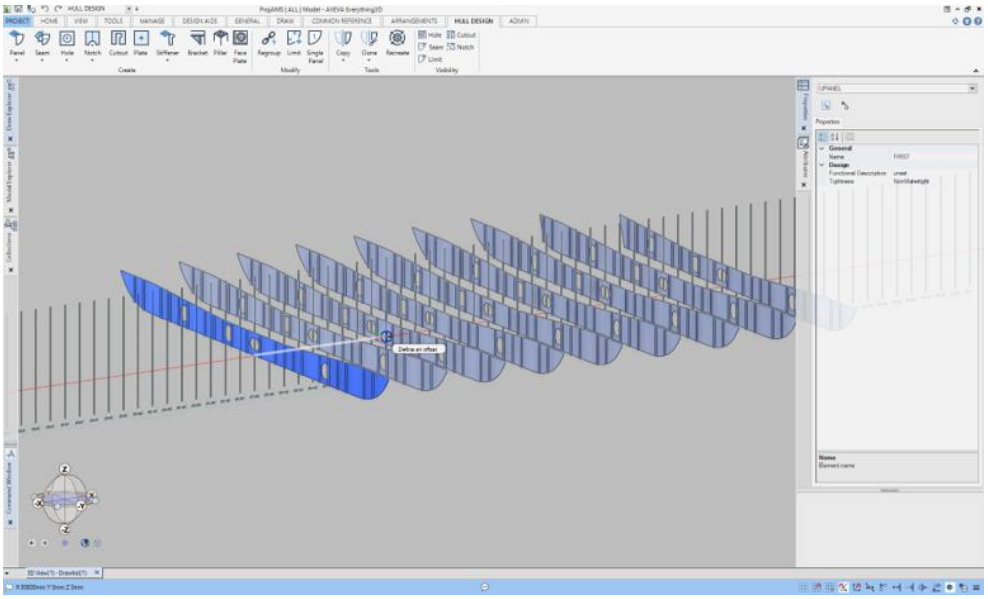
The defined hull components are further detailed by using the provided tools and functions e.g. the Model Properties Grid.

All definition data describing the panel and its components, with topological references, are stored in the database. Changes to the panel, or to the surrounding elements, can be easily accomodated through simple recreate operations.

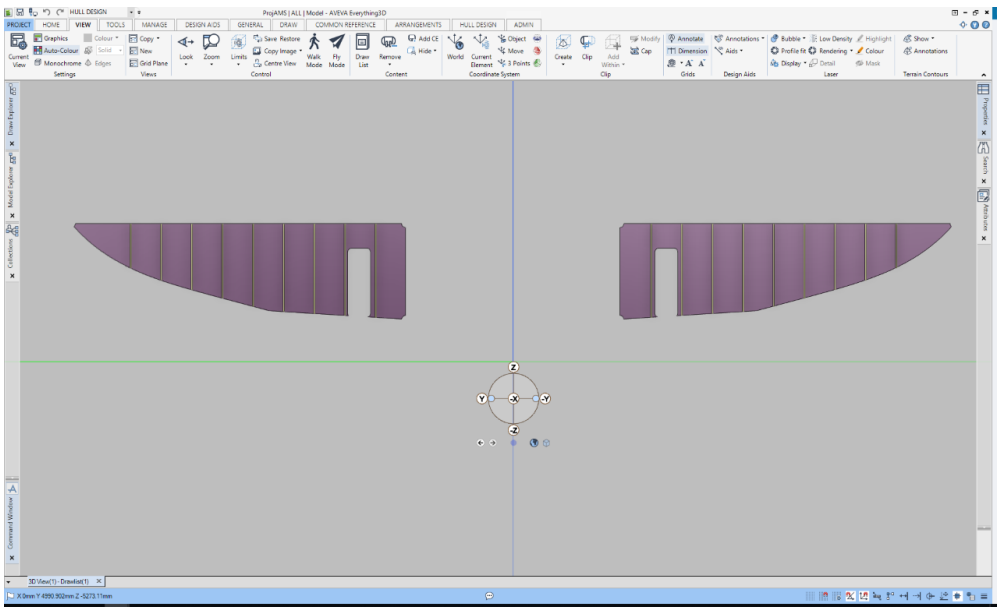
1.1.1.3 Symmetry and Repetitions

- Symmetric models.
- Repetition with Cloning.
- Easy change of multiple models simultaneously.

A ship model contains many repetitions: structure elements that are similar in nature but vary in shape depending on where it is located. The topologically defined panel can easily be copied or cloned by adjusting the definition data of the panel e.g. changing the location.



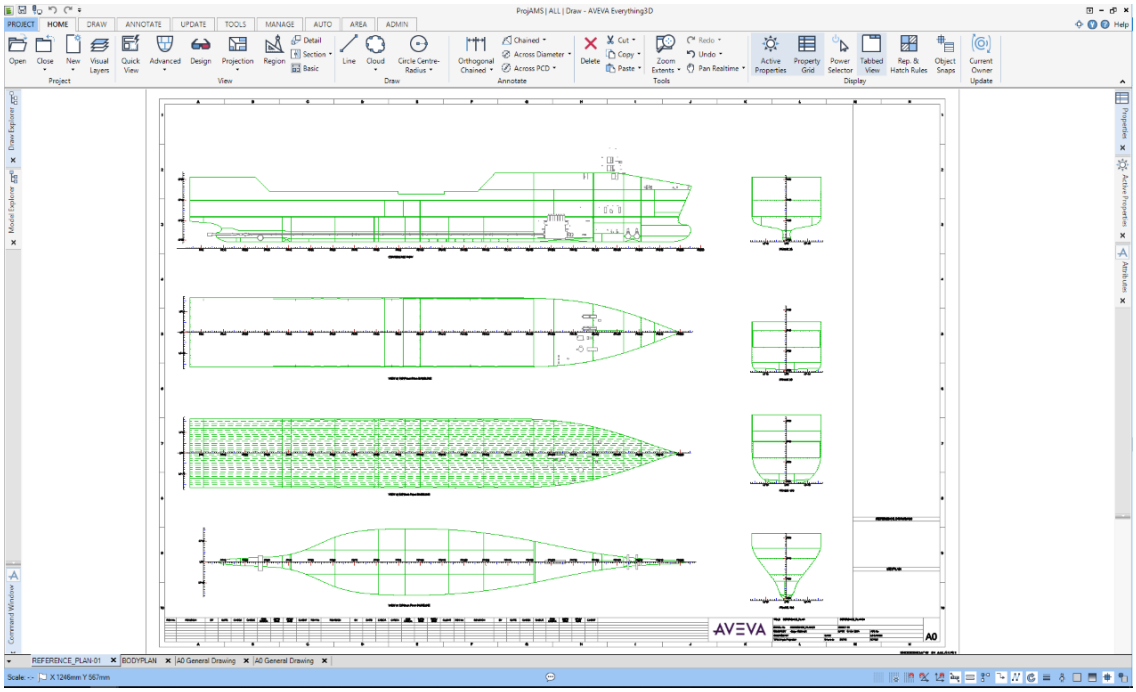
Furthermore, if cloning a panel, a connection is established between the panels and between the panel components. This connection is used when making changes, propagating the made change to all the connected panels. However, specific changes can still be made by breaking the connection on individual hull components e.g. when adding or changing a specific hole in one of the cloned panels. A ship model is likely to contain a number of symmetric elements; identical, or near identical, structures are typically modelled on both the portside and starboard. This consideration is also supported by the cloning concept.

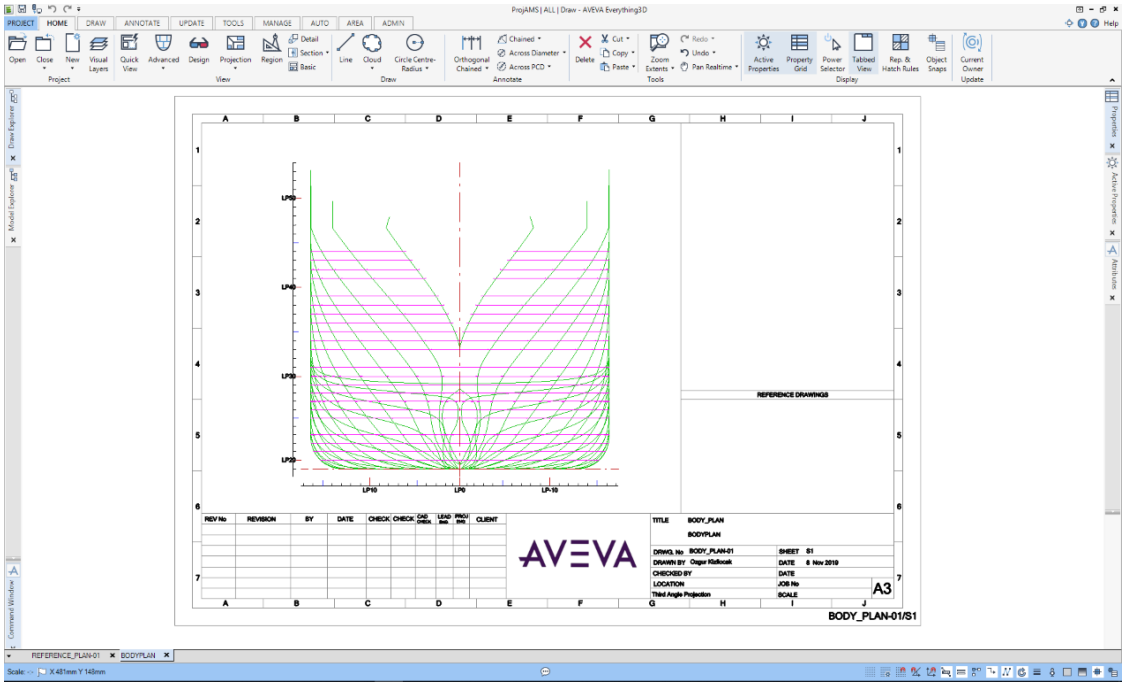


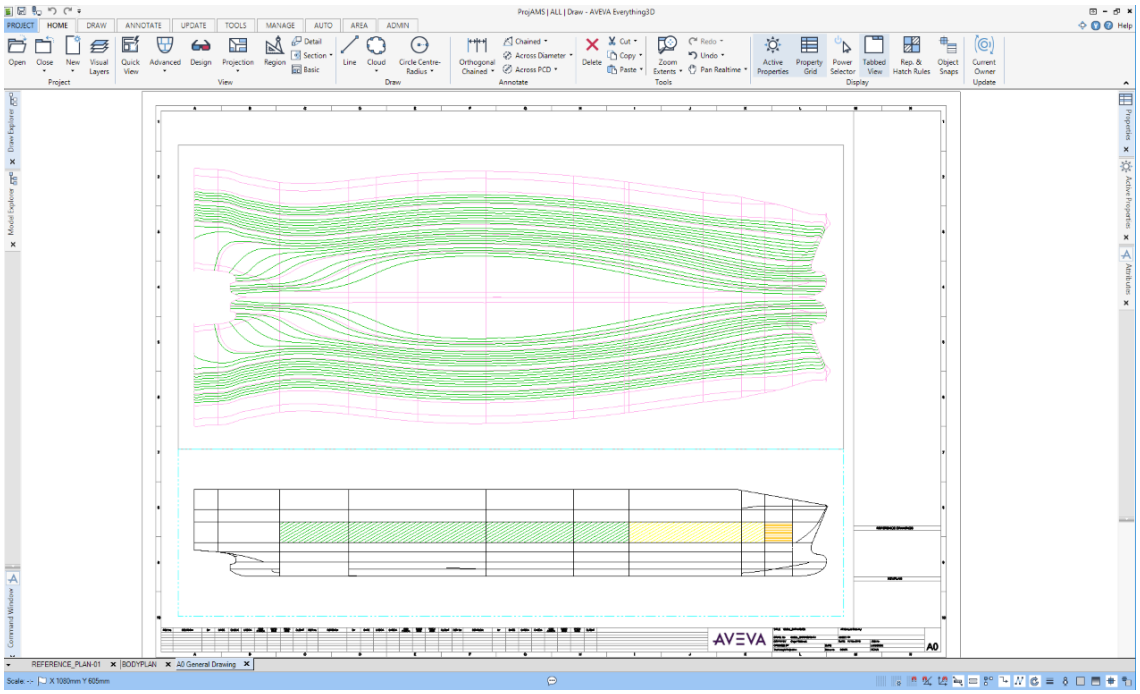
1.1.1.4 Hull Structural Design Models and Deliverables

- Hull Models detailed for Class Approval.
- Drawing deliverables.

The AVEVA E3D 3.1 Hull application supports the modelling of hull with detailing up to class approval stage. The ship model can be used with the AVEVA E3D 3.1 outfitting modules to create a complete model for this early phase of the ship project. The drawing deliverables are created in the Draw module or model application which has been updated to support the necessary marine drawing types i.e. general arrangement, body plan and shell expansion.



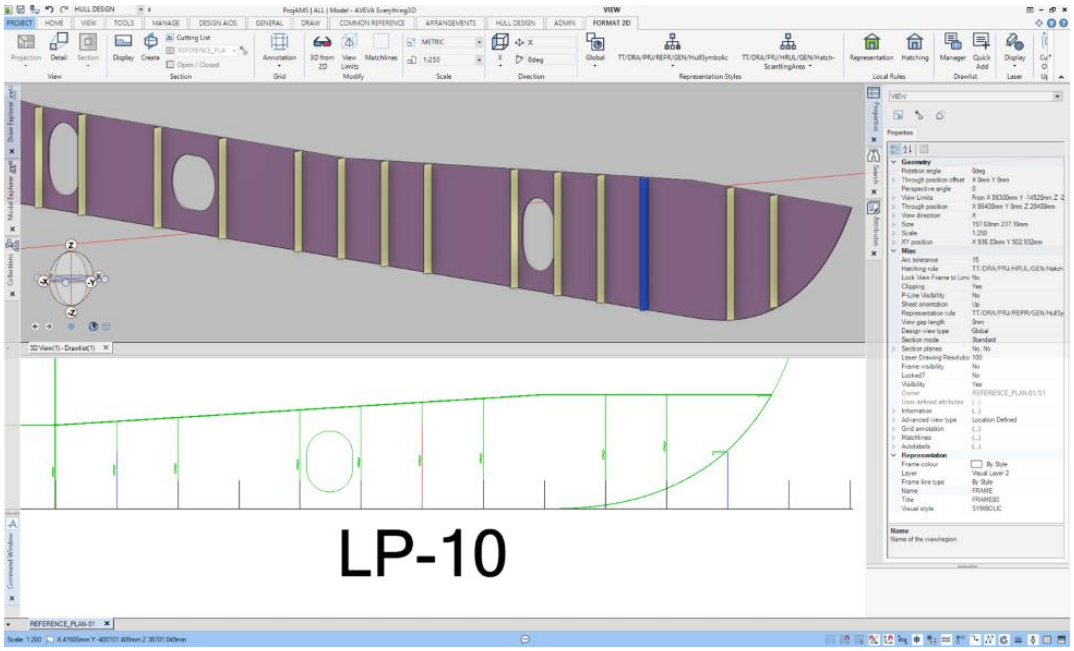




1.1.2 Combined Model and Draw

- Combined 2D and 3D environment in the same module.

A key aspect of AVEVA E3D 3.1 is the possibility to utilise a selection of key E3D Draw features in the E3D Model module. This allows all users to create, view and modify drawings during the modelling design phases. Changes in the model can be seen in the drawing directly as the model is updated.



1.1.3 Space Management

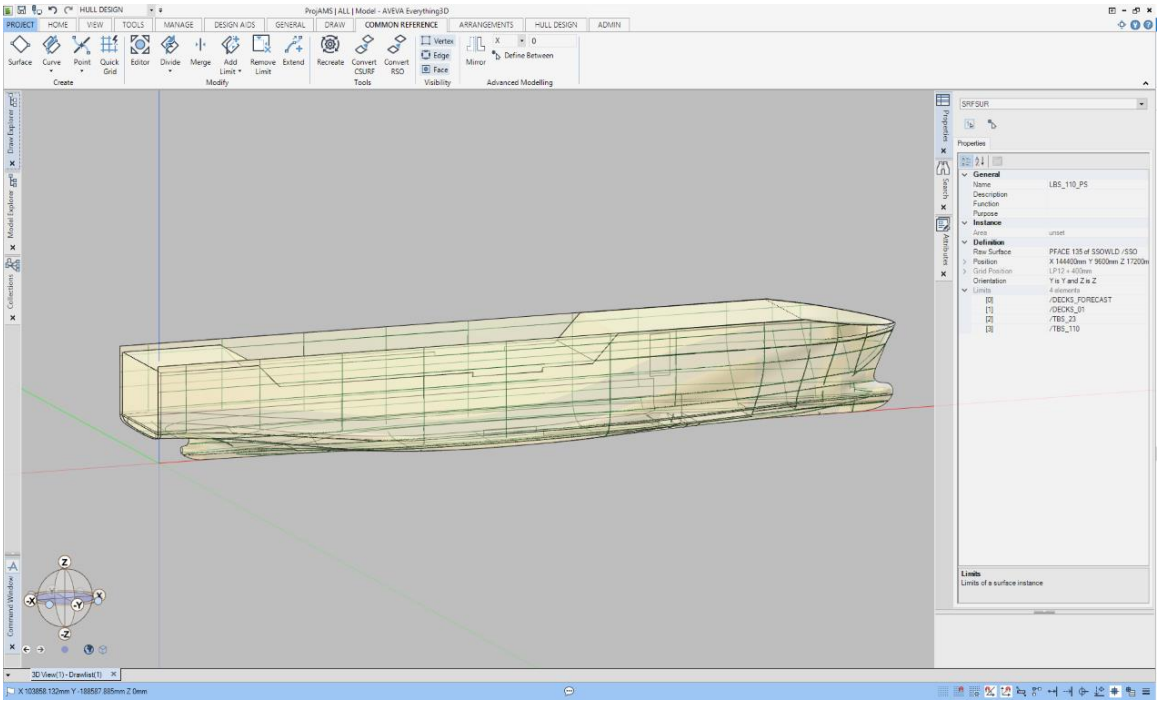
The Space Management application, for both Plant and Marine industries, facilitates arrangement design including the definition of spaces, areas and curves with the possibility to define functional data to specialize for a specific design purpose. The arrangements may be used to coordinate and support design activities with geometry data and functional properties.

1.1.3.1 Common Reference Model

- Easy modelling of Common Reference Models.
- Primitive modelling.

The spatial modelling capabilities in the Space Management application is based on the principle of an envelope and a closed volume that is subdivided automatically, and refined with merge and boolean operations like add and subtract. The creation of an initial envelope and subsequent space subdivisions are typically created by references to the Common Reference Model i.e. surfaces and planes.

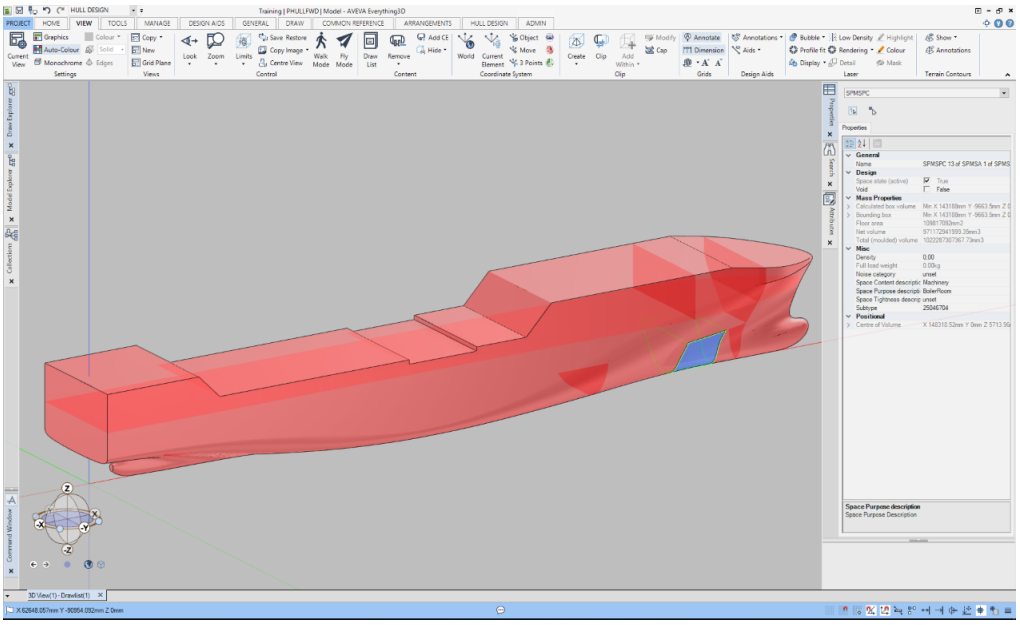
To support a typical plant scenario the Space Management application further supports the use of primitives combined with planes in grid or absolute coordinates to subdivide a space further.



1.1.3.2 Modelling Space Arrangements

- Easy modelling through automatic subdivision.
- Topological model responding to model changes.
- Functional properties.
- 3D coordination.

Space arrangements are modelled by an automatic subdivision of an envelope and further refined by merge and boolean operations, i.e. adding or subtracting primitives or other volume elements. The result is a coherent space model without any accidental void spaces. The definition data and the referencing into the Common Reference Model is stored with the arrangement to support ease of modification. Several space arrangements can be created, for different purposes, within the same volumetric area of the project e.g. for painting area calculation, compartmentation or 3D coordination. Each arrangement has a set of properties, pre-defined or user-defined, to support the functional purpose.

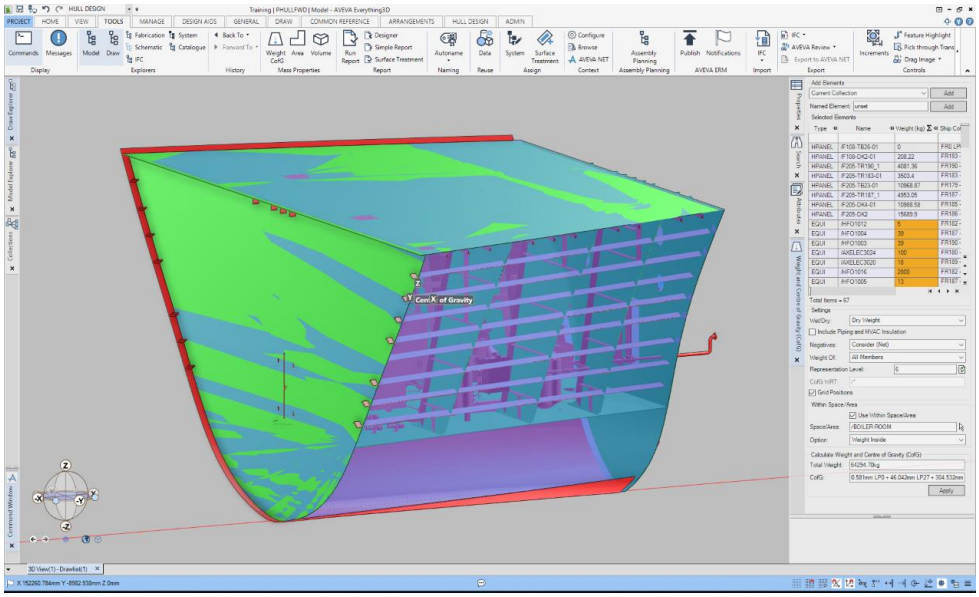


Each space can be queried for properties and be used in volumetric queries such as ascertaining information inside the space. The result can be used for coordination and for analysis in supporting a designer.

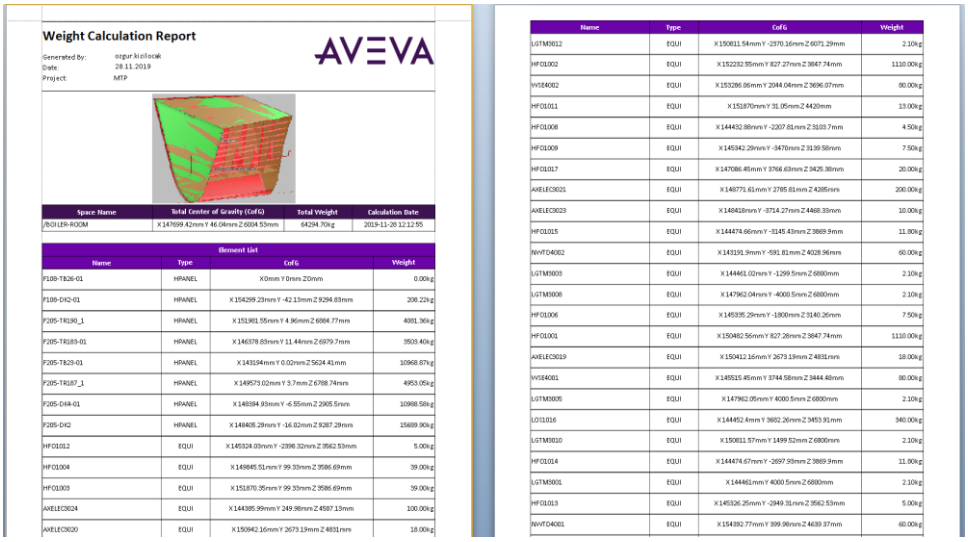
1.1.3.3 Analysis using Space Arrangements

- Volumetric queries.
- Exact geometrical calculations.
- Storing analysis results in a databank for further processing and follow up.
- Reporting.

The volumetric queries, resulting in a selection of models, can be used for various analysis purposes e.g. calculations on volumes, areas and weight and center of gravity. All model elements, fully or partly within the space, are included in the calculation, however only the parts of a model element that is inside the space are considered. The result of a calculation can be stored in an analysis databank (new in AVEVA E3D 3.1) and can be used for reporting or to integrate with AVEVA Engineering.



The Report Tool is used for reporting and some example report templates are delivered with the installation.



Weight Calculation Report

Generated by: ozgur kizilocak
Date: 28.11.2019
Project: MTP

Spare Name	Total Center of Gravity (CofG)	Total Weight	Calculation Date
/BOILER-ROOM	X 147699.42mm Y 46.04mm Z 6604.53mm	64294.70kg	2019-11-28 12:12:55

Element List

Name	Type	CofG	Weight
F108-TB26-01	HPANEL	X0mm Y0mm Z0mm	0.00kg
F108-DK2-01	HPANEL	X 154299.23mm Y -42.13mm Z 9294.83mm	208.22kg
F205-TR190_1	HPANEL	X 151981.55mm Y 4.96mm Z 6984.77mm	4001.36kg
F205-TR183-01	HPANEL	X 146378.83mm Y 11.44mm Z 6979.7mm	3503.40kg
F205-TB23-01	HPANEL	X 143194mm Y 0.02mm Z 5624.41mm	10968.87kg
F205-TR187_1	HPANEL	X 149573.02mm Y 3.7mm Z 6788.74mm	4953.05kg
F205-DK4-01	HPANEL	X 148394.93mm Y -6.55mm Z 2905.5mm	10988.58kg
F205-DK2	HPANEL	X 148405.29mm Y -16.02mm Z 9287.29mm	15689.90kg
HFO1012	EQUI	X 145324.03mm Y -2398.32mm Z 3562.53mm	5.00kg
HFO1004	EQUI	X 149845.51mm Y 99.33mm Z 9586.69mm	39.00kg
HFO1003	EQUI	X 151870.35mm Y 99.33mm Z 9586.69mm	39.00kg
AXELEC3024	EQUI	X 144385.99mm Y 249.98mm Z 4587.15mm	100.00kg
AXELEC3020	EQUI	X 150942.16mm Y 2673.19mm Z 4831mm	18.00kg

Name	Type	CofG	Weight
LGTM3012	EQUI	X 150811.54mm Y -2370.16mm Z 6071.29mm	2.10kg
HFO1002	EQUI	X 152232.95mm Y 827.27mm Z 9847.74mm	1110.00kg
VVS04002	EQUI	X 153286.06mm Y 2044.04mm Z 9696.07mm	80.00kg
HFO1011	EQUI	X 151870mm Y 31.05mm Z 4420mm	13.00kg
HFO1008	EQUI	X 144432.86mm Y -2207.81mm Z 3103.7mm	4.50kg
HFO1009	EQUI	X 145942.29mm Y -3470mm Z 3139.58mm	7.50kg
HFO1017	EQUI	X 147086.45mm Y 3766.63mm Z 9425.38mm	20.00kg
AXELEC3021	EQUI	X 148771.61mm Y 2785.81mm Z 4285mm	200.00kg
AXELEC3023	EQUI	X 148418mm Y -3714.27mm Z 4468.39mm	10.00kg
HFO1015	EQUI	X 144474.66mm Y -3145.43mm Z 3869.9mm	11.80kg
NVVT04002	EQUI	X 143191.9mm Y -591.81mm Z 4028.96mm	60.00kg
LGTM3003	EQUI	X 144461.02mm Y -1299.5mm Z 6800mm	2.10kg
LGTM3008	EQUI	X 147962.04mm Y -4000.5mm Z 6800mm	2.10kg
HFO1006	EQUI	X 145395.29mm Y -1800mm Z 3140.26mm	7.50kg
HFO1001	EQUI	X 150482.56mm Y 827.28mm Z 9847.74mm	1110.00kg
AXELEC3019	EQUI	X 150412.16mm Y 2673.19mm Z 4831mm	18.00kg
VVS04001	EQUI	X 149515.45mm Y 3744.58mm Z 9444.48mm	80.00kg
LGTM3005	EQUI	X 147962.05mm Y 4000.5mm Z 6800mm	2.10kg
LO11016	EQUI	X 144452.4mm Y 3602.26mm Z 9453.91mm	340.00kg
LGTM3010	EQUI	X 150811.57mm Y 1499.52mm Z 6800mm	2.10kg
HFO1014	EQUI	X 144474.67mm Y -2697.95mm Z 3869.9mm	11.80kg
LGTM3001	EQUI	X 144461mm Y 4000.5mm Z 6800mm	2.10kg
HFO1013	EQUI	X 145326.25mm Y -2949.31mm Z 3562.53mm	5.00kg
NVVT04001	EQUI	X 154392.77mm Y 399.98mm Z 4639.37mm	60.00kg

1.2 The User Bulletin

The aim of the User Bulletin is to provide an overview of the main functional differences between AVEVA E3D 3.1 and AVEVA E3D 2.1.

*Please refer to the **AVEVA E3D 2.1 release documentation** and collateral for further information on the capabilities introduced by the AVEVA E3D 2.1 product.*

1.2.1 Using this Bulletin

Certain text styles are used to indicate special situations throughout this document.

Additional information notes and references to other documentation will be indicated in the styles below.

Refer to other documentation.

Additional information.

1.3 AVEVA Experience

AVEVA Experience™ (https://www.aveva.com/experience) provides an effective and easily accessible way to gain hands-on experience of AVEVA E3D, wherever the user is located. For employers, it makes it easier to train and upskill engineers and designers.

Once registered, the user will have the opportunity to go through an extensive set of training modules on core aspects of AVEVA E3D, including training exercises and 'how-to' videos. These modules will highlight the key differences between AVEVA PDMS / AVEVA Hull & Outfitting and AVEVA E3D. The user will also be able to work with a Cloud-hosted deployment of AVEVA E3D, including a sample set of project data.

2 AVEVA Everything3D™ 3.1

The AVEVA Everything3D™ 3.1 (AVEVA E3D™ 3.1) release, usually supplied by download from a secure website, self-installs using standard Microsoft installation procedures. Please contact your local AVEVA office if a DVD installation is required. As found with other AVEVA products, the release is typically installed to individual PCs with a Microsoft Windows operating system, with the license server and file installed to a networked Microsoft Windows server. In addition, the project data is typically located on a separate server.

AVEVA E3D 3.1 is a full release that may be run alongside and in conjunction with AVEVA PDMS and Hull & Outfitting 12.1.SP5 (Fix Release 15 onwards).

*AVEVA E3D 3.1 may also be used in conjunction with other products in the AVEVA product portfolio – please refer to **Section 2.5. Compatibility with other AVEVA Products**.*

AVEVA E3D 3.1 requires the use of AVEVA Administration: this product is distributed, installed and licensed separately and may also be used for AVEVA PDMS, Hull & Outfitting, Engineering and Schematics products.

2.1 Workstation Configuration

The following configuration is recommended in the use of AVEVA E3D 3.1. A 64-bit operating system is required for the installation of AVEVA E3D 3.1 and for the visualisation and use of laser data in the application.

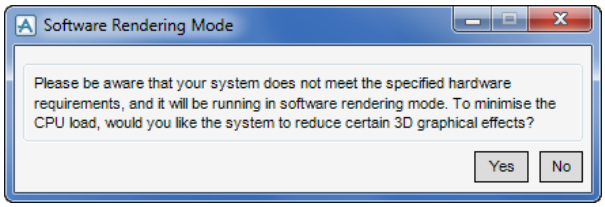
Configuration	Recommendation
Operating System(s)	Windows® 10 (64-bit) (version 1709 or higher). Microsoft .NET Framework 4.7.2. (Supplied with AVEVA E3D 3.1 and installed if necessary).
Processor Type / Speed	Intel x86 or x64 compatible - CPU with high performance in each processor core.
Memory	16 GB of high-speed RAM
Hard Disk Storage	A full installation requires approximately 1GB of drive space. In addition, extra capacity is usually required for local storage and data; this may be used for the database cache where the Database Cache Service is employed. The use of two SATA-300 RAID HDDs is recommended where projects are stored on the local machine. The product has also been verified with solid state HDDs.
Display	High resolution widescreen displays recommended (1920 x 1200); dual screens also supported.
Graphics Card	NVIDIA Quadro, AMD FirePro™ or similar. *Please refer to **Section 2.2 Graphics Cards** for further information.*

*[1] AVEVA does not support the installation of E3D 3.1 software and\or Projects on to disk volumes with Short\8.3 file name format disabled. Please ensure that Short\8.3 file name format is enabled on all relevant volumes before installation.

For further information regarding IT Configuration please contact the local AVEVA Support Office. Recommended / supported hardware and software configurations are constantly subject to review; please consult the AVEVA support web pages for the latest recommendations.

2.2 Graphics Cards

AVEVA E3D 3.1 requires 3D graphics hardware, capable of running DirectX 12, to ensure optimum performance for both design and drafting. DirectX 12 is included as an integral part of the Windows 10 operating systems.



AVEVA strongly recommends that appropriate hardware is used for AVEVA E3D 3.1. If appropriate graphics hardware is not detected on entry, AVEVA E3D 3.1 may still be used but a warning will be given and certain graphical effects, including the use of laser data, limited.

Following extensive testing of current market Graphics Cards and AVEVA E3D 3.1, a recommended configuration is summarised in the table below.

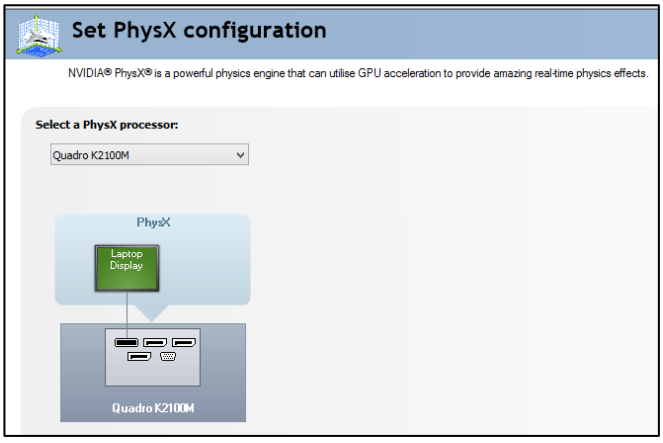
	Desktop	Laptop
Graphics Card	• NVIDIA® Quadro® P2000 or P2200 • NVIDIA® Quadro® M2000 • AMD FirePro™ WX5100	• NVIDIA® Quadro® P2000 • NVIDIA® Quadro® M2000M or M2200 • NVIDIA® Quadro® T1000
DirectX Support	• DirectX 12 (Shader Model 5.1).	• DirectX 12 (Shader Model 5.1).

⚠ *Where laser data is utilised, the Graphics Card Memory allocation is an important consideration as this is further exploited in the visualization and manipulation of laser data (incl. HyperBubble™). Note that the system will post an error message on entering the HyperBubble where the GPU memory is less than 1GB.*

⚠ *AVEVA strongly recommends that clients should test their chosen card or laptop in their own environment before purchase.*

Availability and support of graphics cards changes frequently; a full updated list of graphics cards that have been verified with AVEVA E3D 3.1 is available via the IT Configuration area of the AVEVA Support Site (https://support.aveva.com).

To ensure the optimal performance of the graphical memory, i.e. when utilising laser data, it is recommended that the Physical Processor is altered (where employing a NVIDIA graphics card).



Using the NVIDIA Control Panel, setting a GPU allows an increase in PhysX processing and may improve overall performance.

2.3 Server Configuration

The following configuration is recommended in the use of AVEVA E3D 3.1 with a server configuration. A 64-bit operating system is required for the installation of AVEVA Everything3D™ 3.1.

Operating System(s)	• Windows® Server 2019 (version 1809). • Windows® Server 2016 (version 1607). • Microsoft .NET Framework 4.7.2. (Supplied with AVEVA E3D 3.1 and installed if necessary).
Processor Type / Speed	Intel x86 or x64 compatible - Modern architecture multiple core processors recommended (AVEVA E3D 3.1 has been verified using a Server Machine with 4 core CPUs).
Memory	16 GB RAM. Additional RAM increases the caching capability and thereby the performance.
Hard Disk Requirements	The amount of disk space should be configured according to the customer's requirement based on the number and size of projects (incl. supporting laser data). To secure data and improve performance, the use of RAID 0+1 or 5 storage is recommended; 15k rpm drives are preferred.
File System	NTFS For further information on NTFS, please refer to: https://docs.microsoft.com/en-us/windows-server/storage/file-server/ntfs-overview.
Network	Gigabit Ethernet (GbE) LAN. 64-bit capable network adapter. The network should provide at least 1 Gb/sec for each workstation. Two or more network cards are recommended for increased performance and redundancy.

2.4 Prerequisite for this Release (Products)

The following products are required for the use of AVEVA E3D 3.1.

2.4.1 AVEVA Licensing™ 4.1.0

AVEVA Licensing™ 4.1.0 or later and an appropriate License File is required for the operation of AVEVA E3D 3.1.

*AVEVA Everything3D™ 3.1 does **NOT** operate with AVEVA Flexman.*

Where upgrading from AVEVA Licensing System 2.0 or 3.0, the existing license file and logs will be preserved when upgrading. The version 2.0 license file will continue to work with the new ALS 4.1 server.

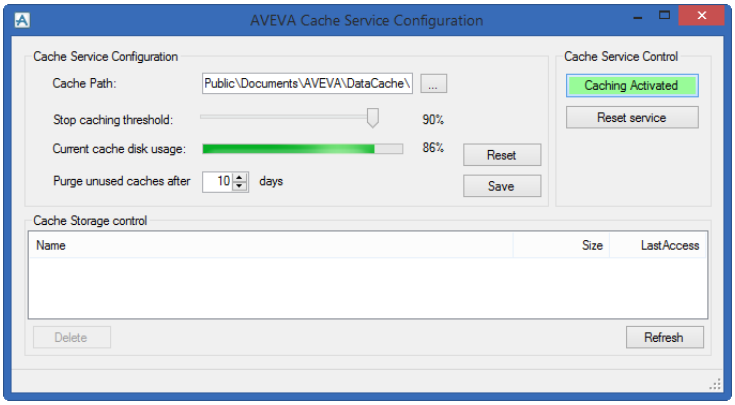
*For full details on the features of AVEVA Licensing System 4.1, please refer to the **AVEVA Licensing System™ 4.1 Release documentation** and **user guide**.*

2.4.2 AVEVA Client Cache Service™ 1.0.5

The AVEVA Client Cache Service is designed for use on a LAN or WLAN network with full connectivity to the Database files and can make a considerable improvement to Dabacon database performance. The use of the Service is strongly recommended for all multi-user projects. The AVEVA Client Cache Service has been developed to produce an improved performance when reading data over 'high' latency networks by minimizing traffic.

The AVEVA Client Cache Service stores a copy of the read project data on the local disk which improves performance where there is repeated reading of project data across a computer network. The service operates by a data request

being sent to the local Cache folder to retrieve the required Data (Database Page). If the data is not within the Cache folder, a Data Request is sent across the network to the central server to retrieve the required data. Likewise, data that is unchanged since it was previously read is retrieved from the local Cache whereas Data that has changed in the Database must be read again from the central Database file. Similarly, data that must be written to a Database file must still be written to that identified file.



The AVEVA Client Cache Service is installed with AVEVA E3D 3.1 and may be configured or disabled using the **AVEVA Cache Service Configuration** application. The prompted form, seen above, enables an Administrator to configure the caching threshold level to avoid the local hard drive being filled.

The Default is to stop caching on the Hard Drive on becoming 80% full. When full, data is continued to be delivered where already cached but no further data is cached until more space is made available. The Cache persists data locally between sessions – thereby, very often, the start-up will be quicker.

*To ensure the performance benefits of the service are realized, Microsoft Message Queuing (MSMQ) must be enabled. This is achieved using the **Windows Components** feature of **Windows Control Panel > Add or Remove Programs**.*

*For full details, please refer to the **AVEVA Everything3D™ 3.1 Installation Guide**.*

2.4.3 Microsoft® Software

The following Microsoft products are required to support the operation of AVEVA E3D 3.1.

2.4.3.1 Microsoft Office & Fonts

AVEVA E3D 3.1 requires Microsoft Office 2016 (or later) to ensure the full function of product features. Please note the following:

- Optimum operation of the AVEVA Design Platform GUI requires Arial Unicode MS font, supplied with Microsoft Office and also with Microsoft Office Visio (Please note that this font is not available in Office 2016 by default).
- The layout and display of forms and the general user interface may also be adversely affected if the screen font size is not set to the smallest size.

AVEVA E3D 3.1 has been verified with Microsoft® Office 365.

2.4.3.2 Microsoft Internet Explorer

Internet Explorer 10.0 or later is required to support AVEVA E3D 3.1 e.g. the Model and Draw Design in Context feature.

2.4.3.3 Microsoft .NET Framework

AVEVA E3D™ 3.1 uses Visual Studio 2016 and .NET 4.7.2 for .NET Customisation.

2.5 Compatibility with other AVEVA Products

For full compatibility details, and for information about AVEVA E3D 3.1 compatibility with any later versions, please refer to the compatibility matrix. A full and up to date compatibility matrix can be found via compatability.aveva.com /matrix.

The following AVEVA products are compatible with AVEVA Everything3D™ 3.1.0:

- AVEVA Administration™ 1.7.0 (Fix Release 1).

Note: This release supersedes all previous AVEVA Administration versions delivered with other AVEVA products.

- AVEVA Applications Service™ 3.1.0.
- AVEVA Bocad™ 3.2.1.
- AVEVA Client Cache Service™ 1.0.5.
- AVEVA Clash Manager™ 14.3.0.
- AVEVA Diagrams™ 14.1.3 (Fix Release 4).
- AVEVA E3D Documentation™ 3.1.0.
- AVEVA E3D Insight 2.3.0 (Fix Release 1).
- AVEVA Electrical™ 12.2.0 (Fix Release 1).
- AVEVA Engage™ 3.4.1.
- AVEVA Engineering™ 15.2 Fix.1.
- AVEVA ERM 15.1.2
- AVEVA GCD Creator 3.4.1
- AVEVA Global Server™ 3.6.0 (Fix Release 1).

Note: Includes separately licensed products AVEVA Global Hub and AVEVA Global Satellite.

- AVEVA Hull & Outfitting™ 12.1.5 & associated products (Fix Release 15).
- AVEVA NET Gateway for AVEVA IE&D 1.3.0.
- AVEVA Implant-I 2.3.0.
- AVEVA Implant-STL 1.5.0.
- AVEVA Instrumentation™ 12.2.0 (Fix Release 1).
- AVEVA Integration Service 1.6.0 (Fix Release 2).
- AVEVA NET Workhub & Dashboard™ 5.1.7
- AVEVA Open Steel 2.3.0.

- AVEVA PDMS™ 12.1.5 & associated products (Fix Release 15).
- AVEVA PDMS-VPRM Gateway™ 5.7.0 (Fix Release 2).
- AVEVA Pipe Stress Interface™ 3.1.0.

Note: Compatibility is via a forthcoming release.

- AVEVA Pipe Stress Interface - R2 ™ 3.1.0.

Note: Compatibility is via a forthcoming release.

- AVEVA PML Publisher™ 2.2.0
- AVEVA Shared Services™ 3.5.0.
- AVEVA Structural Analysis Interface 4.1.0.

The following LFM products are compatible with AVEVA Everything3D™ 3.1:

- LFM Server™ 5.2.0.

2.6 Environment Variables

AVEVA E3D 3.1 relies on the use of environment variables for various aspects of configuration, notably the location of folders for project databases and user workspace.

When setting up a user's environment, please bear in mind that Write access is required for folders such as AVEVA_DESIGN_USER and AVEVA_DESIGN_WORK. The installer uses default locations, for both the program files and these data folders, that are different from those used for PDMS / Hull & Outfitting. These were chosen to work better on Windows 10; additional dialogs enable the user to control them better.

The defaults are:

Work files C:\Users\<username>\AppData\Local\Temp\

User files C:\Users\Public\Documents\AVEVA\USERDATA\

Environment variables are usually set up for AVEVA E3D by the program initialization (.INIT) file when running interactively or by using a batch (.BAT) file.

⚠ *Note that at AVEVA E3D 3.1 an optional feature is available whereby a customer may remove all the Project evars from the corresponding bat files apart from <proj>000 and ID (required to display a project in the Login form). On selecting the project and entering AVEVA E3D 3.1, the start-up process will look to the project and set up any required environment variables. Where an evar is already set, the start-up process will leave that untouched, thus avoiding any unnecessary changes.*

2.7 Network

AVEVA E3D 3.1 is best run on a network offering Internet access.

The system will by default be set up to access the latest online version of the documentation from the AVEVA website. It is possible instead to install the documentation locally. It may be downloaded from the AVEVA Support website, currently: AVEVA Everything3D - Documentation 3.1.0.

2.8 Security considerations for Customer IT (On-premise deployments)

AVEVA E3D (Dabacon) projects rely on good LAN connectivity and availability between:

- User Workstations and the License Server.
- User Workstations and the Dabacon Project Database Server.

⚠ *Note that some virus scanners can interfere with product access to Dabacon Databases.*

- User Workstations and Company Customisations (both PML [PMLLIB and PMLUI folders] and C# Addins).
- User Workstations and any other servers for any bulk import / output of Dabacon project data.

The IT department is responsible for ensuring that appropriate access is provided while protecting against Data-sniffing.

Frequent backups of the Dabacon Database server should be taken to protect against malicious deletion.

There should also be good connection between User Workstation and AVEVA products online help.

If IT policy is to restrict access to the world-wide web and the AVEVA help is inaccessible to end-users, then it is advised that copy the online help to a corporate location, updating it regularly, and set products to use online help from this location.

User workstations should have the appropriate Operating Systems, processors, graphics cards, memory and hard disk storage as specified in the previous sections.

2.9 Install

Installations using setup.exe will install to C:\Program Files (x86)\AVEVA\Everything3D3.1 by default. The individual .msi files will use the drive with most free space by default.

It is important that any files, including configuration files or sample data, that need to be updated by users are accessible for read, write etc. so they are not by default installed with the software. This is particularly important when installing in Program Files due to the introduction of User Account Control (UAC). In particular, this makes it important to ensure that files that need to be written are accessible by users without Administrator privileges. This applies to folders specified by environment variables such as AVEVA_DESIGN_WORK and AVEVA_DESIGN_USER. The AVEVA Everything3D™ installer has been designed to allow the separate definition of suitable folders, with different defaults.

⚠ *It is not recommended that any combination of AVEVA products are installed in the same folder because AVEVA does not guarantee runtime compatibility between Separate Products on different release cycles, and the uninstall of one of them subsequently damaging the other.*

⚠ *During the install process a user can configure AVEVA Everything3D 3.1 to access a license server running a valid AVEVA E3D license. This well set an Environment variable that points to the identified license server.*

*For further details, please refer to the **AVEVA Everything3D™ 3.1.0 Installation Guide**. This may be accessed from the start screen of the installation process or found within the E3D310 release folder.*

2.10 AVEVA Projects 3.1

As part of the install process for AVEVA E3D 3.1, a variety of standard model projects may be installed and thereafter used in the product. The projects are also available as a separate download available via support.aveva.com.

The sample projects have been extended and enhanced but wherever data matches the previous (AVEVA PDMS and Hull & Outfitting) sample model data, the same reference numbers and database numbers are used to ensure compatibility.

A file, for example APS_Project_description.pdf, is included in each project folder giving brief details of the purpose and data included in that project. The Catalogue Project (ACP) provides example component data and specifications (Component Data). All data in the projects are provided as sample data only and should be verified prior to production use.

AVEVA Projects 3.1 include:

- A main catalogue sample project called ACP (AVEVA Catalogue Project).
- Sample data projects called APS (AVEVA Plant Sample) and AMS (AVEVA Marine Sample).
- Sample drawings are in the Draw format and Draw project libraries have been extended to support any new Draw capabilities at AVEVA E3D 3.1.
- Additional data has been added to support the use and demonstration of Space Management and Marine (Hull) data.

The AVEVA sample projects are regularly revised. Please check the AVEVA Support Site (AVEVA Everything3D™ Fix Release History) frequently for updates.

*A detailed list of changes is included in the **AVEVA E3D Projects 3.1** release documentation.*

2.11 AVEVA Everything3D™ – Documentation 3.1

The AVEVA E3D 3.1 documentation includes the AVEVA Administration, Catalogue and Global product user guides.

Documentation is available online so that it may be continually updated and remain current for any new functionality introduced through the life of the product. AVEVA Documentation 3.1 may also be downloaded separately for local installation.

The documentation may be accessed via the top of the main product window, via the Project tab or via the context sensitive F1 key.

The Documentation is presented via a Help Viewer, which comprises an Explorer style Contents list complete with Search function and a reading pane.

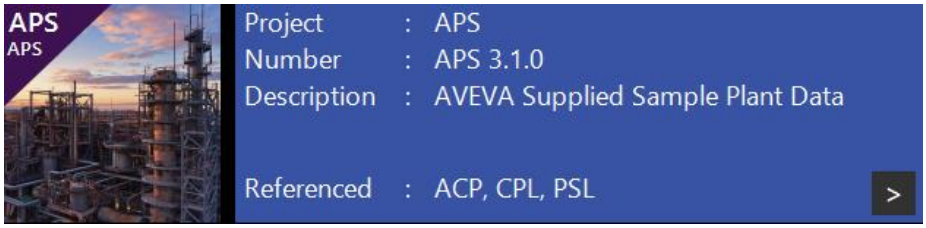
2.12 Entering AVEVA Everything3D 3.1

AVEVA Everything3D 3.1 may be accessed via the Windows Start menu or Start screen depending on the Windows Operating System being used.

The **Login** form is displayed.

The Project images may be set by placing an image (.png) named <project> within the <project>dflts folder. The recommended image size is 600x600.

From the **Login** form a project may be accessed by selecting the identified Project tile prior to entering the required login information and clicking on the desired module.



2.13 Project Configuration

The following sections note recent changes to the supporting AVEVA Administration product and how they aid the configuration and use of AVEVA E3D.

For more details please refer to the AVEVA Administration Release Letters and the Administation and Lexicon User Documentation.

2.13.1 UTC Date & Time

AVEVA Administration (1.6) stores the UTC date time in addition to the local date time on both sessions and stamps when they are created. AVEVA E3D 3.1 utilises UTC date and time to ensure that updates are shown correctly sequenced across time zones.

A project wide UTC switch has been introduced to control which date format is returned when either the session date or stamp date is queried. The UTC switch controls the output of a ‘Calculated local date time’ as the Session Date Time, where the Calculated local date time is the sum of the UTC date time when the session is saved and the current time zone bias. This allows interoperability for session dates with earlier AVEVA products e.g. PDMS / Hull & Outfitting 12.1 SP5

UTC switch default states:
ON for any new project created with, and OFF for any existing projects accessed with, Administration 1.6

AVEVA recommends that once the UTC switch has been enabled, it is never disabled.

If there is a requirement to copy an existing project that has UTC OFF and maintain this setting in the copy, since the starting point is to create a new project with either Make or Project Creation Wizard, this will see the new project created with UTC ON. Once the replication is complete the copied project will need to be switched to UTC OFF.

Global Projects: As the Calculated Local Date Time depends on the current time zone, it is possible that the first session saved after the UTC switch is turned on could occur before the last session saved when the switch was off. To prevent this a gap of up to 24 hours (depending on the time separation of locations) is required between turning on the UTC Switch and saving the first (UTC) session.

2.13.2 Configuration Databases

With the release of the supporting AVEVA Administration the Configuration Database has been introduced to move external reference data into project(s).

In the installation folder of AVEVA E3D the databases folder contains two database files: 9100 and 9101 (C:\Program Files (x86)\AVEVA\Everything3D3.1\databases). These are DICTIONARY and CONFIGURATION Databases respectively.

The supplied Databases are automatically included in any new project created and are referenced by AVEVA products in any module without the need to add them to the MDBs within the project. The DICT DB contains a set of KEYs, each Key representing a specific data type and the CONF DB contains a value applied to the key. An example might be a UNITs key with the value set to mm.

The AVEVA supplied DICT and CONF Database files cannot be accessed or edited by customers.

2.13.2.1 Customer Preferred Values

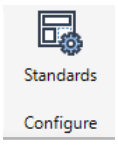
It is noted that many customers have common data e.g. Piping CATA DB or PADD DB with corporate backing sheets and preferred symbols. These Databases are often stored in a master or corporate project and become foreign reference Databases in many design projects. Within each design project specific piping CATA DBs and PADD DBs are added to ensure the project has the specific design requirements.

It is expected that customers will similarly create a master or corporate CONF DB in which they set the preferred values to overwrite one or more of the AVEVA default values and that this CONF DB is referenced by a design project.

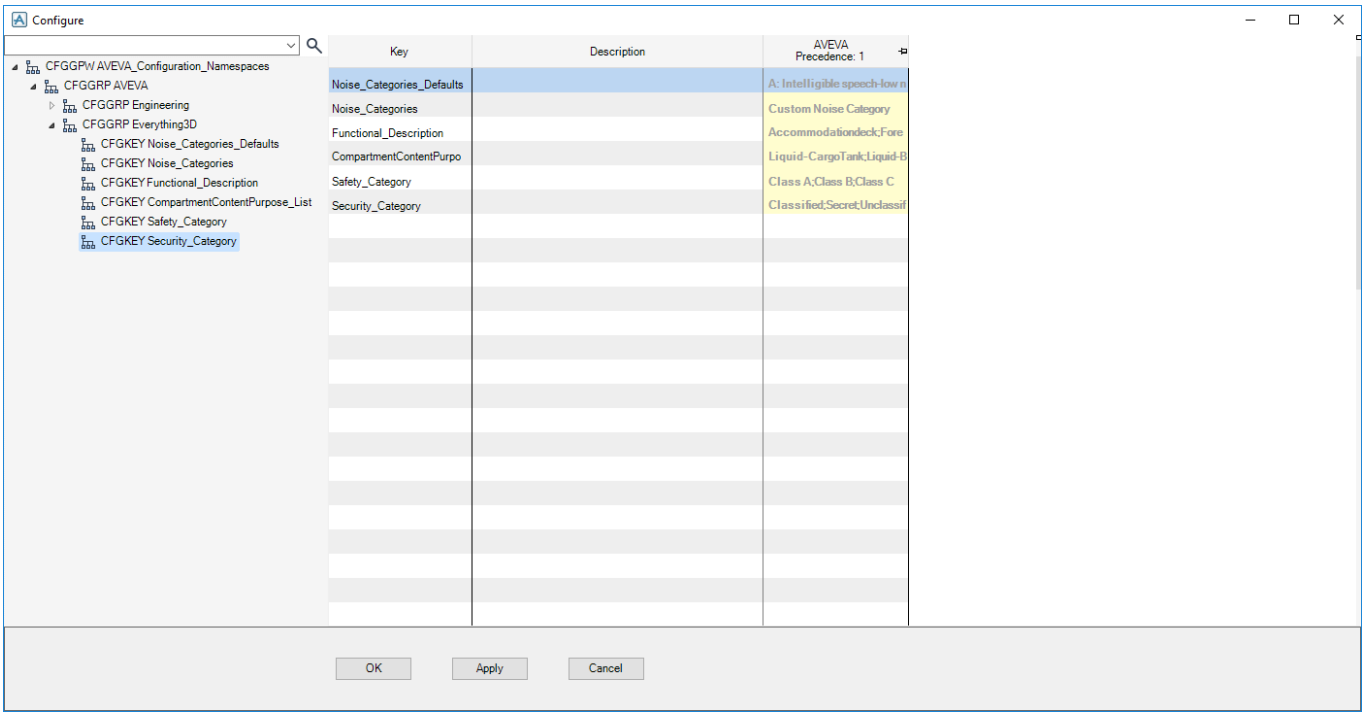
The design project may also have its own CONF DB to accommodate specific project requirements and this will be used to overwrite any AVEVA default values or any of the corporate CONF DB default values.

Customers who create CONF DBs must add these to the MDBs within the project.

2.13.2.2 Configuration in AVEVA E3D



Users of AVEVA E3D 3.1 (or AVEVA Engineering) can see the configuration values via the **Configure** form accessed via the **Standards** button within the **Configure** group of the **MANAGE** tab.



Unless the user is a member of the appropriate Team, the user has read-only access. If required, a CONF DB may be created and assigned to a specific User to allow individual engineers or disciplines to utilise their own values

2.13.3 Additional (Engineering) Units

Further Engineering units have been introduced via the AVEVA Administration product to support the interoperable use of AVEVA E3D and AVEVA Engineering.

There are new Dimensions and Units of Measure:

Cable (core) size:

- Kcmil
- AWG
- mm2

Reactive Power

- VAr

Noise

- dBA

2.13.4 PML Pseudo

AVEVA Administration (Lexicon) has introduced support for PML pseudo attributes with configuration for PML functions that will be called to set or retrieve values. Including such a UDA in the EXPCOL for a Dbview enables full PML2 functionality to be used.

Please note that the use of PML in DBviews should be considered with care regarding performance impact.

2.13.5 Expression Query for Backref

An introduced expression syntax supports a qualified backref to return the specific back reference for a UDA:

Backref(attname :UDAname)

2.13.6 Text Arrays

Utilising the supporting AVEVA Administration product (Lexicon) a text array may now be used to define a UDA or attribute.

2.13.7 5000 Databases

Projects created for use with AVEVA Everything3D 3.1 can now have 5000 DBs in an MDB.

To enable this, the project is required to be upgraded using AVEVA Administration (1.7.0).

- Enter Admin module, expunging any dead users and then LOCK the project.
- Type the following command:

  DBUPGRADE PROJECT TO LATEST OPTION CONFIRMED
- Unlock the project.

2.14 Large Co-Ordinates

In earlier versions of AVEVA E3D and AVEVA PDMS / Hull & Outfitting Model applications the extents of a primitive's bounding box entry in the spatial map was limited in x, y, z world coordinates to +-100km. At AVEVA E3D 3.1 changes have been made to remove this limit so that primitives may be positioned beyond x, y, z world coordinates +-100km.

2.14.1 Compatibility with AVEVA PDMS / Hull & Outfitting 12.1.SP5

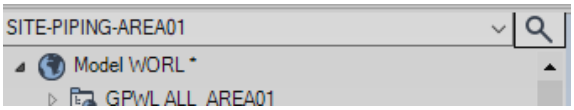
Spatial maps built in AVEVA E3D 3.1 may be incompatible with AVEVA PDMS / Hull & Outfitting 12.1.SP5 and vice versa for elements positioned greater than +-5km from the origin. This can be resolved by using the command MAP CHECK/BUILD. The MAP CHECK/BUILD command will ensure that the spatial map is compatible in the following ranges:

- Spatial map entries for xyz < +-5km will be compatible and not require a MAP BUILD.
- Spatial map entries +-5km < xyz < +-100km will require a MAP BUILD going backwards/forwards between products.
- Spatial map entries xyz > +-100km will not be compatible with 12.1.SP5.

2.15 Search

2.15.1 Search via Explorer

Access to the **Search** form has been extended to be made available from the (Model) Explorer.



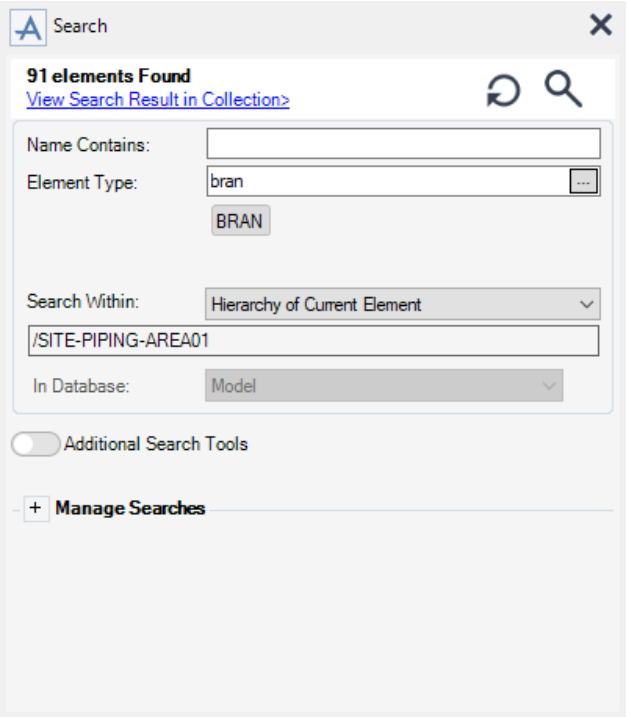
2.15.2 Redesigned Search form

The **Search** form has been revised at AVEVA E3D 3.1 with the following improvements:

- Search (incl. number of elements found) and reset functions moved to the top of the form.
- Able to view search result in a collection (via link).

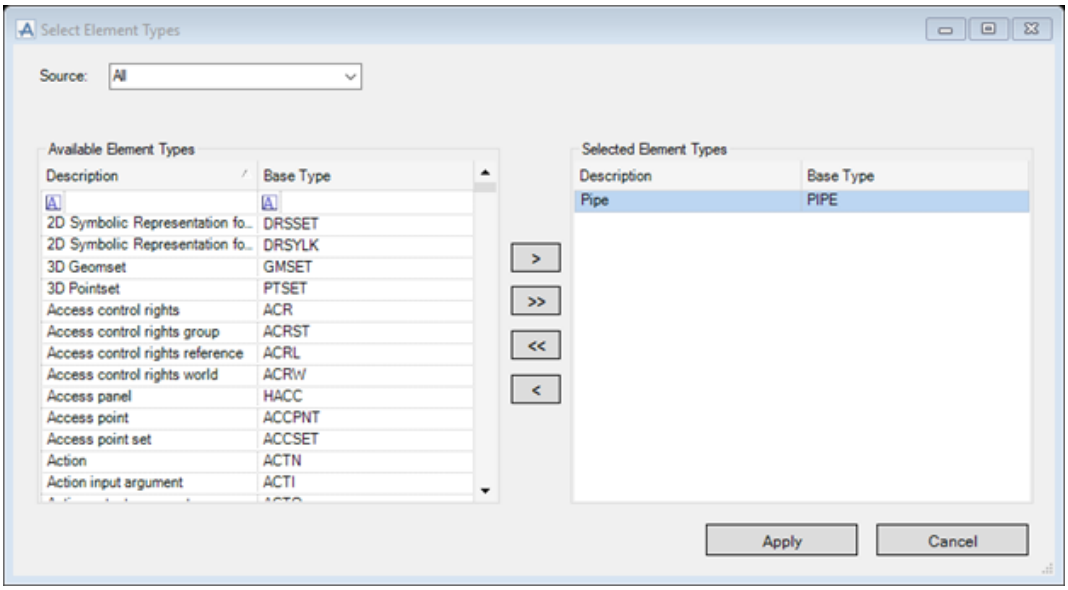
- Additional search tools toggle button is used to manage the collapsible search options form.

If a search result is more than 1000000, the following message is prompted: "Too many results, please refine your search"



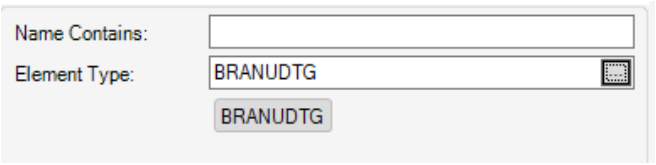
2.15.3 Element Type Selector

A selector button has been added to the **Element Type** field on the **Search** form to allow users to review and select all available element types via the prompted **Search Element Types** form. The **Source** filter allows element types to be filtered using DB types and, for Design DBs, Sub Types.



2.15.3.1 User Defined Type Groups

From the **Source** options list in the **Select Element Types** form a user may select a User Defined Type Group applicable to the current MDB.

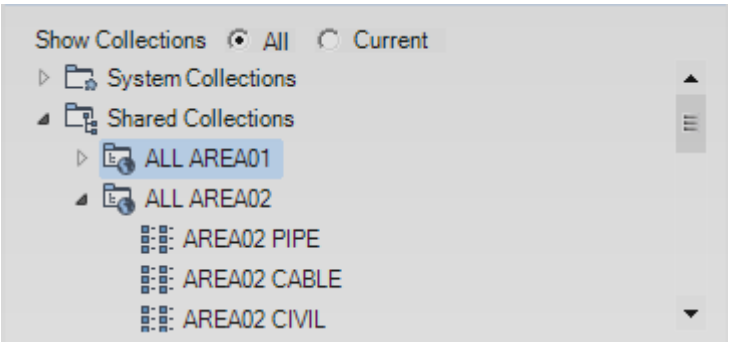


2.16 Collections

The **Collections** form has been revised at AVEVA E3D 3.1 with the following improvements:

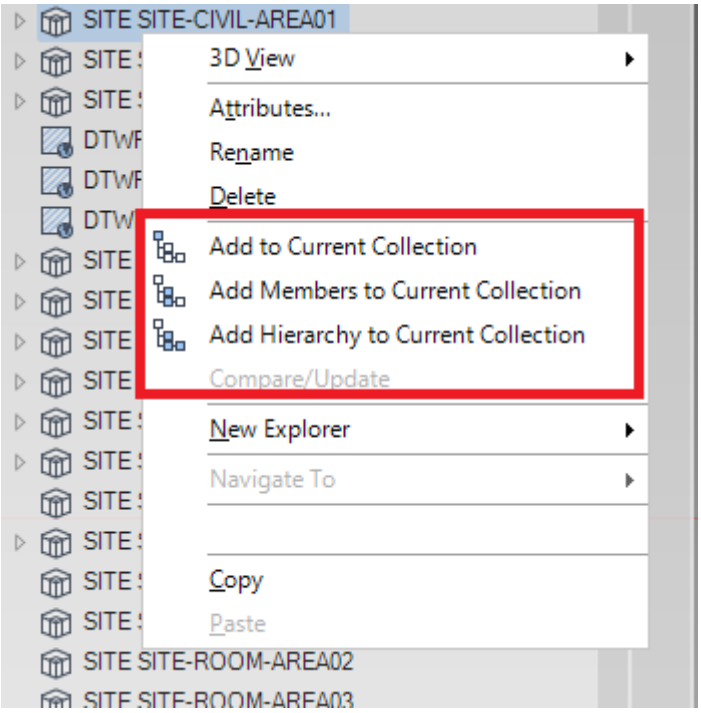
2.16.1 Show All or Current Collection

Option buttons have been introduced to the **Collections** form to allow a user to control the visibility of All Collections or the Current Collection.



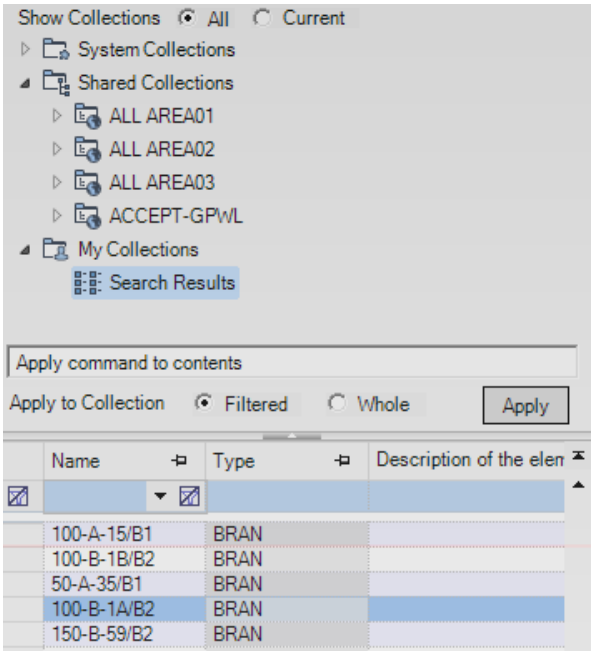
2.16.2 Add to Collection

An additional option has been added to the (Model) Explorer right-click context menu to add hierarchy elements to the current collection.



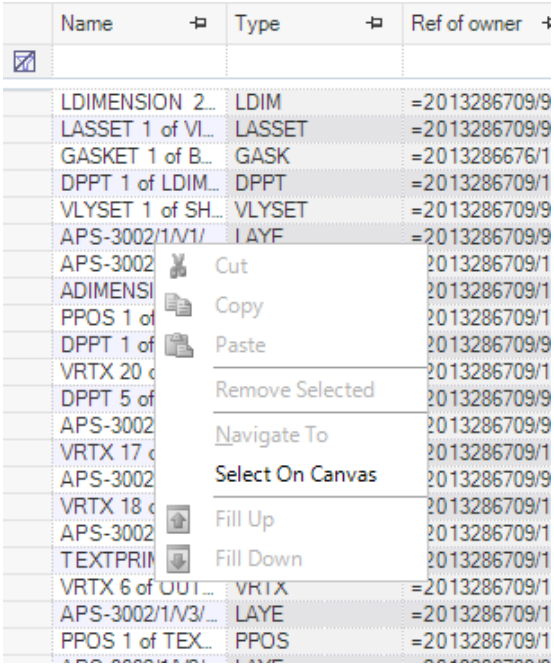
2.16.3 Action on Filtered List

The *Action* button in collections utility allows the user to apply an expression on the complete list of selected collection elements or on a filtered list.



2.16.4 Select on Canvas

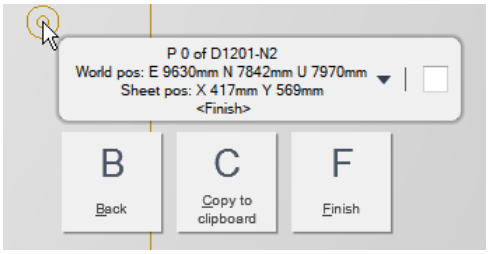
In the AVEVA E3D Draw module the Select on Canvas option is now available via a right-click context menu in the **Collection** form results grid.

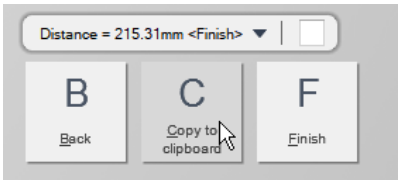


2.17 Copy

2.17.1 Copy from DIST / ID result to clipboard

In AVEVA E3D Model and Draw modules the result of the canvas command DIST and ID may be copied to clipboard via an introduced tile option in the context editor. The displayed description/output is copied to the system clipboard as a plain text so that it may be used in other applications.



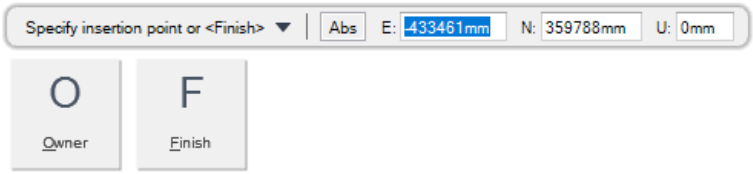


In both cases the current DIST or ID operation will not be released, ensuring the user can still manage the previous result, change target point or exit.

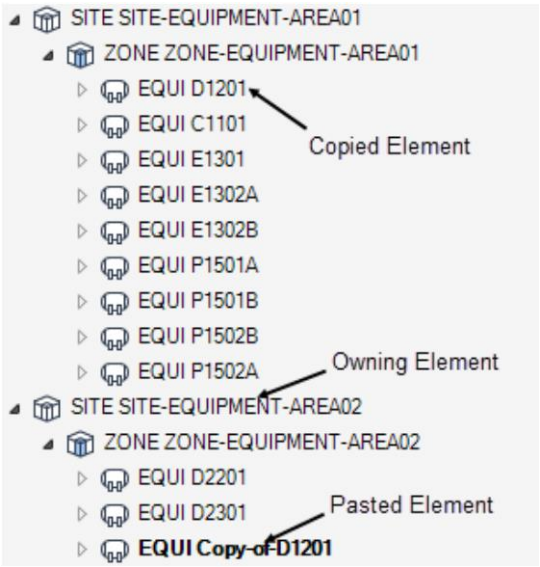
2.18 Paste

2.18.1 Paste to alternative Owner

In the AVEVA E3D Model module the individual Copy and Paste functions have been extended to allow a user to paste an identified object under a new owning element using an element pick on the **Model** or **Draw Explorers**. The option is accessed via the Context Editor option Owner tile.

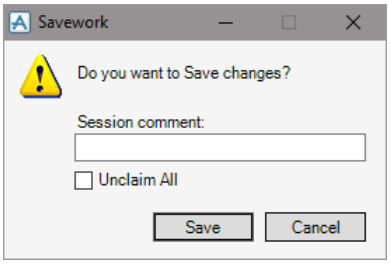


For example, to paste an equipment element into a different ZONE



If the picked owning element is not valid, an appropriate message window is displayed.

2.19 Savework



The **Savework** from has been redesigned at AVEVA E3D 3.1 to encourage the use of session comments and allow the unclaim of elements.

3 Model

The AVEVA E3D 3.1 Model module facilitates the creation, modification and checking of the full-sized design model in a fully interactive 3D environment. The model can be formed using imported geometry, reference laser data and discipline specific design functions and tools. Component selection is provided through Specifications that dictate which Catalogue Components can be used. A wide variety of diagnostic tools, such as clash and design checkers are available, and a flexible reporting capability can be used to produce a wide variety of design documents.

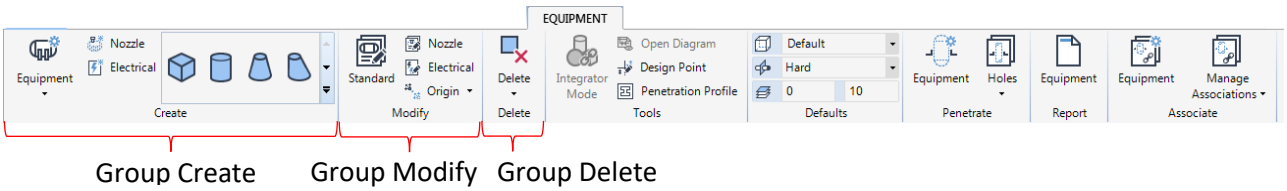
The following sections outline the Model user interface and key developments at AVEVA E3D 3.1.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for detailed information on the new features described and the **AVEVA E3D 2.1 release documentation** for information on functionality introduced to AVEVA E3D 2.1.*

3.1 User Interface & Applications

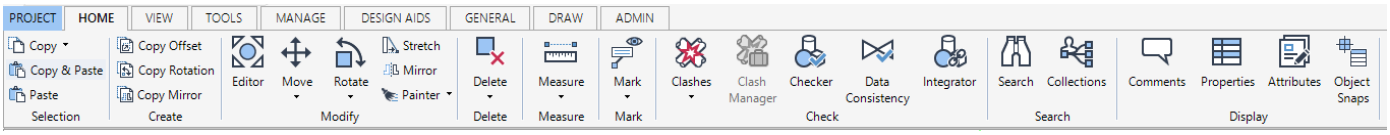
Introduced at AVEVA E3D 1.1, Model (and Draw) utilises a series of tabs displayed at the top of the application window.

The layout of the tabs has been reviewed at AVEVA E3D 3.1 to support new functionality and to promote an intuitive, efficient workflow. For example, the organisation of the discipline tabs offers user friendly access by presenting the same groups in the same order for common tasks like Create, Modify and Delete:



A brief description of each general and discipline tab follows:

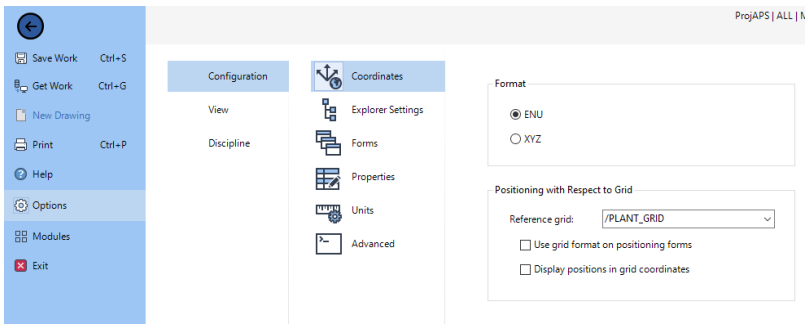
3.1.1 Home



The **HOME** tab is the starting point on entry to Model and provides access to commonly used tools to modify elements and to check model data.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further details of the available options.*

3.1.2 Project

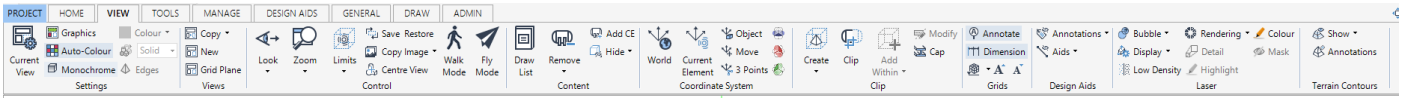


The **Project** menu or 'backstage area' provides access to several key commands and facilities including the common AVEVA E3D commands Save Work, Get Work, Help, Modules and Exit.

The Options menu option updates the Project area to display an Options area. This area may be utilised to tailor the Model application to the user's preference by specifying general Display, View, Modelling and Discipline options. At AVEVA E3D 3.1 the Project area has been extended to support several developments including the introduction of a configuration to allow Positionig with Respect to Grid.

*Please refer to **AVEVA E3D 3.1 User Documentation** and **Chapter 4 Model: General Interactions** for further information on the use of the **Project** tab.*

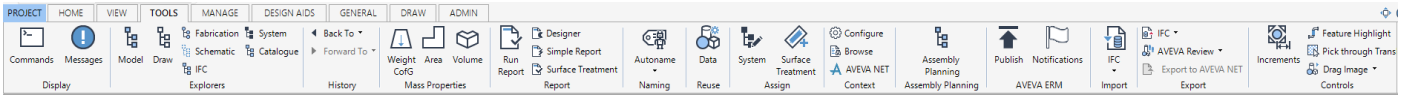
3.1.3 View



The **VIEW** tab allows the user to define the parameters (colours, view direction etc.) and content of each 3D View; controlling model content through clipping and laser data manipulation.

*Please refer to **AVEVA E3D 3.1 User Documentation** and **Chapter 4 Model: General Interactions** for further information on the use of the **VIEW** tab.Please refer to **Chapter 9 Laser** for further information on the use of the laser functionality.*

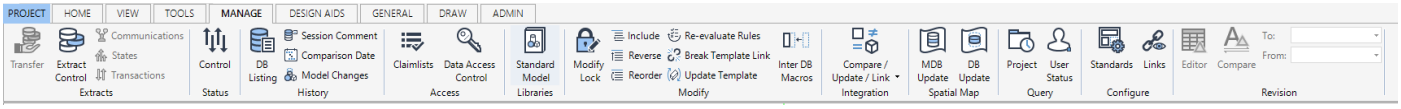
3.1.4 Tools



The **TOOLS** tab provides methods to check the meta-data of the 3D model, such as volume and weight, and produce reports. At AVEVA E3D 3.1 the introduced Assembly Planning capability is accessed via this tab. The tab also offers integration with AVEVA NET™ through the Design in Context feature, AVEVA ERM and a number of export/import utilities.

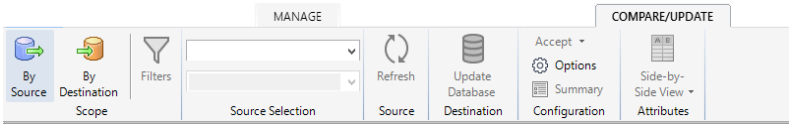
*Please refer to **Chapter 8 General Features** for further information on the use of the Assembly Planning and **AVEVA E3D 3.1 User Documentation** for further information on the use of Model tools.*

3.1.5 Manage



The **MANAGE** tab contains functionality for the management of the project and Model. Model management is aided by the control and management of Database elements together with Status Control management and Compare / Update integration.

3.1.5.1 Compare/Update

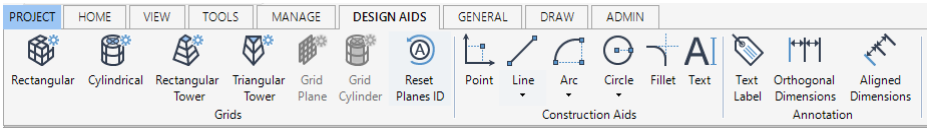


The **COMPARE/UPDATE** tab is prompted on clicking the **Compare/Update/Link** button from the **Integration** group of the **MANAGE** tab.

The **COMPARE/UPDATE** tab enables the comparison of the 3D model with data in the Schematic (P&ID) and Engineering domains, including AVEVA Instrumentation and AVEVA Electrical. It enables users to understand the changes made by other disciplines and departments, which affect their own scope of work with selected changes accepted or rejected.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of the Model management functions and Compare/Update.*

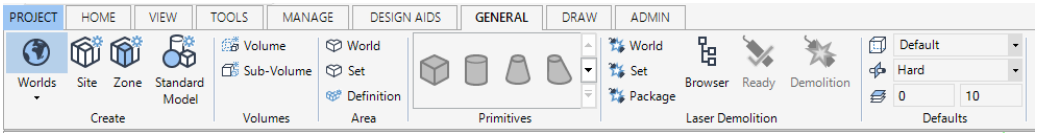
3.1.6 Design Aids



The **DESIGN AIDS** tab assists the AVEVA E3D user by offering the ability to utilise Reference Grids of various forms, Construction Aids and directly annotate the grid and model to aid the overall design.

*Please refer to **AVEVA E3D 3.1 User Documentation** for further information.*

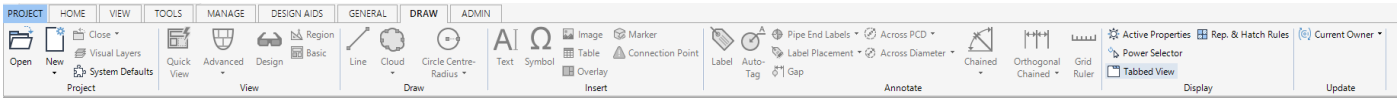
3.1.7 General



The **GENERAL** tab allows the user to create the owning Model hierarchy elements, including Worlds and general elements such as Volumes and Areas. The tab also contains Laser demolition functionality that can be applied to laser data across model disciplines.

*Please refer to the **AVEVA E3D 3.1 User Documentation** and **Chapter 9 Laser** for further information on the general functions and the use of demolition in the Laser workflow.*

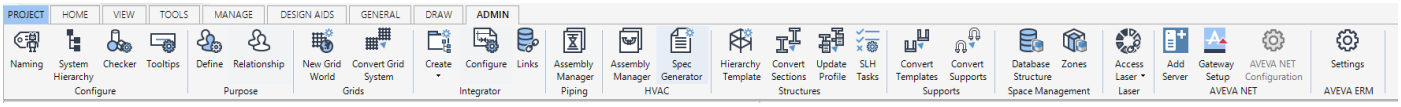
3.1.8 Draw



The **DRAW** tab enables selected users to view, create and modify drawings via a selection of features from the E3D Draw module.

*Please refer to the **AVEVA E3D 3.1 User Documentation** and **Chapter 6 Draw in Model** for further information on the use of Model in Draw functionality.*

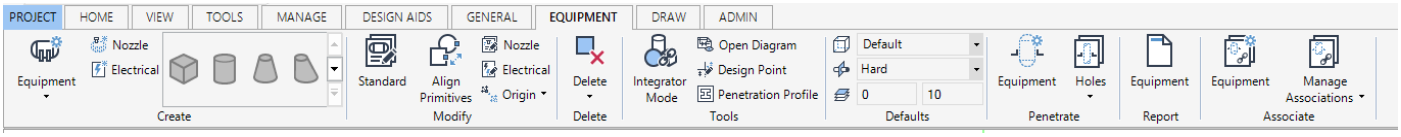
3.1.9 Admin



The **ADMIN** tab enables selected users, who have been granted access to the Admin team, to set up various modelling tools such as tool-tips (for the Explorer and 3D graphics), auto-naming, design checker and the Schematic 3D Integrator. It can also be utilised to set up administrative data such as system hierarchies, object purpose and links between objects.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of Model Administrative functionality.*

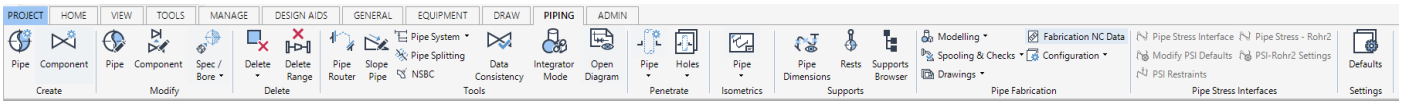
3.1.10 Equipment



The discipline specific **EQUIPMENT** tab allows the creation and modification of Equipment elements including the management of Penetrations and Associations.

Please refer to the AVEVA E3D 3.1 User Documentation and Chapter 8 Model: General Features for further information.

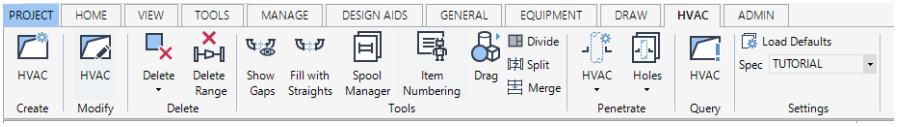
3.1.11 Piping



The discipline specific **PIPING** tab (displayed in conjunction with the **EQUIPMENT** tab) allows a user to create and modify piping elements. Further, the user can check the modelled pipework using data consistency tools and in an Integrator mode.

*Please refer to the **AVEVA E3D 3.1 User Documentation** and **Chapter 8 Model: General Features** for further information on the Piping discipline and the use of Integrator.*

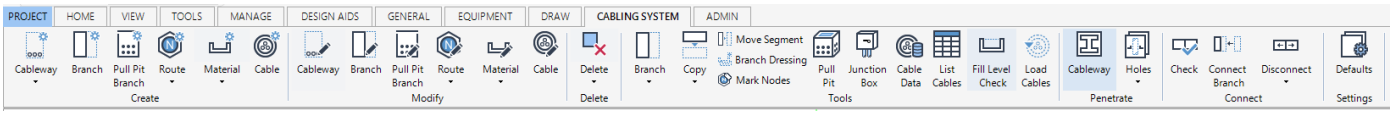
3.1.12 HVAC



The discipline specific **HVAC** tab (displayed in conjunction with the **EQUIPMENT** tab) allows the user to create and modify HVAC elements including the management of Penetrations and Spools.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of HVAC.*

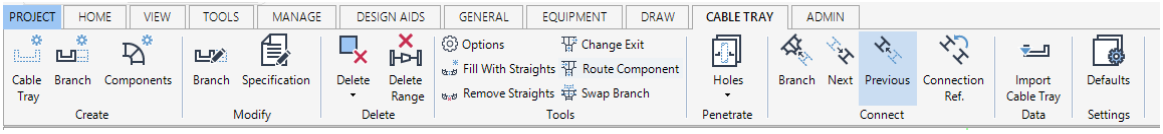
3.1.13 Cabling System



The discipline specific **CABLING SYSTEM** tab (displayed in conjunction with the **EQUIPMENT** tab) allows the user to create and modify Cableway elements including the management of Penetrations and Cable Data.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of Cableways.*

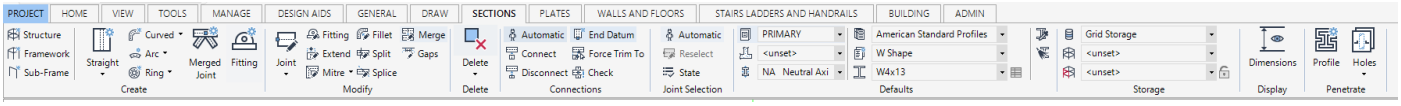
3.1.14 Cable Tray



The discipline specific **CABLE TRAY** tab (displayed in conjunction with the **EQUIPMENT** tab) allows the user to create and modify Cable Tray elements including the management of Penetrations and the import of Cable Tray.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of Cable Tray.*

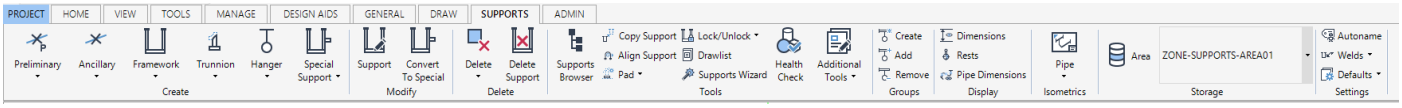
3.1.15 Structures



The discipline specific Structures tabs: **SECTIONS**, **PLATES**, **WALLS AND FLOORS** and **STAIRS LADDERS AND HANDRAILS** allow the user to create and modify a series of structural elements.

*Please refer to the **AVEVA E3D 3.1 User Documentation** and **Chapter 8 Model: General Features** for further information on the Structures discipline.*

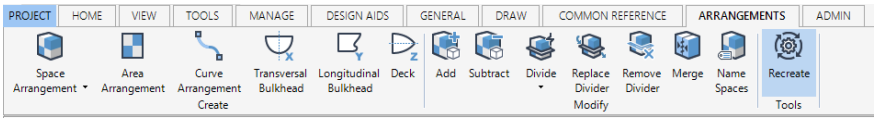
3.1.16 Supports



The discipline specific **SUPPORTS** tab allows the user to create and modify Support elements.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information.*

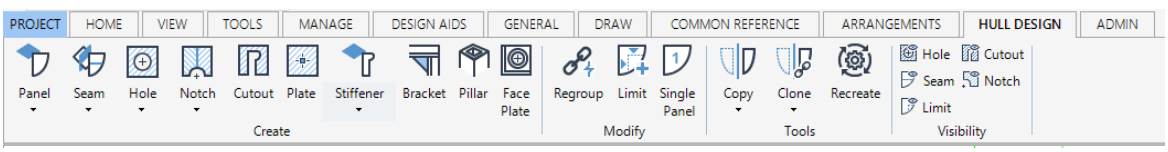
3.1.17 Space Management



The discipline specific **ARRANGEMENTS** tab allows the creation and modification of the space arrangements as well as functional area and curve arrangements.

*Please refer to the **AVEVA E3D 3.1 User Documentation** and **Chapter 7 Model: Space Management** for further information.*

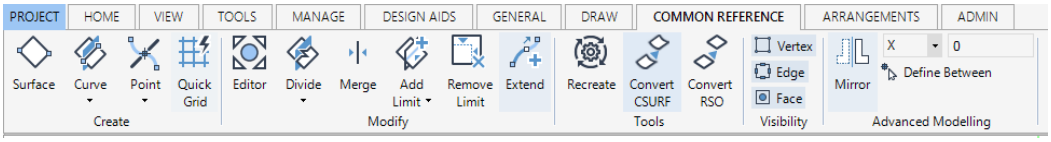
3.1.18 Hull Design



The discipline specific **HULL DESIGN** tab allows the user to create and modify Hull elements.

*Please refer to the **AVEVA E3D 3.1 User Documentation** and **Chapter 5 Model: Hull Design** for further information on the use of Hull Design.*

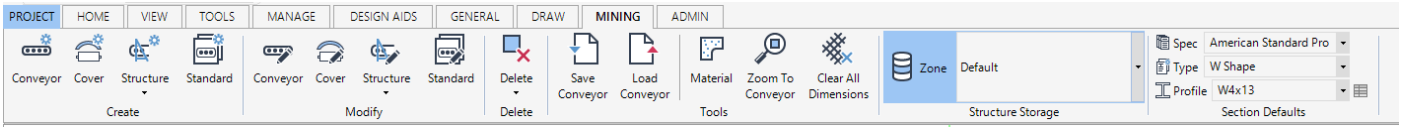
3.1.19 Common Reference



The **COMMON REFERENCE** tab allows the creation and modification of the common reference elements surfaces, curves and points.

*Please refer to the **AVEVA E3D 3.1 User Documentation**, **Chapter 5 Model: Hull Design** and **Chapter 7 Model: Space Management** for further information on the use of Common Reference functionality.*

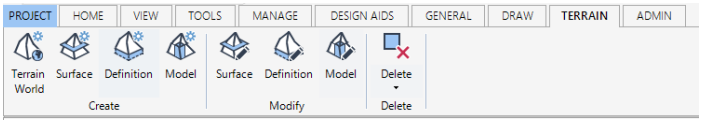
3.1.20 Mining



The discipline specific **MINING** tab allows the user to create and modify Mining elements.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of Mining.*

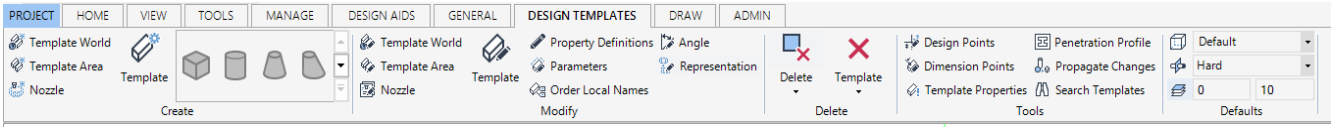
3.1.21 Terrain



The discipline specific **TERRAIN** tab allows the user to create and modify Terrain elements.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of Terrain.*

3.1.22 Design Templates



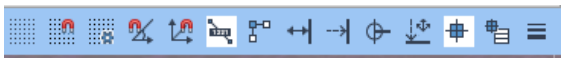
The discipline specific **DESIGN TEMPLATES** tab allows the user to create and modify Design Templates and the supporting hierarchy.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on the use of Design Templates.*

3.2 Message & Status Bar

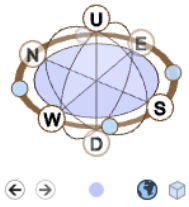
Positioned at the bottom of the user interface, the Status and Message bar displays message information, global notifications and view and selection options. The Status Bar offers a designer quick access (and feedback) to 3D View and modelling aids. For example, the user can display the 3D View Grid and select a variety of positioning options.

The status bar has been reviewed at AVEVA E3D 3.1 to account for Draw in Model functionality and a redesign of the **Object Snap** form.



*Please refer to **4.3 Positioning Elements** for further information.*

3.3 AVEVA PowerCompass™



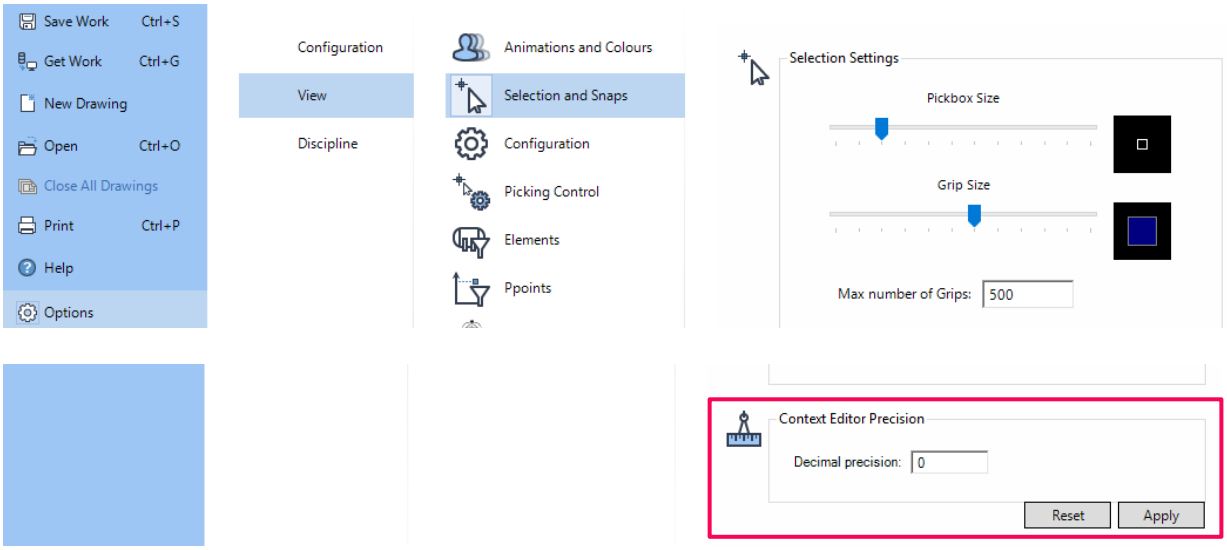
The PowerCompass is an intuitive design that allows the user to control the view direction, the working plane and to select different coordinate systems.

The PowerCompass can be moved to another area of the 3D view by using the central blue grip below the compass. As of AVEVA E3D 3.1, the position of the PowerCompass now persists between sessions.

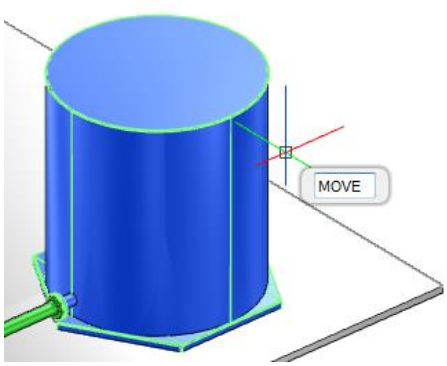
*The size / directional sense of the PowerCompass may be controlled via the **PROJECT** tab Options.*

3.4 Contextual Editor

The Context Editor has been improved at AVEVA E3D 3.1 to allow the specification of the number of decimal characters displayed. The definition is set in both Draw and Model via the **PROJECT** tab, Options menus as illustrated below. The default value is 0.



3.5 In Canvas Commands & Shortcuts



It is possible to invoke specific commands by entering them directly to the 3D View. Alternatively, a shortcut can be used to invoke a command e.g. <Ctrl+A> prompts a Select All action. The shortcut actions are, where appropriate, aligned with Microsoft Windows standard shortcuts e.g. <Ctrl+S> prompts a Savework.

The available commands and shortcuts have been extended at AVEVA E3D 3.1 with introduced functionality.

*A list of the In-Canvas Commands is presented in **Appendix B Keyboard Shortcuts & Commands**.*

4 Model: General Interactions

AVEVA E3D utilises a set of common interactions that ensure the designer's focus in on the design Model and allow design tasks to be completed in an efficient and accurate manner.

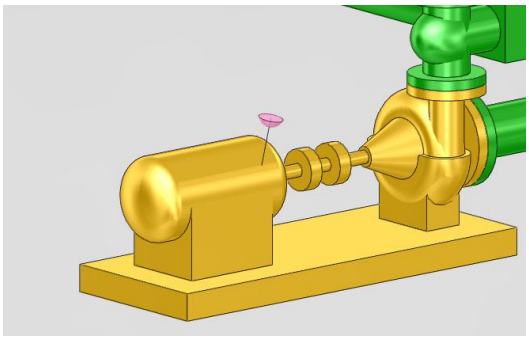
The following Chapter will outline general interactions in the Model 3D View and how they have been improved at AVEVA E3D 3.1; describing how the View content may be manipulated and controlled.

⚠ *The key Model interactions described in the following sections are also often shared with the Draw module (Draw 2D Canvas and 3D View).*

4.1 3D View Controls

The majority of the controls to manipulate the 3D View may be accessed via mouse action, including the PowerWheel, and through the **VIEW** tab user interface.

4.1.1 Rotating the 3D View



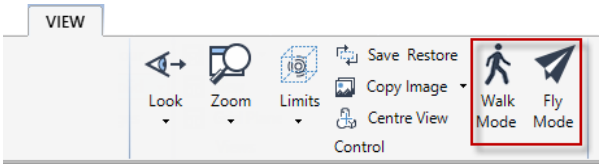
The Rotation of the model is achieved by holding the middle mouse button down and moving the mouse in a direction. By default, the rotation mode is set about the Model.

The centre of rotation is determined when the button is pressed. Its position is set where the crosshair touches an element in the 3D View. The centre of rotation will be indicated by a pink pin.

At AVEVA E3D 3.1 the model may be rotated a complete 360 degree rotation.

4.1.2 Walk & Fly Modes

In addition to the classic View Controls, the Walk and Fly Modes allow the user to visualise the 3D Model from a moving observer point of view and in perspective mode (with a 90-degree field of view). These functions are ideally suited for the navigation of the laser environment on activating the HyperBubble™.

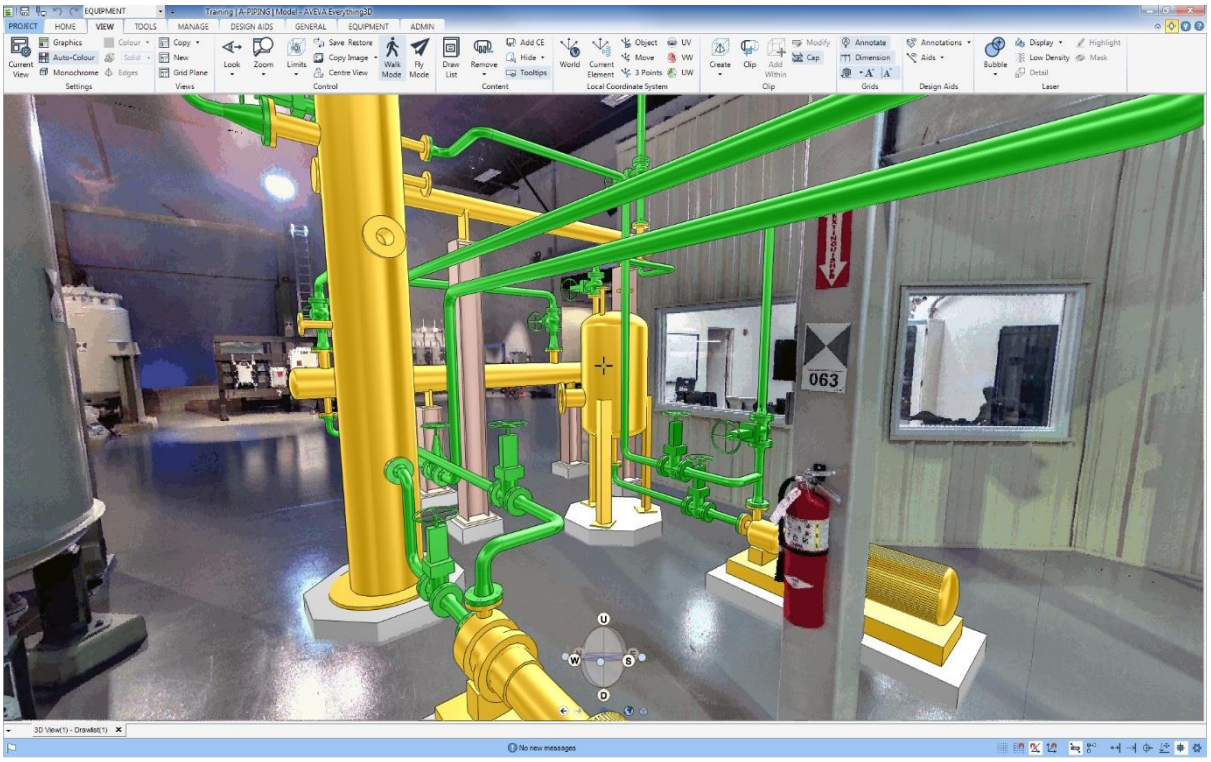


To activate or deactivate the modes, the **Walk Mode** or the **Fly Mode** toggles can be selected from the Control group of the VIEW tab.

When Laser models are displayed, enabling the Walk or Fly Modes will activate the HyperBubble™ / Solid Point Cloud mode for a increased rendering of the laser data.

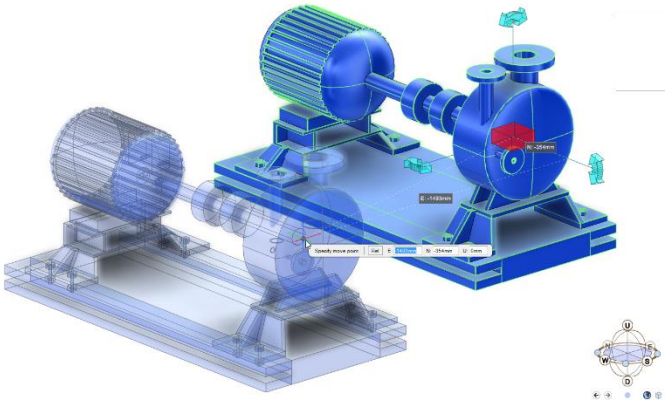
In addition to mouse interactions, AVEVA E3D 3.1 introduces the ability to use the arrow keys to walk through the model. The following controls are available:

- Up Arrow — Move forward.
- Down Arrow — Move backward.
- Left Arrow — Move left.
- Right Arrow — Move right.



*For more information about displaying Laser Data, please refer to **Chapter 9 Laser**.*

4.2 Grips & Feedback



The use of grips in the creation and modification of the 3D model together with the immediate feedback of the preview ghost image are integral to an efficient AVEVA E3D 3.1 modelling workflow. In the example here the Pump position grip (located at the pump origin) has been selected (denoted by red highlight) and the intended new position is shown by a ghost preview of the pump (and the updated Contextual Editor).

Grips are only made available where the user has write-access to modify the selected element.

4.2.1 Grip Sizes

To aid modelling when at a close zoom proximity, grips are no longer dynamically consistent in their size on a zoom operation. The conistency of the grip size may be controlled via the **PROJECT** tab, Options menus.

4.3 Positioning Elements

The recommended method to modify the position of elements is to move them in the 3D View by either:

- Using the **Editor** mode to reposition elements from their origin
- Using the **Move** command to specify a start and end position

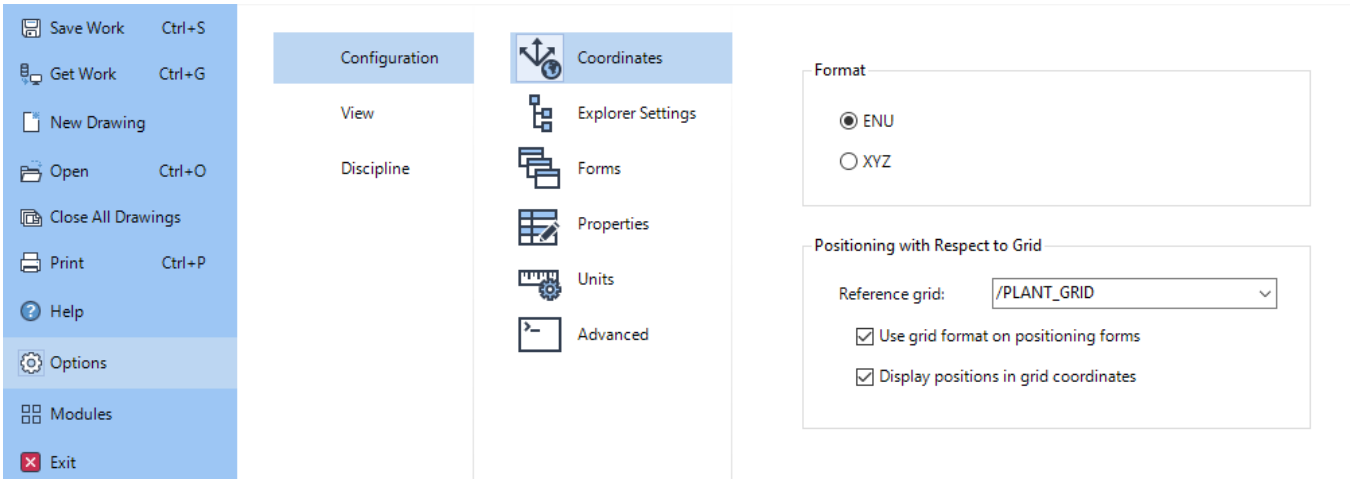
Both these methods will require the user to specify positions. It can be just one position for an absolute displacement, two positions or a vector for a relative displacement. In all scenarios, the user can specify the position by either:

- Entering coordinates directly to the Canvas Contextual Editor.
- Using the existing geometry of the model by Snapping to graphical objects.
- Using a combination of Canvas entries and Snapping.

4.3.1 Position Format

In addition to the use of XYZ and ENU coordinates, AVEVA E3D 3.1 allows the positioning of an element in respect to a grid using a grid format position / coordinate.

The Coordinates option accessed via the **PROJECT** tab, **Options** menus sets the default format to ENU (East, North, Up) or XYZ and allows the coordinates to be positioned with respect to a defined reference grid.



4.3.1.1 Positioning with Respect to Grid

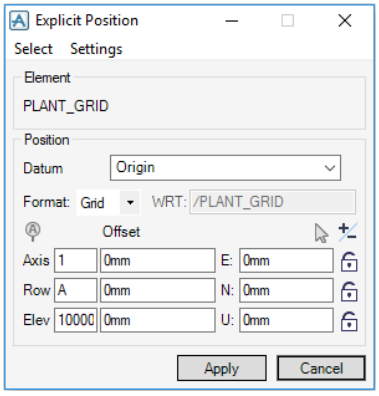
Reference grid coordinates can be used with plant and marine projects. The Reference Grid from which the coordinates are derived is defined through selection from the Reference Grid options list e.g. in the example above /PLANT_GRID has been selected.

- **Use Grid Format on Positioning Forms**

Select the checkbox to display positioning forms with coordinates derived from the selected reference grid.

- **Display Positions in Grid Coordinates**

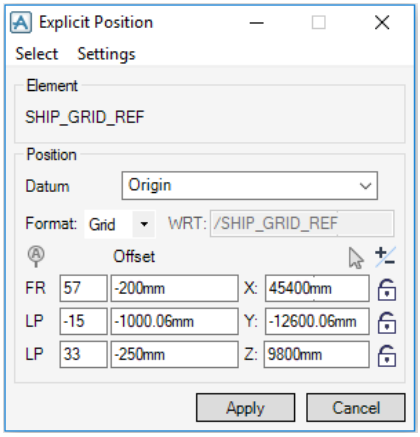
Select the checkbox to display positions across the application, including the coordinates fields in positioning windows, with position values measured from the nearest grid. The example displays a referenced plant grid for explicit positioning.



The plant grid coordinates can be defined using Axis, Row and Elevation directions. Positive and negative values can be used.

The position format gadget labels are dependent on each GRIDFA's GRDLBL attribute e.g. Axis, Row and Elev.

The example displays a referenced ship grid for explicit positioning.



The ship grid coordinates can be defined using Frame Positions and Longitudinal Positions.

The Position Format control has the following features:

- **Display Positions as Absolute Values**

Clicking the option populates the coordinates fields with absolute position values measured using the current coordinates system.

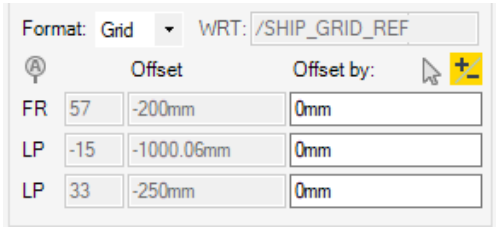
- **Display Positions as Offset from nearest Grid Plane**

Clicking the option populates the coordinates fields with position values measured from the nearest grid plane.

- **Pick Position**

Clicking the option populates the coordinates fields with position values measured from a picked position in the 3D view.

- **Offset**

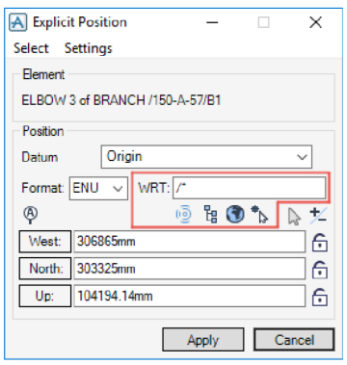


Clicking Offset modifies the position of the coordinates by an offset measured from the original position. Click Return from offset mode to exit the offset display.

- **Lock**

Toggle to lock and unlock the coordinates in a specified field; the position values cannot be modified.

4.3.1.2 WRT

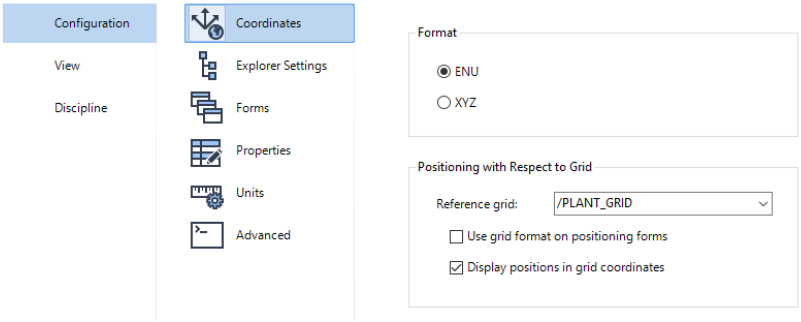


The With Respect To (WRT) field can be used to define an element from which the coordinates are derived.

The name of the required element can be modified explicitly; other options are also available:

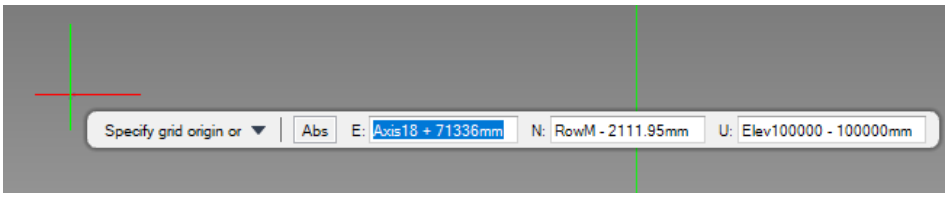
- **CE** Click to identify the required element in the Model Explorer as the CE.
- **CE Owner** Click to identify the required element in the Model Explorer as the CE's Owner.
- **World** Click to identify the required element in the Model Explorer as the world.
- **Picked Element** Click to identify the required element as the picked element in the 3D view when prompted.

4.3.1.3 Display positions in grid coordinates

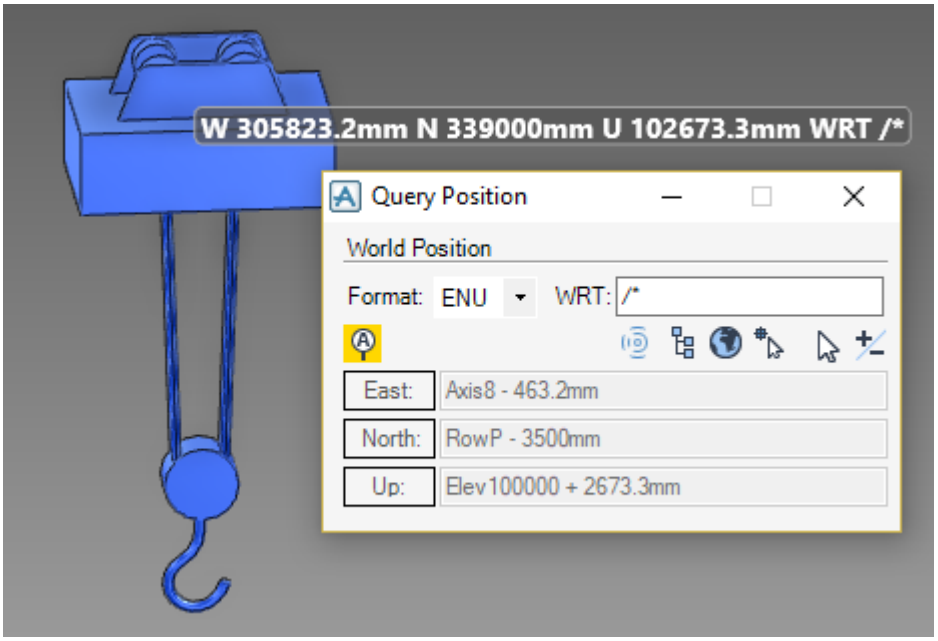


When the option **Display positions in grid coordinates** is enabled in the backstage, certain positions will automatically be formatted with respect to the nearest plane of the selected reference grid.

In CIE operations, this appears as:



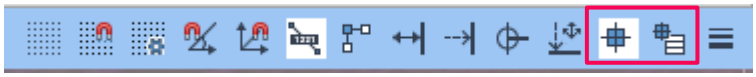
In positioning forms, it appears as:



In the Properties Grid, it appears as:

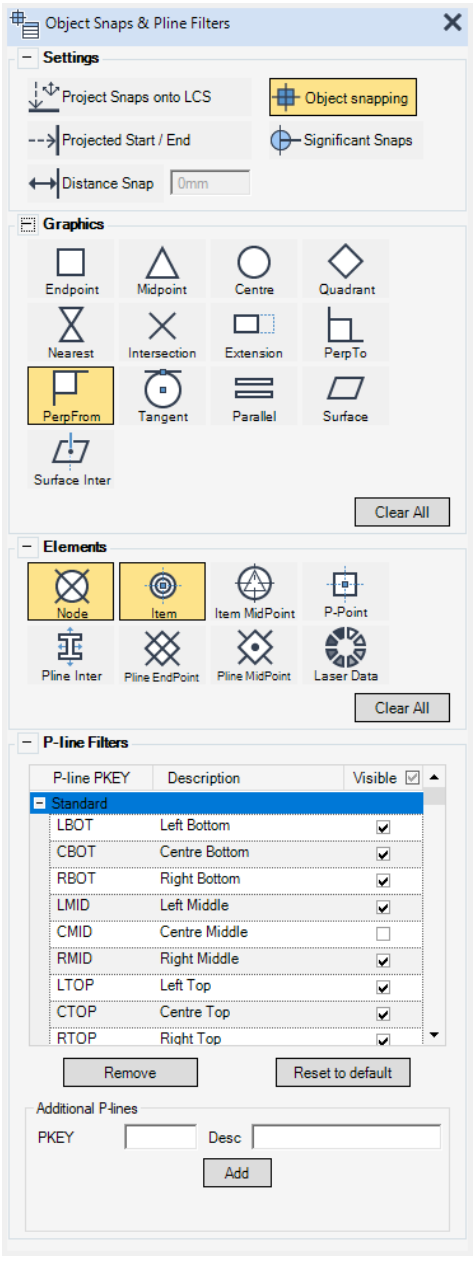
Positional	
Orientation	Y is W and Z is U
Position	Axis8 RowP - 3250mm Elev100000 + 4042.6mm
E	Axis8
N	RowP - 3250mm
U	Elev100000 + 4042.6mm

4.3.2 Object Snapping



To activate or deactivate the object snapping, press the <**F3**> key or click on the correspondent toggle in the Status Bar.

The object snapping filters may be configured using the **Object Snaps & Pline Filters** form. The form has been redesigned at AVEVA E3D 3.1.

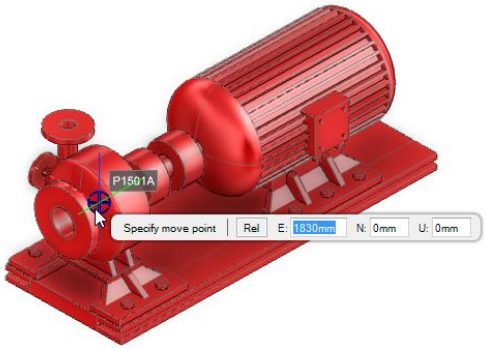


The redesigned **Object Snaps & Pline Filters** form has been arranged to present all salient object snaps and (pline filters) in a single form, that can be docked to the side of the 3D View canvas for contiuned use.

The **Graphics** section offers filter options to activate graphical snaps e.g. **Endpoint** or **Midpoint**.

The **Elements** sections offers filter options to activate the snapping to database elements e.g. **Item** or **P-Point**.

Each snapping filter is associated with a specific snap icon as represented on the **Object Snaps & Pline Filters** form. When the system prompts the user to specify a point, hovering the mouse close to an item included in the selected snap filters will display the associated snap icon on the item.



In the example here, the item object snap has been highlighted.

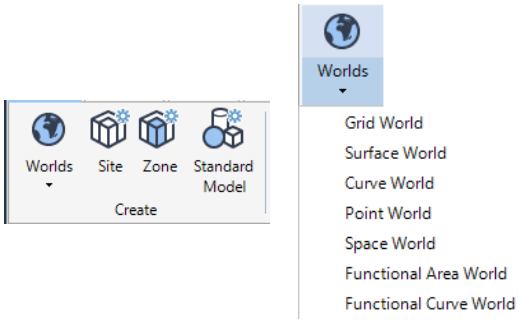
Left clicking when the snap icon is displayed will validate the position at the exact location of the Snapping position.

Also, it is possible to invoke a specific snap filter temporarily to define a specific position regardless of Object Snapping being active. This is achieved by right clicking in the 3D View while holding the <**Shift**> key to invoke the Object Snap PowerWheel and selecting an appropriate Object Snap option.

The PowerWheel presents the principal Element Object Snap options such as Item or P-Point.

Gesturing to the **More** tile will open a secondary PowerWheel. The secondary PowerWheel presents the principal Graphics Object Snap options such as Endpoint or Midpoint.

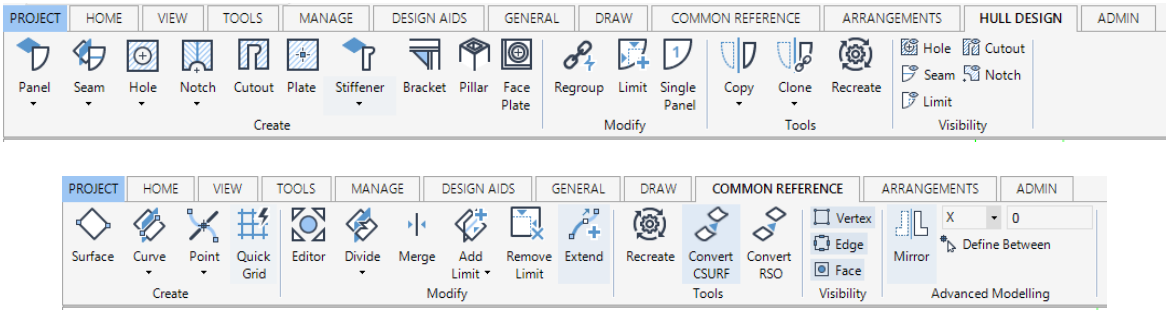
4.4 Application World



Application world elements can be created using the functions available via the **World** options in the **Create** group of the **GENERAL** tab.

5 Model: Hull Design

The introduced Hull Design application to the AVEVA E3D 3.1 product supports the design of a new hull model, with detailing up to a structural design level. The features therein also support the modelling of common global reference data i.e. surfaces, curves and points, and the modelling of arrangements used for blocks and scantling data.

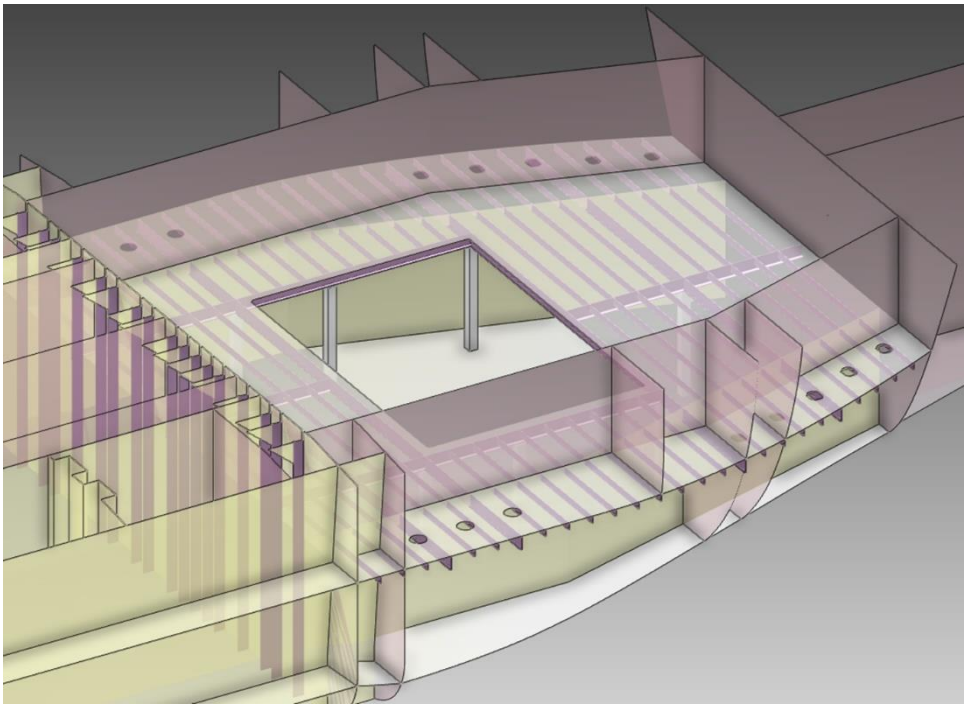


*Please refer to the **AVEVA E3D 3.1 User Documentation** for further detailed information on the use of Hull Design*

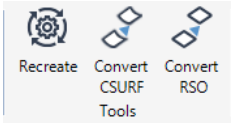
5.1 Highlights

Highlights of the hull design application include the following:

- Tools and functions to model a common reference model, i.e. surfaces, curves and points.
- One-click concept - Panels and panel components modelled with few clicks.
- Detailing by using the Properties Grid.
- Copied and cloned panels.
- Panel properties inherited from arrangements.



5.2 Interoperability



Sculptured surfaces used in AVEVA Hull & Outfitting 12.1.SP5 can either be converted in AVEVA E3D using the function **Convert CSURF** in the **Tools** group of the **COMMON REFERENCE** tab or the surface can be released into AVEVA E3D 3.1 using, for example, AVEVA Surface Manager.

RSOs created in AVEVA Hull & Outfitting 12.1.SP5 can be converted into polyface surfaces using the **Convert RSO** function in the **Tools** group of the **COMMON REFERENCE** tab.

⚠ *The conversion does not consider any functional data that may have been added to the RSO.*

Please note the following interoperability considerations:

- Polyface surfaces created in AVEVA E3D 3.1 are not available in AVEVA Hull & Outfitting 12.1SP5.
- Curves and points created in AVEVA Hull & Outfitting 12.1.SP5 are not available for use in AVEVA E3D 3.1.
- Curves and points created in AVEVA E3D 3.1 are not available for use in AVEVA Hull & Outfitting 12.1.SP5.
- Space arrangements created in AVEVA E3D 3.1 can be used as read-only in AVEVA Hull & Outfitting 12.1.SP5.
- Space arrangements created in AVEVA Hull & Outfitting 12.1.SP5 can be used as read-only in AVEVA E3D 3.1.
- Area and curve arrangements created in AVEVA E3D 3.1 are not available for use in AVEVA Hull & Outfitting 12.1.SP5.
- Hull panels created in AVEVA E3D 3.1 are not available for use in AVEVA Hull & Outfitting 12.1.SP5.
- Hull panels created in AVEVA Hull & Outfitting 12.1.SP5 can be used as read-only in AVEVA E3D 3.1.

5.2.1 Interoperability with Hull & Outfitting 12.1.SP5

The following Hull components can be created in AVEVA Hull & Outfitting 12.1.SP5 and used as read-only in AVEVA E3D 3.1

ELEMENT TYPE	ELEMENT TYPE
CPLATE	Shell plate
CSTIFF	Shell stiffener
CSURF	Surface
FEBEAM	Finite Beam Element
FEFRED	Finite Free Edges Element
FESHEL	Finite Shell Element
FETRUS	Finite Truss Element

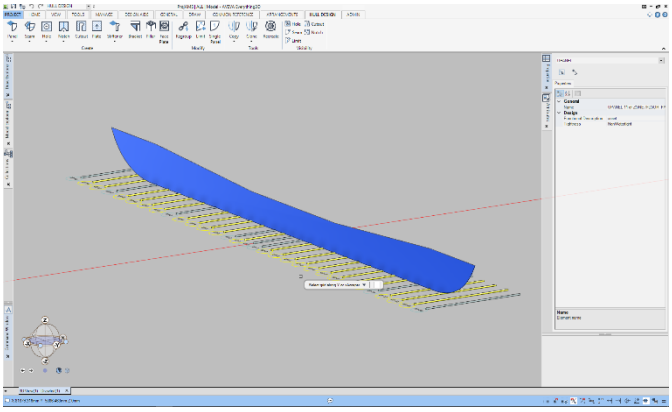
HBEAD	Planar panel bead
HBRCKT	Planar panel bracket
HCLIP	Planar panel clip
HCTOUT	Planar panel cutout
HDOPLA	Planar panel doubling plate
HFLANG	Planar panel flange
HPANEL	Planar panel
HPILLR	Planar panel pillar
HPLATE	Planar panel plate
HSTIFF	Planar panel stiffener

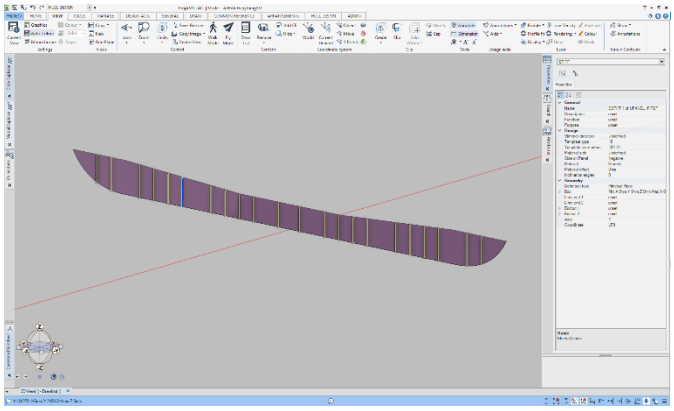
5.3 Modelling

5.3.1 One-click

The 'One-click' concept is to generate visible results in the 3D canvas with as few user interactions as possible.

In the Hull Design application, this means that any hull component will be presented as soon as necessary location information is given e.g. once a stiffener trace is available it will be presented. Remaining properties will be derived from the functional model or system default values will be used. Once the hull component is presented in the 3D View it can easily be updated with correct properties using the **Properties Grid**.



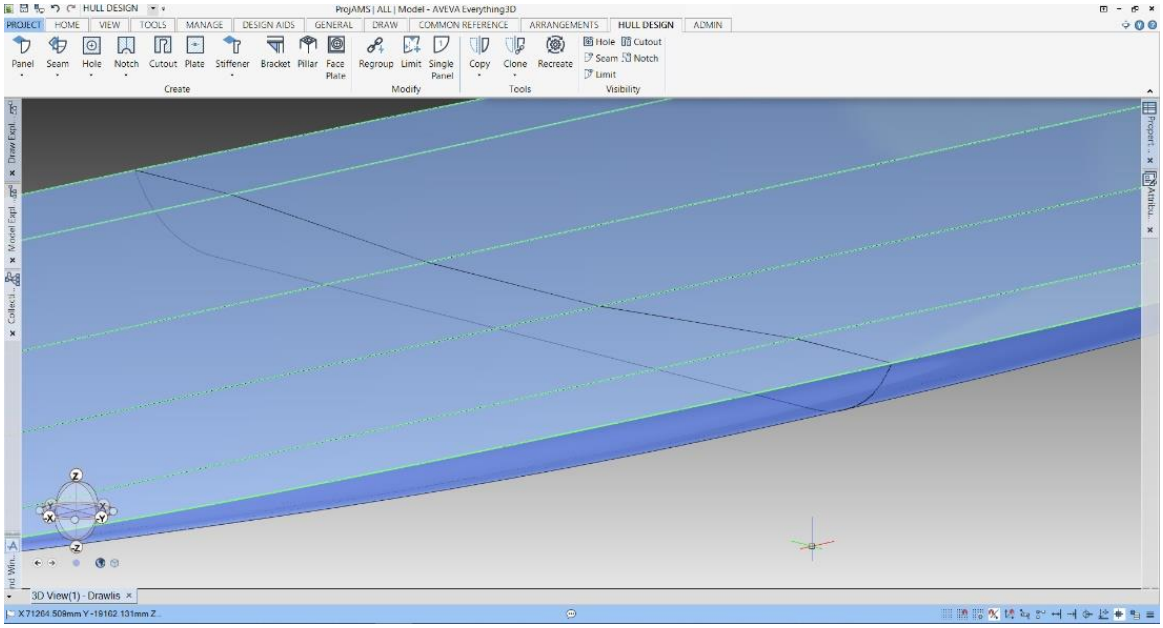


5.3.2 Project Envelopes

A hull panel will be automatically bounded when created and later refined by adding bounding limits to the definition. A panel located in a surface will first be bounded by the location surface and secondly by envelopes. Panels generated in a grid plane or in an absolute coordinate will be automatically bounded by envelopes.

The project envelope is by default a box, calculated and automatically defined, from the extensions of the ship grid. The project envelope can be changed as required.

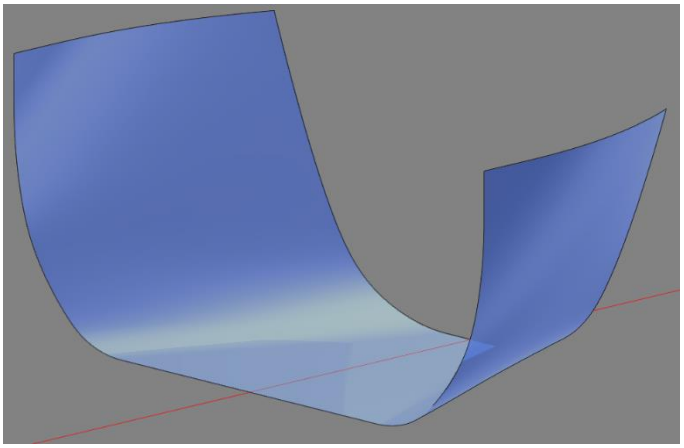
In the scenario where the panel is added to a zone which has a connected space (defining the block shape), the space will be used as bounding envelope. If no space is available, then the panel is instead bounded by the project envelope.

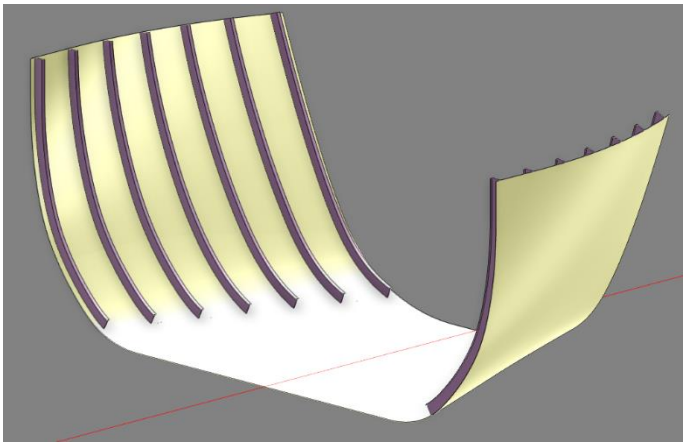


*This is further explained in the **AVEVA E3D 3.1 Hull Design user documentation.***

5.3.3 Locations

A Hull Panel location can be defined in any plane using absolute coordinates but is preferably defined with reference to the common reference model, i.e. a grid position or a surface to get a topological model that can be easily maintained and modified. If the location is a surface, then the shape of the surface defines the shape of the hull panel, i.e. planar, knuckled or curved.

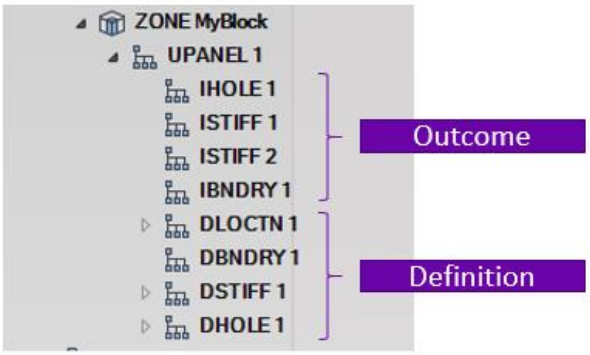




5.3.4 Definition and Outcome

A Hull panel consists of a definition that is capturing the designer's intentions to get all hull components within the hull panel topological and easy to change and maintain. The definition can at any time be recreated to get a hull panel instance that can be viewed in the 3D canvas. The concept a definition and an outcome (the instance) is allowing for

hull panel adaptations to any changes in the surrounding elements, which is making changes to the hull model fast and simple.



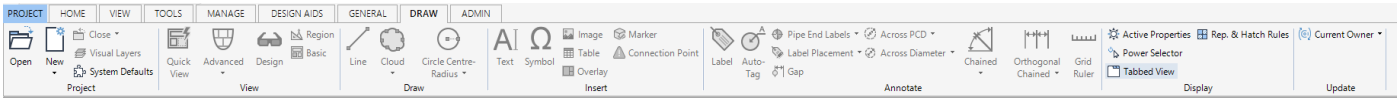
5.4 Standards

The Hull Design application in AVEVA E3D 3.1 utilizes built-in standards for profiles, holes, notches, cutouts and clips. The built-in standard for profiles, holes and notches is the same built-in standard as in AVEVA Hull and Outfitting 12.1.SP5. The built-in cutout standard is new to AVEVA E3D 3.1 to support basic slot and lug configuration in structural design.

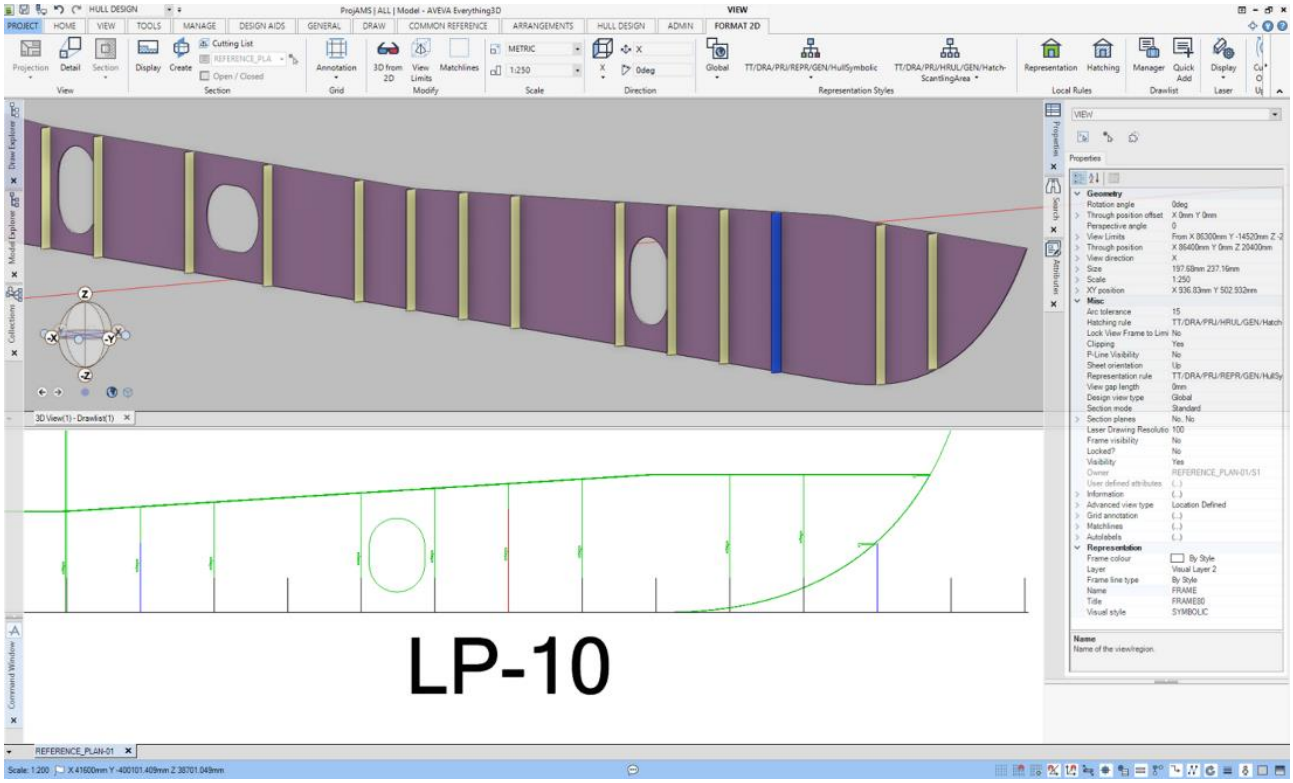
⚠ *Brackets created in AVEVA E3D 3.1 are standard brackets with user-defined armlengths. A full bracket standard is not currently available.*

6 Model: Draw in Model

Draw in Model is a new capability within AVEVA E3D 3.1 that enables the usage of Draw functions inside Model, making it possible to view, create and modify drawings. A selection of Draw functions is available in a new DRAW ribbon tab.



Activating Draw in Model will make it possible to see both the 3D canvas and the 2D drawing canvas at the same time.



6.1 Configuration

The visibility and use of the Draw tab in Model can be controlled via the following actions:

- The Model application must have access to Draw (PADD) databases. Read access allows a user to open and view drawings and write access allows a user to create and modify drawings. Access and control (module definition) are defined via AVEVA Administration for an identified project.
- The MDB in use must have access to a Draw (PADD) database. To create new drawings or modify existing drawings the current user must have write access.
- The windows environment variable “AVEVA_E3D_DRAWINMODEL” must be set to TRUE when starting Model. This can be added to the “evars.ini”, “evars.bat” or “custom_evars.bat” for instance. This will activate Draw in model for all projects. In case you would like to activate it only for a specific project this can be done in the “project_evars.bat”.

6.2 Partial Update Design

When modelling it is preferred to see all changes made to the model directly in the drawing. To accommodate this, without affecting performance, a partial update design functionality has been developed.

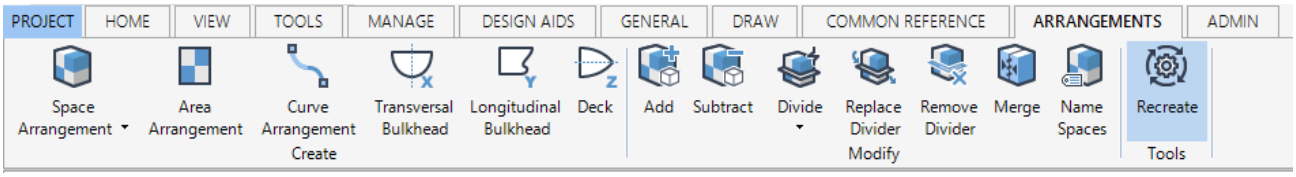
The mode is activated via the toggle in the Status Bar and affects the Current Owner View. When changes are made to the model only the changed elements are redrawn if they exist in the view or added to the view if newly created, allowing for immediate feedback not only in the 3D view but also in the drawing. When all changes have been made a full update design can be performed on the view if necessary.

6.3 Properties Grid

It is possible to select elements in the drawing and see the properties in the Propeties Grid both in Model and Draw. This is achieved by selecting one or multiple views and using the **IN** in-canvas command. All other views will be greyed out. To exit this mode, use the **OUT** in-canvas command or the <Esc> button.

7 Model: Space Management

The Space Management application available in AVEVA E3D 3.1 enables the design of functional arrangements; spatial as well as area and curve based. These arrangements are the bearers of functional properties (e.g. scantling and insulation information) which can be used in, for example, reports and drawings, and in downstream modelling activities. To build these arrangements, the ability to create common stable geometrical references in the form of points, curves and surfaces is also available in this application. The functionality made available through the arrangements can be used for 3D coordination as well as automating parts of the modelling work.

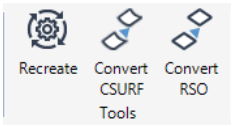


7.1 Highlights

Highlights of the space management application include the following:

- Tools and functions to model a common reference model, i.e. surfaces, curves and points.
- Tools and functions to model space arrangements by subdividing a volumetric envelope into spaces. Add, subtract and merge operations allow for creation of complex shapes. Space arrangements are made functional to serve a specific purpose e.g. a layout arrangement.
- Tools and functions to support extraction of model data within a space and calculations on the exact content within the space. The results of such calculations are possible to store in the database for further processing and reporting.
- Tools and functions to model area arrangements by subdividing a surface into functional areas and supporting merge operations. Area arrangements are made functional to serve a specific purpose e.g. an insulation arrangement.
- Tools and functions to model curve arrangements by subdividing a curve into functional curve branches and supporting merge operations. Curve arrangements are made functional to serve a specific purpose e.g. a seam arrangement.

7.2 Interoperability



Sculptured surfaces used in AVEVA Hull & Outfitting 12.1.SP5 can either be converted in AVEVA E3D using the function **Convert CSURF** in the **Tools** group of the **COMMON REFERENCE** tab or the surface can be released into AVEVA E3D 3.1 using, for example, AVEVA Surface Manager.

RSOs created in AVEVA Hull & Outfitting 12.1.SP5 can be converted into PolyFace surfaces in AVEVA E3D 3.1 using the **Convert RSO** function in the **Tools** group of the **COMMON REFERENCE** tab.

⚠ *The conversion does not consider any functional data that may have been added to the RSO.*

Please note the following interoperability considerations:

- Polyface surfaces created in AVEVA E3D 3.1 are not available in AVEVA Hull & Outfitting 12.1SP5.

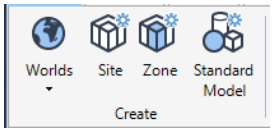
- Curves and points created in AVEVA Hull & Outfitting 12.1.SP5 are not available for use in AVEVA E3D 3.1.
- Curves and points created in AVEVA E3D 3.1 are not available for use in AVEVA Hull & Outfitting 12.1.SP5.
- Space arrangements created in AVEVA E3D 3.1 can be used as read-only in AVEVA Hull & Outfitting 12.1.SP5.
- Space arrangements created in AVEVA Hull & Outfitting 12.1.SP5 can be used as read-only in AVEVA E3D 3.1.

7.3 Model Hierarchy

The top element of any created arrangements is a world element, specific to the type of arrangement, i.e. if the arrangement is a space, area or curve arrangement.

The administrative elements are:

- SPMSW for space arrangements.
- FNCAW for area arrangements.
- FNCCW for curve arrangements.



The different world elements can be created using functions in the **World** creation options list in the **Create** group of the **GENERAL** tab.

7.4 Modelling Principles

The modelling of any arrangement is based on the principle of automatic subdivision of an envelope to create a cohesive model with no accidental void areas and with fast response on any geographical question, e.g. what is on the other side of a space limit. The subdivided model can then be refined by merging or by adding or subtracting elements.

7.4.1 Envelopes

The space arrangement envelope is a closed volume, generated from surfaces and planes forming a closed volume, a primitive definition or a space from a space arrangement.

- The area arrangement envelope is a surface.
- The curve arrangement envelope is a curve.

7.4.2 Automatic subdivision

The automatic subdivision of the envelope uses elements from the common reference model, i.e. surfaces, planes, curves and primitives. Thus, the actual modelling work of the arrangement is performed when creating and modifying these common reference elements.

⚠ *Arrangements, created for different purposes, can share references to the same common reference elements.*

7.4.3 Definition and Outcome

A functional arrangement is created by several operations: dividing, merging, adding and subtracting. Typically, a larger volume is subdivided by surface or grid elements and then further refined by adding or subtracting of other volumetric elements.

All these operations (and the order of them) represents the definition data of the arrangement. The actual arrangement created is the geometrical outcome of the definitions. A change of an arrangement is made by changing the definition or by changing the underlying elements that are referenced by the definition data. If an underlying surface, used as definition data in one or several arrangements, is changed then a new updated arrangement can be presented by a simple recreate operation.

7.5 Using Arrangements

Arrangements can contain functional data allowing the arrangement to be specialized for a specific function. The pre-defined set of attributes, described in detail in the AVEVA E3D 3.1 documentation, is based on the type of arrangement, which is set on the owning world element.

⚠ *The type of arrangement is set in the **Properties Grid**.*

7.5.1 Space arrangements types

The following are Space Arrangement Types:

- Generic.
- Compartment.
- Layout.
- PaintingArea.
- ProductionBlock.
- Zones.

7.5.2 Area Arrangement Types

The following are Area Arrangement Types:

- Generic.
- Scantling.
- Openings.
- Insulation.
- PaintingAreas.

7.5.3 Curve Arrangement Types

The following are Curve Arrangement Types:

- Generic.
- DesignSeam.
- ProfileTrace.

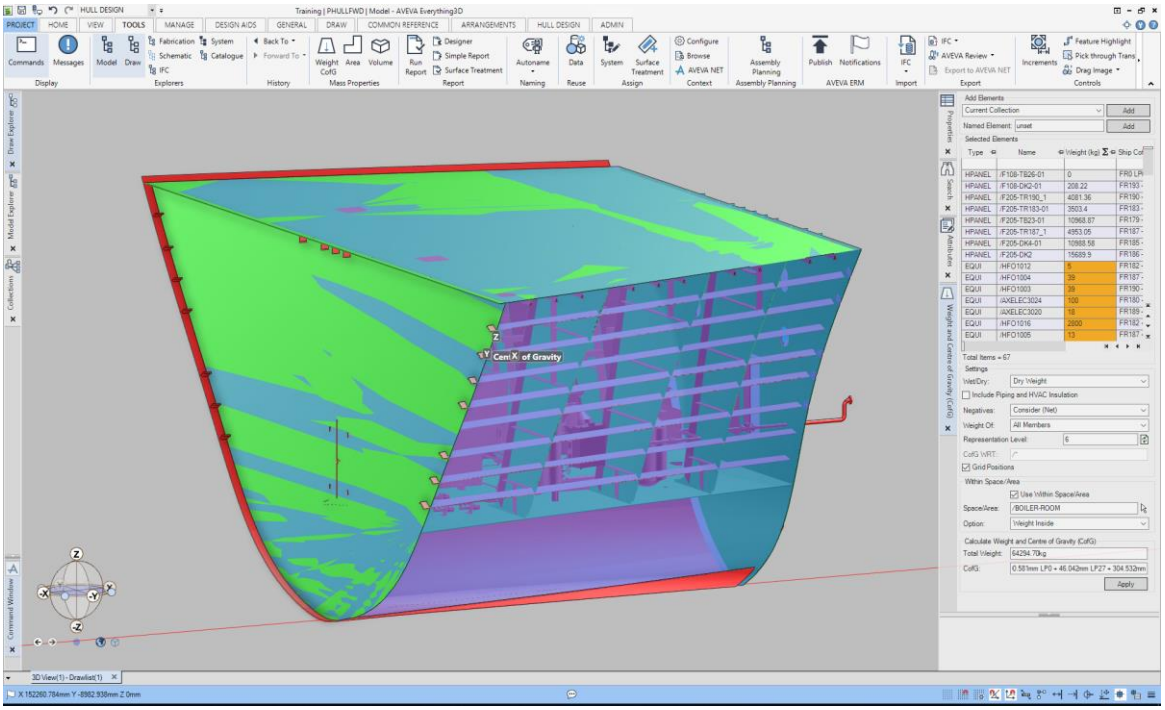
7.5.4 Navigating Arrangements

Navigation in space arrangements, to programmatically find a space within an arrangement from a given point or to find the space on the other side of a space face, is supported through the implementation of pseudo attributes.

*The pseudo attributes are described in detail in the **AVEVA E3D 3.1 user documentation**.*

7.5.5 Calculations

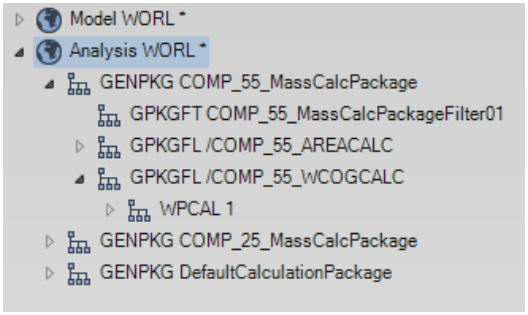
The space geometry can be used for searching and selecting elements from any discipline. The Search tool is activated (as a side pane) from the function Search in the **Search** group of the **Home** tab. The tool can be used to search exactly within the shape of a given space. Once a selection of elements is available, it can be used for mass calculations.



The mass property functions: Volume, Area and Weight and Centre of Gravity, can be found in the group **Mass Properties** of the **Tools** tab. Each of the mass property functions activates a side pane where a space can be referenced, and a calculation can be defined to only calculate exactly within this given space.

Calculation results can be stored in the Analysis database using a right-click menu on the calculation result.

7.5.6 The Analysis database



The Analysis database and read/write access is setup in AVEVA Administration. Analysis data, stored in the Analysis database, is organized in packages (GENPKG) and folders (GPKGFL). Each element has a filter rule that automatically sorts analysis data into the wanted package and folder; either created in advanced or automatically when storing. Mass property results, calculated within a space, is stored in a package automatically created per used space and in a folder automatically created for each mass property calculation.

The stored calculation results can be reported on using the Report tool or used by AVEVA Engineering products.

8 Model: General Features

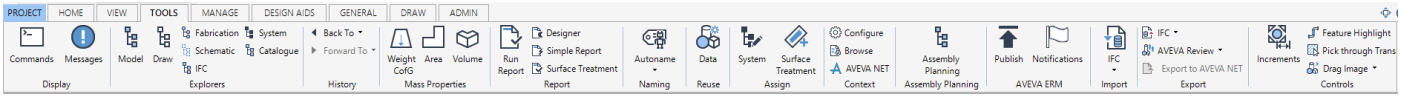
In addition to the principal development areas of AVEVA E3D 3.1 several improvements have been made across the Model disciplines, the following Sections outline a few such improvements.

*For further details on improvements made at AVEVA E3D 2.1 update releases, please refer to the **AVEVA Everything3D™ 2.1.0 Fix Release Documentation**.*

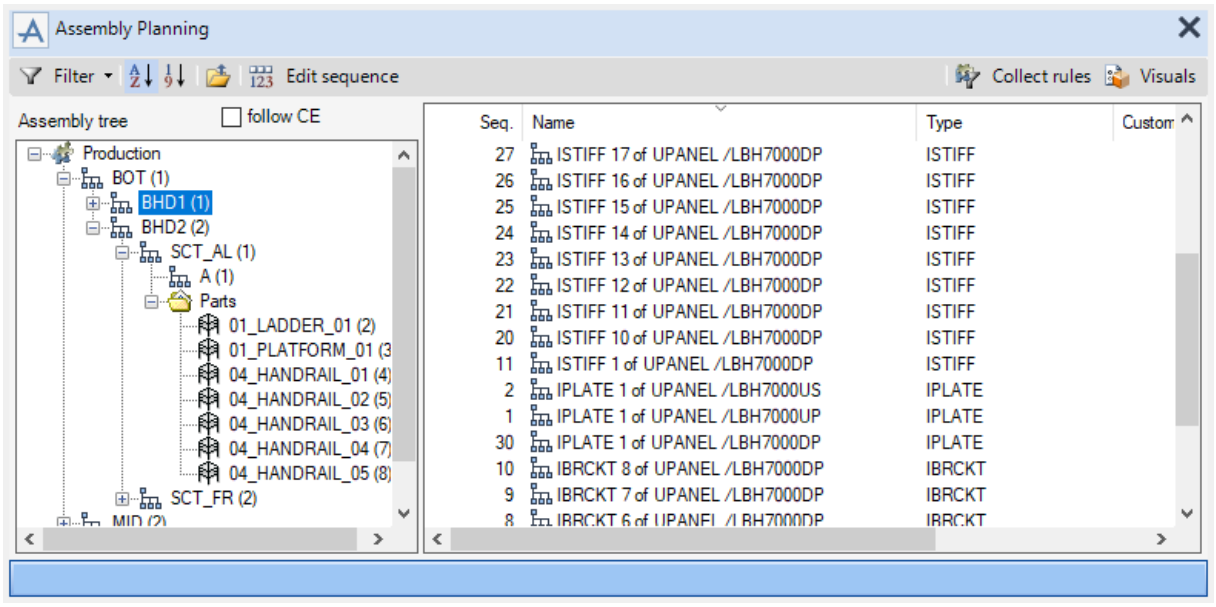
8.1 Assembly Planning

The Assembly Planning application has been introduced at AVEVA E3D 3.1. The appliaction is aligned with the content and functionality found in AVEVA Hull and Outfitting 12.1.SP5. The Assembly Manager provides functionality to manage the production breakdown structure of the design and supports the definition of the build strategy; including the creation of assembly production information.

Assembly Planning functionality is accessed from the **TOOLS** tab.



A typical **Assembly Planning** (form) session is shown below:



*Assembly Planning is described in detail in the **AVEVA E3D 3.1 documentation** and training material.*

8.2 Piping

The Piping application has been improved at AVEVA E3D 3.1 with the following functional improvements.

8.2.1 Component Editor: Alignment

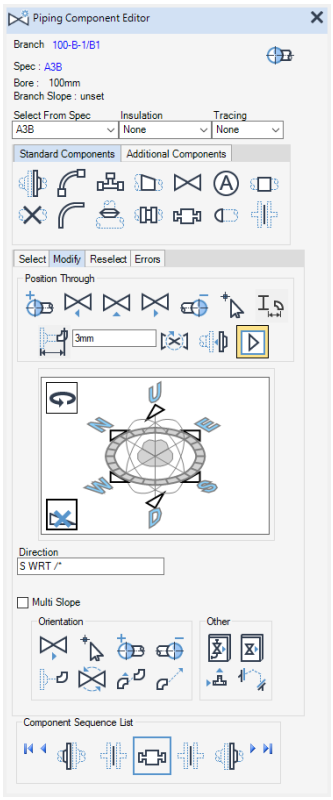
The Editor tool in AVEVA E3D has a feature whereby a user can position a component relative (aligned) to a feature; including an offset if required.

- **Align with feature** allows a user to align the component currently selected with the Editor with other objects in the 3D View such as structural members. Alignment can be aided using the graphical aids where the bottom of the pipe and any insulation can be accounted for.

- **Offset from feature** mirrors the align feature but further allows the specification of an offset from the identified feature.

Documentation for this functionality can be found in the AVEVA E3D user documentation: Editor > Model Editor Handle > Position and Orientate.

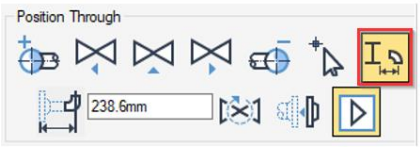
At AVEVA E3D 3.1 the described alignment features have also been made available directly from the Pipe application **Piping Component Editor** form.

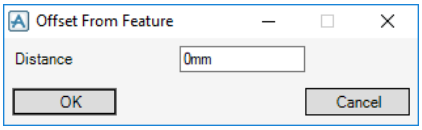


The **Position Through** area of the **Modify** tab has been updated with changes to the behaviour of the **Position with a cursor pick** button and the inclusion of a new button **Position with offset**.

- The **Position with a cursor pick** button now initiates the same functionality as the **Align with Feature** function of the Editor.

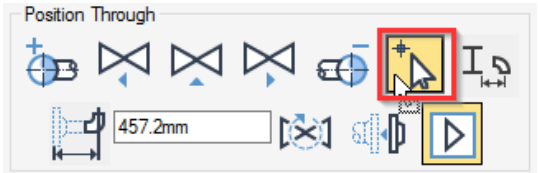
- The new **Position with Offset ON/OFF** button toggles to specify whether align with an offset is applied or not. With a positive toggle the **Offset from Feature** form is displayed on clicking the **Position with a cursor pick** button.



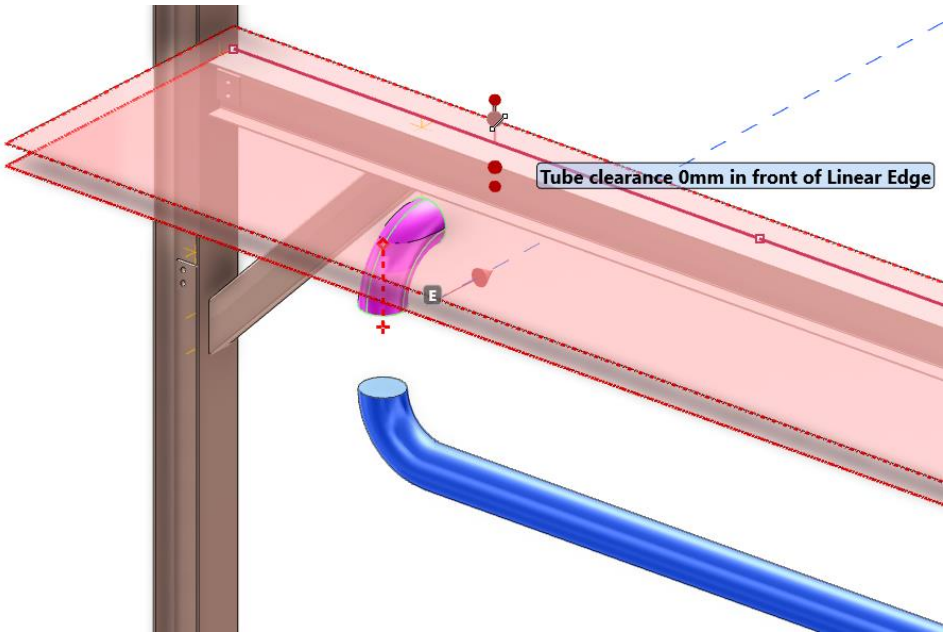


8.2.2 Component Editor Form: BoP/ToP Dumbells

Expanding on the functionality of the **Piping Component Editor** form to be aligned with the features available with the Editor, the **Position Thro cursor pick** button has been improved to allow for the O.D of the pipe and any applied insulation.



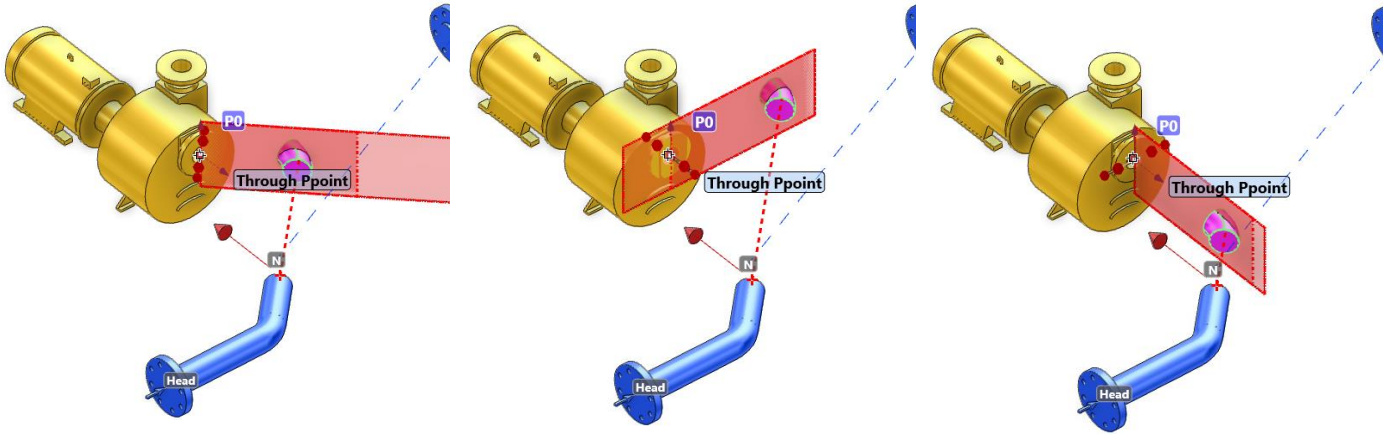
When indicating a position in the **3D View** the corresponding **Bottom of Pipe** / **Top of Pipe** solution can be selected



8.2.3 Component Editor Form: Use of 'P' Key

The **Position Through** form available at AVEVA E3D 2.1 and displayed when there is more than one solution for a selected position, i.e. for non-orthogonal routes, is no longer used at AVEVA E3D 3.1. Instead, the user can press the <**P**> key to cycle through the possible solutions.

For example:

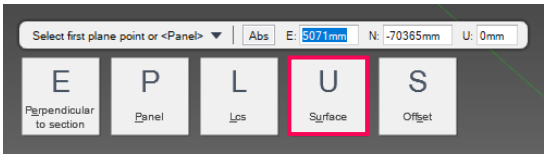


8.3 Structures

The Structures application has been improved at AVEVA E3D 3.1 with the following functional improvements.

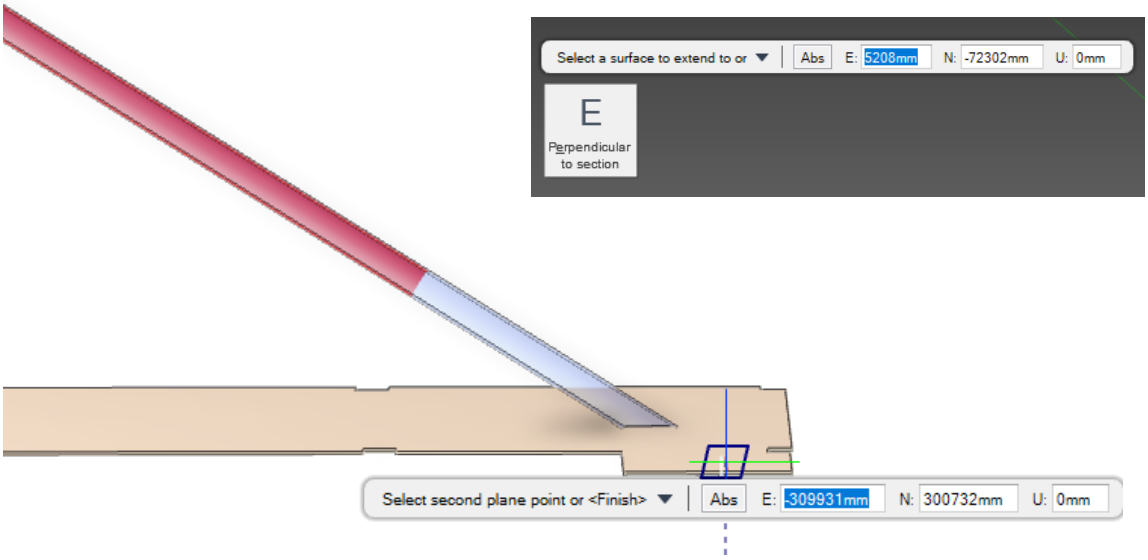
8.3.1 Extend Section to Surface

The extension function for GENSEC elements has been enhanced to allow the extension point to be defined by a surface pick.



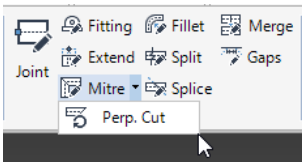
On invoking the Extension command the context editor presents a new option tile to set a surface pick.

On selecting the Surface option, the context editor updates to allow surface selection and offers the option, via an option tile, to cut the section end parallel or perpendicular to the surface.



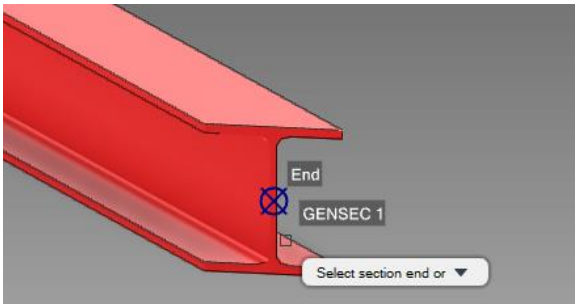
8.3.2 Section End Cut Reset

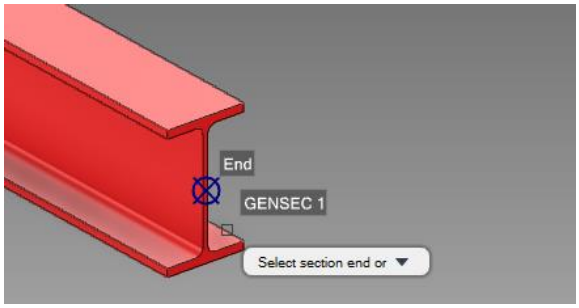
As part of the Structures application **Mitre** function, it is now possible to efficiently reset a Section (GENSEC) start cut or end cut to square, or 'perpendicular'.



A new button called **Perp. Cut** has been introduced beneath the **Mitre** button in the **Modify** group of the **SECTIONS** tab.

On selecting the option, the button launches a graphical operation requesting the user selects a GENSEC end to apply the perpendicular cut to. After selecting the GENSEC start or end the perpendicular cut is applied and the operation continues to be available for further selection until dismissed.





8.4 Equipment

The Equipment application has been improved at AVEVA E3D 3.1 with the following functional improvements.

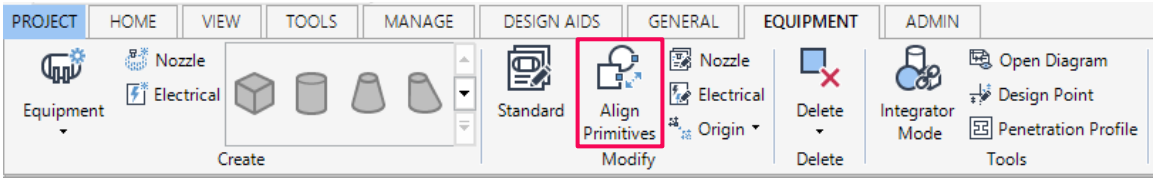
8.4.1 Primitive Align & Rotate.

The **Align Primitives** function enables the alignment of one primitive with another using a graphical operation. The operation involves selecting a P-Point from two different primitives. The first primitive is moved and rotated so that the two identified P-Points are at the same position, pointed towards each other.

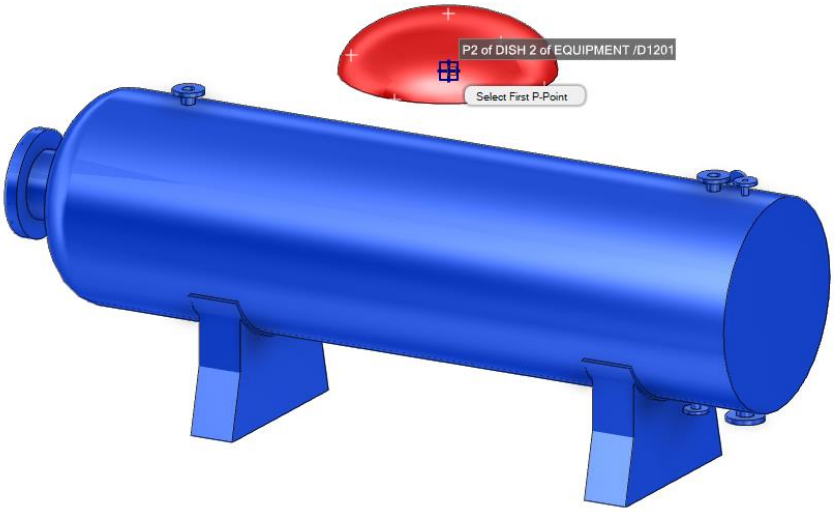
The result of the function is identical to the CONNECT command for Primitive Element Connection.

⚠ *The default orientation of Extrusion and Revolution P-Points may prohibit the intended primitive alignment.*

The function is instigated by clicking the **Align Primitives** button in the **Modify** group of the **EQUIPMENT** tab.



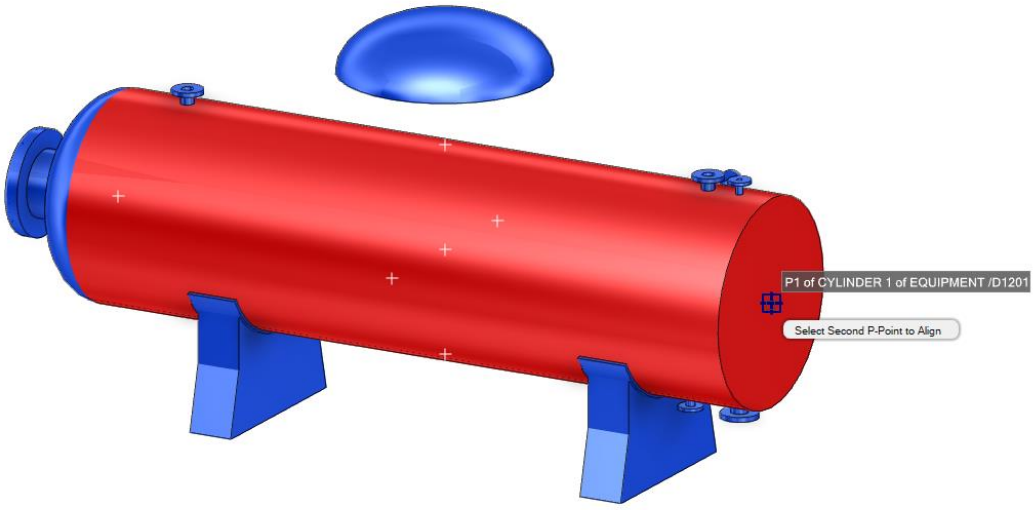
On invoking the function, the user is prompted to Select First P-Point.



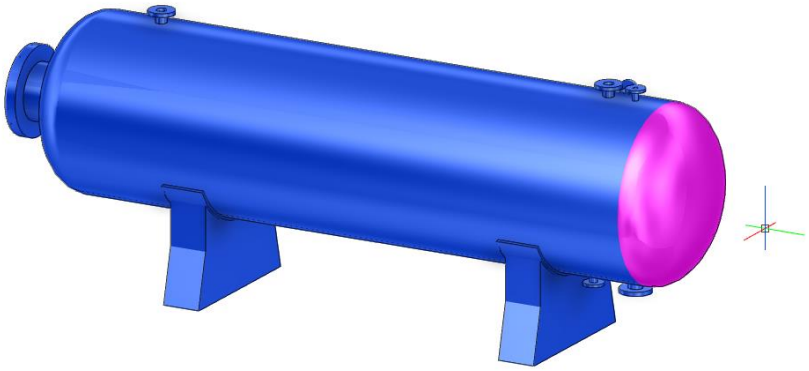
P-Points appear as white crosses, and the closest P-Point to the cursor is highlighted for selection.

⚠ *If two P-Points are coincident, the P-Point with the highest number in the current element is selected.*

On P-Point selection, the Select Second P-Point to Align prompt is displayed. A P-Point from two different primitives must be selected in each stage of the operation.



As seen below, the P-Point of the first primitive is now aligned with the P-Point of the second primitive.



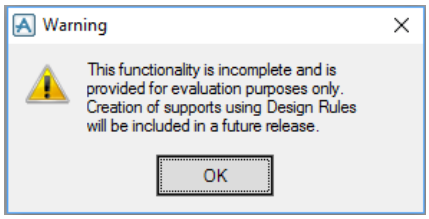
8.5 Supports

8.5.1 AVEVA Catalogue: Design Rules

The AVEVA E3D Supports application is in the process of being updated to enable automated ancillary selection via rules. As part of this process the AVEVA Catalogue application Paragon has been updated to demonstrate the tool set that will be available for this feature in future releases.

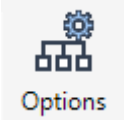
⚠ *These tools are not intended for production at this time and are provided for demonstration purposes only.*

On the **SUPPORTS** tab, in the **Design Rules** group six functions have been introduced as shown:

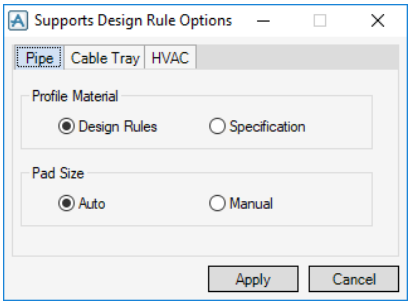


Clicking the **Options**, **Active Profiles**, **Rule Sets, Ancillary, Structure** and **Pad** buttons will result in a **Warning** form being displayed. With the exception of the Ancillary, Structures and Pad buttons, clicking the **OK** button will display the relevant form for reference purposes.

8.5.1.1 Options

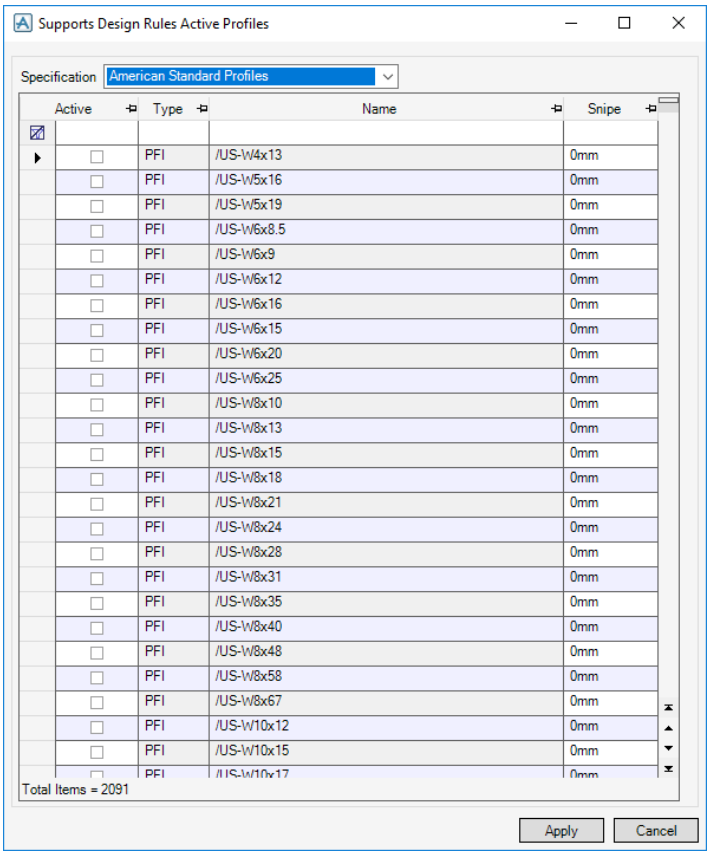


The **Support Design Rule Options** form will allow a user to determine how ancillary selection is undetaken in the Supports application.



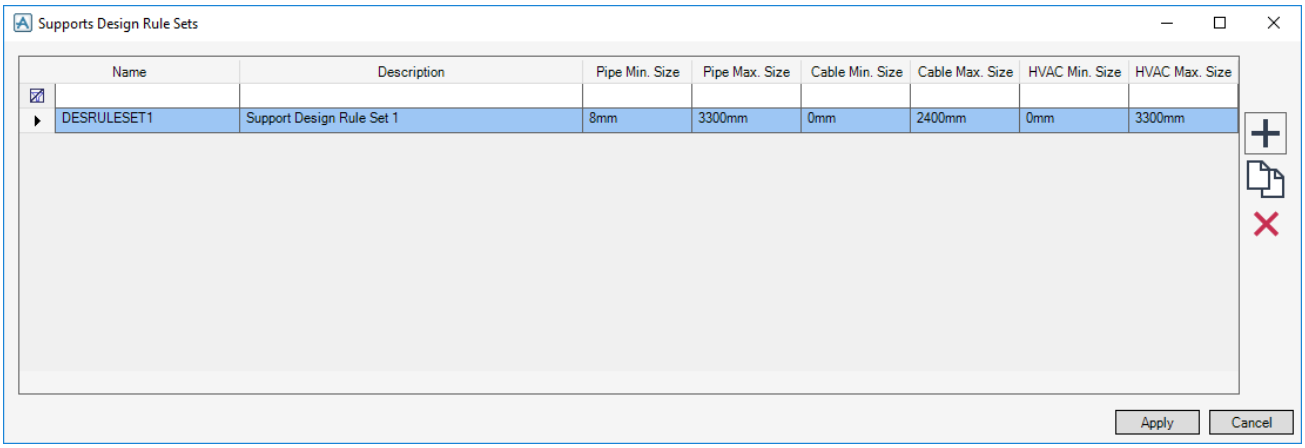
8.5.1.2 Active Profiles

The **Support Design Rules Active Profiles** will allow a user to set which profiles will be available for automatic selection during framework selection.



8.5.1.3 Rule Sets

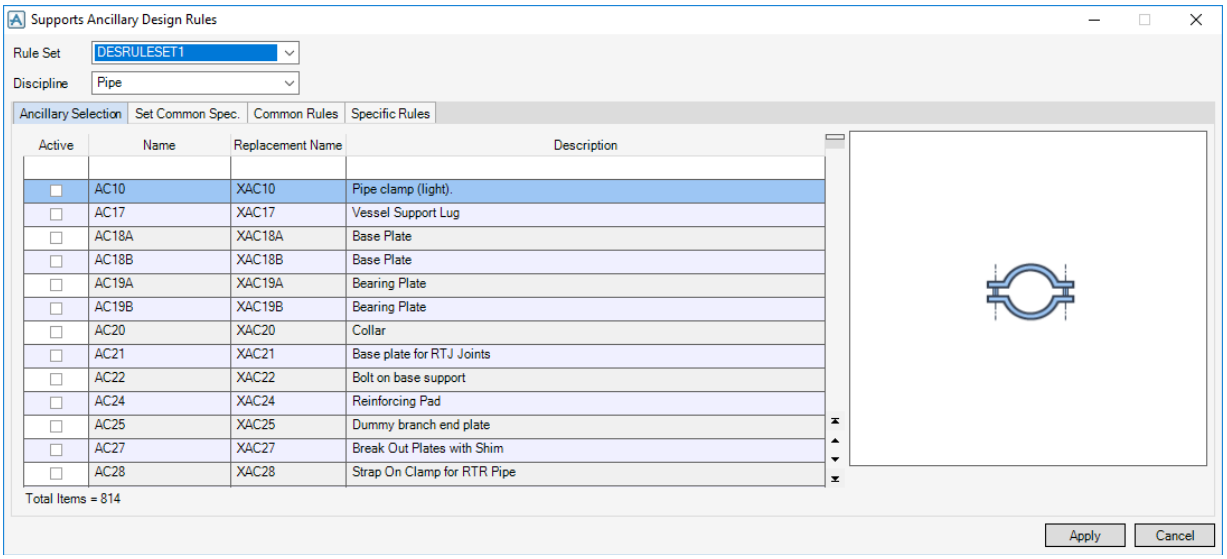
The **Support Design Rule Sets** form will enable a user to setup rule definitions for automated ancillary selection. Each rule definition will allow users to define selection behaviour for a variety of pipe, cable and HVAC sizes.



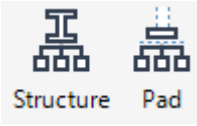
8.5.1.4 Ancillary

The **Supports Ancillary Design Rules** form will enable the user to configure how ancillaries are selected for each design rule set. The tools will provide precise configuration of how an ancillary is selected for:

- A general selection case (i.e. the majority of all support placement).
- Specific cases (i.e. cases in which pipe bores require a more customised ancillary selection).
- In addition, each rule will be able to be tailored to suit individual specs from the current catalogue.



8.5.1.5 Structure & Pad



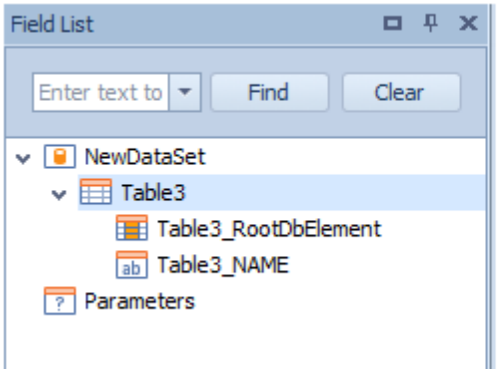
These options have yet to be implemented but will offer rule configuration options to setup support framework placement and pad placements.

8.6 Reports

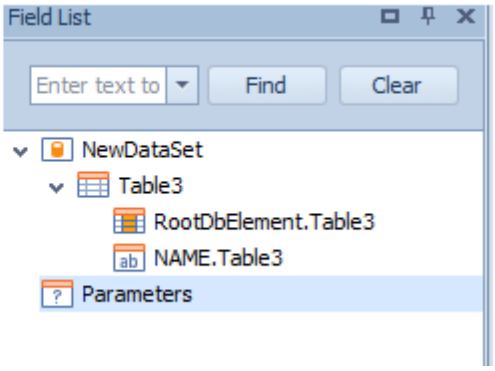
8.6.1 Table Separators

To account for changes in the supporting software it should be noted that at AVEVA E3D 3.1 the dot (.) character is no longer used as a table separator in the Report tools. It is therefore required to replace dots in field names with an alternative character e.g. the underscore (_) character.

Current Example:



Previous Example:



9 Laser

Laser scan data, including photo-realistic Bubble Views™, can be shown with the design model in the 3D views allowing designers to take account of the latest information from the construction site. Breaking free of the scanner position, HyperBubble™ and Solid PointCloud technology also allows the user to walk or fly though a combined model and laser environment.

Key laser features improved upon and introduced in AVEVA E3D 3.1 include:

- Solid Point Cloud rendering of laser data.
- Use of multiple XGEOM elements.
- Extended Highlight options.

Laser data reproduced with the kind permission of Eaton Corporation Plc. This data has been collected from a mock up facility at Eaton's training centre in Houston that focuses on industrial applications with over 5,000 products installed.

*Please refer to the **AVEVA E3D 3.1 User Documentation** for further information on laser capabilities in AVEVA E3D 3.1.*

9.1 Solid Point Cloud

AVEVA E3D 3.1 introduces an additional mechanism to render point clouds using the Solid Point Cloud. This new technique has been developed to build on the previous HyperBubble™ rendering introduced in AVEVA E3D 2.1 and acknowledging the growth in unstructured hand held, airborne and photogrammetry data capture devices. The Solid Point Cloud rendering style has been developed to allow the fast rendering of the point cloud to the screen. For a focused view of specific areas of a point cloud the point rendering is always recommended for the highest fidelity view.

The Solid Point Cloud is a re-indexing of the laser data for rendering purposes, an Administrator is required to index the Solid Point Cloud for a point cloud dataset. As this action is considered an administrative task, the indexing of the dataset would require an LFM Server license and installation.

The following images show the same scene rendered as Solid Point Cloud and as the point representation. The Solid Point Cloud resources are generated by the AVEVA LFM Server and not by AVEVA E3D.

Like the HyperBubble, resources should be requested from the service provider providing the survey, or alternatively contact the AVEVA LFM Support team to request a copy of the LFM Server software.

The WALK and FLY modes when working with point cloud data have been modified to access the Solid Point Cloud. Where the rendering is not available, the HyberBubble mode is accessed and finally falling back to the point cloud rendering of the survey.

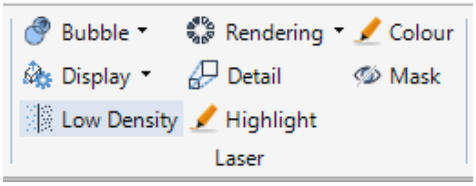
9.2 Multiple XGEOM Elements

Users interact with survey data in AVEVA E3D using a XGEOM element, this element allows users to interact with data stored in the LFM database as if it were in the AVEVA DABACON database. Once the survey data is loaded users can visualise, clash and pick the survey. The AVEVA E3D 2.1 restriction that only 7 surveys (XGEOM) can be opened at any one time has been removed at AVEVA E3D 3.1.

It should be noted that the resources of a computer restrict the number of scans that can be loaded into the HyperBubble rendering to six. This is aligned with the purpose of the HyperBubble in regard to close proximity navigation of the laser data.

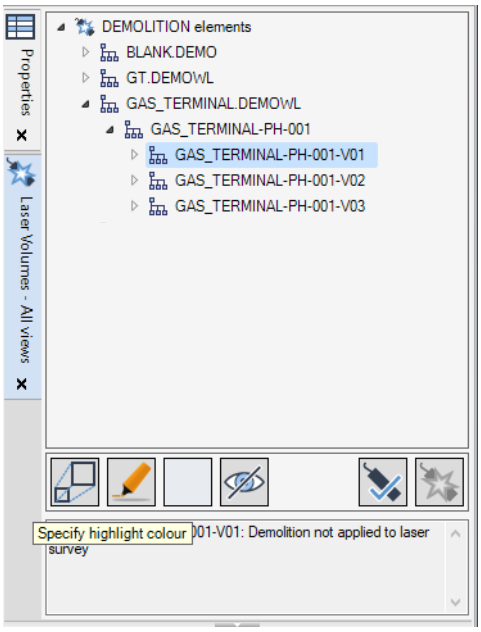
9.3 Extended Highlight

The AVEVA E3D 2.1 product allows users to highlight and mask (preview) volumes of point cloud data, thus aiding the communication of updates to existing conditions. AVEVA E3D 3.1 builds upon this capability to use multiple colours for the highlight of laser data. This allows for the display of status management and demolition sequencing of As-Built conditions.

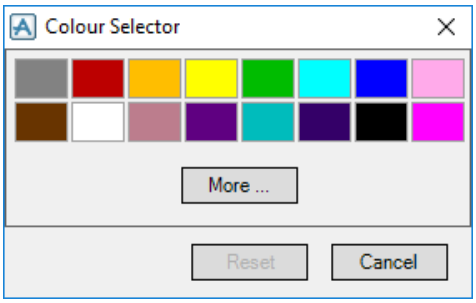


The user interface has been extended to allow the user to select highlight colour that will be applied to the point cloud.

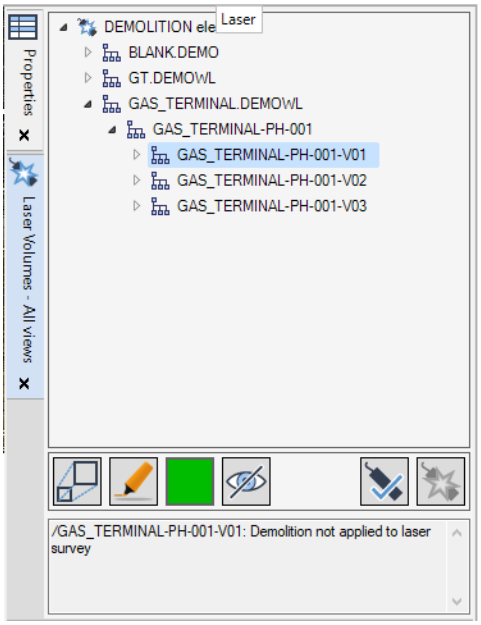
The user interface is accessible both through the **View** tab and the Laser Volume browser.



Within **Model** the **Laser Volumes** interface will only show the demolition elements. As users select elements within the Laser Volumes the element will be displayed in the main display, they can then be selected to highlight the point cloud captured by the element or the highlight colour selected.

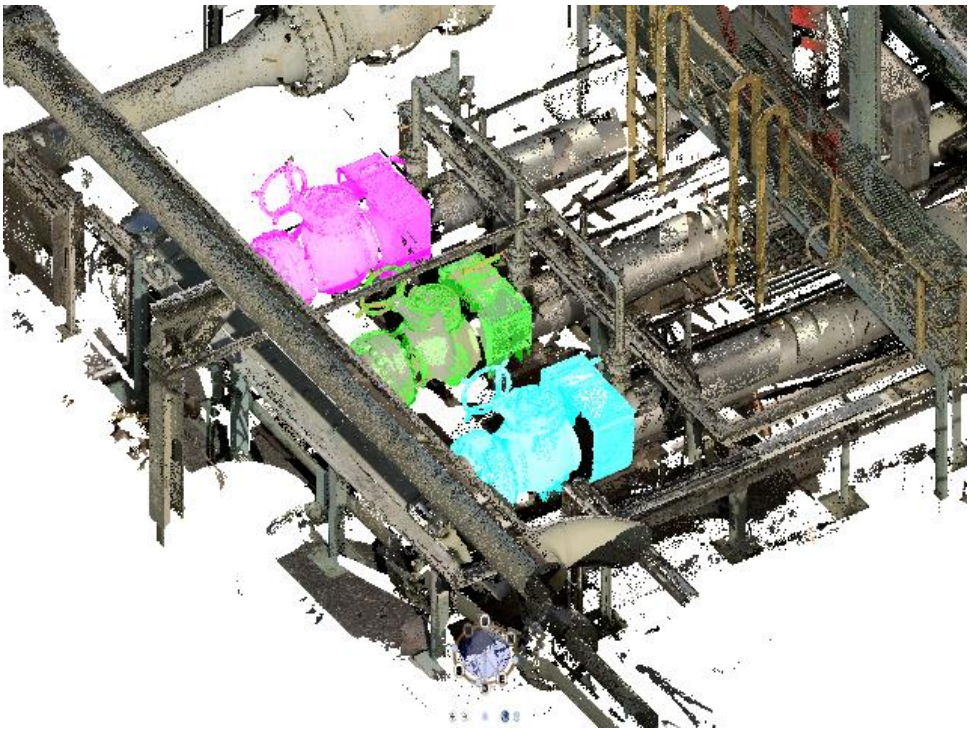


The standard **Colour Selector** will be displayed.



On selecting a colour, the **selector** button will change to the highlight colour.

The user can then toggle the highlight on for the element at which point the point cloud will display the specified highlight, different volumes can be different colours.



10 Draw

The Draw module was introduced at AVEVA E3D 1.1 and further improved at AVEVA E3D 2.1 and 3.1. The module covers the generation and management of drawings, primarily those of the 3D model. As found with the Model module the main features of the user interface are based on the Microsoft® Office Fluent™ user interface with a ribbon bar, status bar and Properties Grid.

Drawing generation is efficient, with rapid generation of views of the 3D model and highly interactive annotation and dimensioning. Drawings may easily be output in various formats such as .DXF, .DGN and PDF.

The Draw development at AVEVA E3D 3.1 can be summarised as:

- **Advanced View Options**

  Provide the ability to create location defined Views and Marine industry expansion views.

- **Representation Improvements**

  Improvements including the ability to manually hatch island geometry.

- **Annotation Improvements**

  Improvements to annotation including flexible label annotation points, extendible symbols and symbol groups.

- **2D Drawing**

  Provide ability to order primitives and alignment of Views, Regions and annotation.

- **Administration**

  Introduced user interface for Line Styles.

- **Export Deliverables**

  Provision of multi-export and a new SVG interface.

Please refer to the AVEVA E3D 3.1 Draw user documentation for further detailed information on the introduced features.

10.1 Draw Transformation

Visual elements originally created by AVEVA PDMS Draft or AVEVA Marine Drafting must be transformed before being viewed or modified by a Draw user in AVEVA E3D 3.1.

The transformation of visual elements such as Sheets, Backing Sheets, Symbol Templates and Sheet Templates is only necessary when migrating AVEVA PDMS or Hull & Outfitting 12.1.SP5 project data to AVEVA E3D 3.1 Draw. Transformation is not required for new projects created with AVEVA E3D, or for new visual elements created in AVEVA E3D Draw.

Once transformation is complete and a Save Work has been applied, it is no longer possible to view or modify the sheet using AVEVA PDMS Draft or AVEVA Marine Drafting. Similarly, new sheets created in Draw will not be accessible.

One exception to the transformation of Sheets 'on-the-fly' is the requirement to 'refresh' Overlays. This is not required where Overlays are to be transformed as part of a bulk up-front transformation process. Refreshing is necessary in order for Overlays to appear correctly in AVEVA E3D Draw sheets. Unlike transformation, a refresh does not affect the use of overlays in AVEVA PDMS Draft or AVEVA Marine Drafting in any way. This is important when using AVEVA E3D Draw in a mixed project environment.

*Please refer to the **AVEVA Migration & Interoperability Guide** for further information on the transformation process from AVEVA PDMS Draft and Marine Drafting 12.1.SP5 to AVEVA E3D 3.1.*

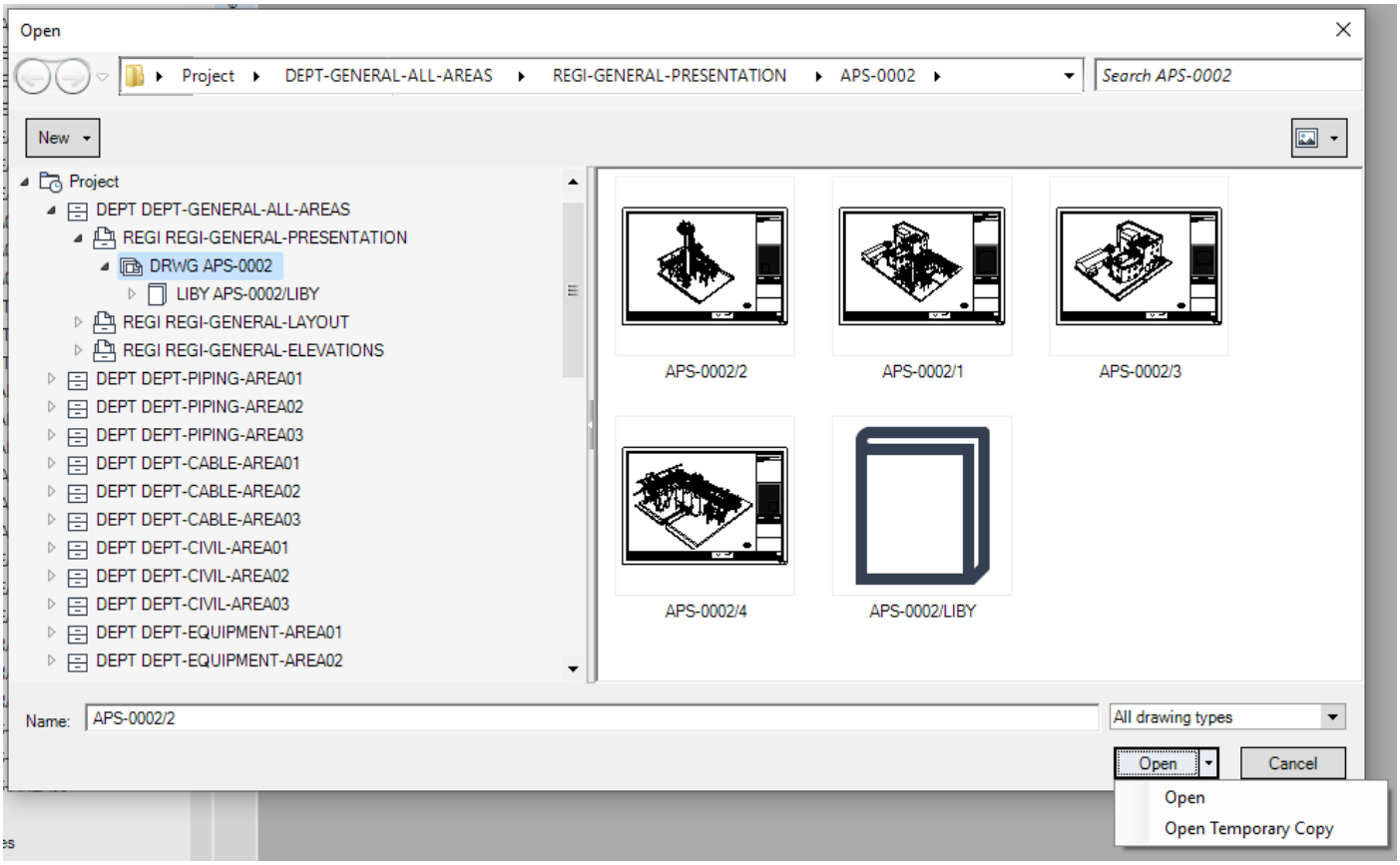
10.2 User Interface & Concepts

In general terms there is a consistent approach to Canvas and 3D View interaction with the Model module. The following sections highlight key concepts introduced at AVEVA E3D 3.1.

*Please refer to **Chapter 4 Model: General Interactions** for further information.*

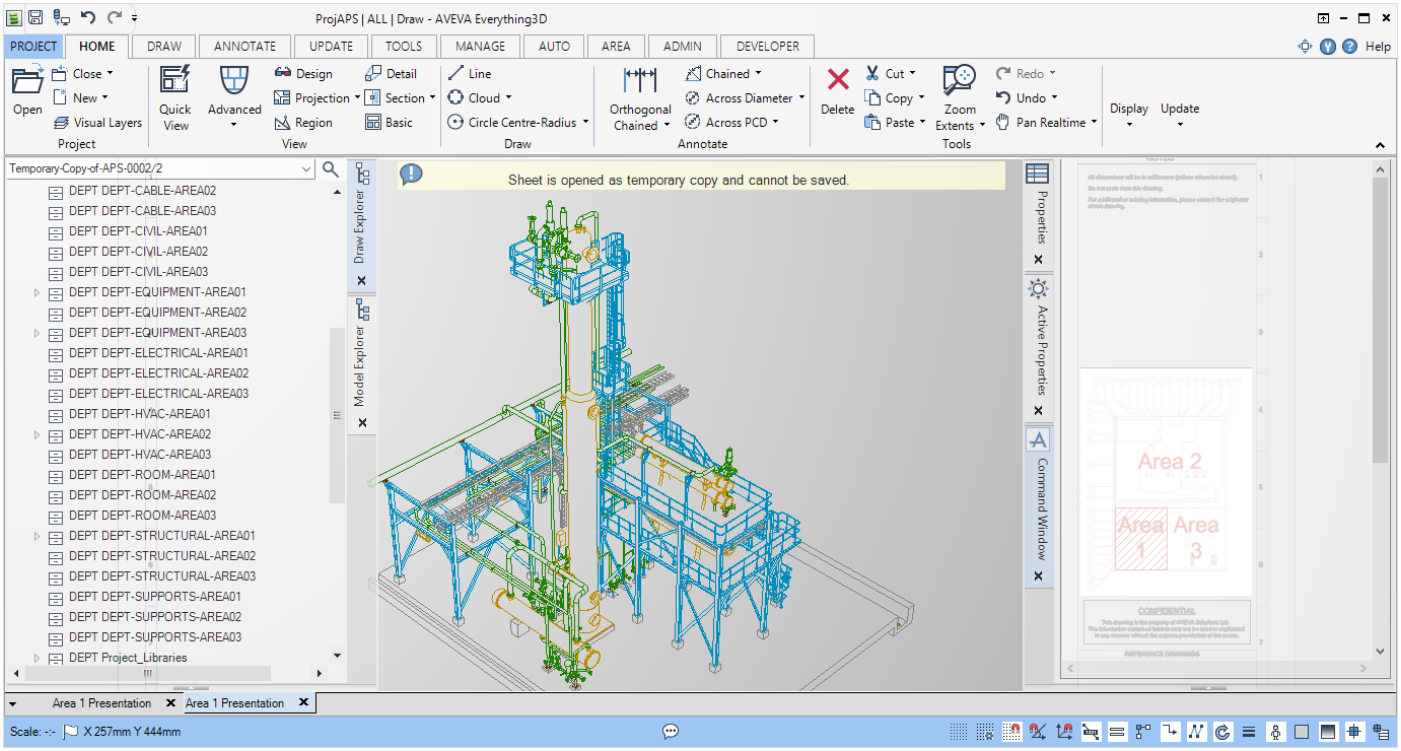
10.2.1 Open Sheet

AVEVA E3D 3.1 introduces a new way of opening a drawing called 'Temporary copy'. A drawing can be opened in this mode by selecting the option on the **Open** button from the **Open Sheet** form.



When a drawing is opened as a Temporary Copy it can be edited, but changes can not be saved to the database. When a session ends any drawing modifcations in Temporary Copy mode will be lost.

When a drawing is opened in Temporary Copy mode the new Feedback Banner is shown to inform the user.



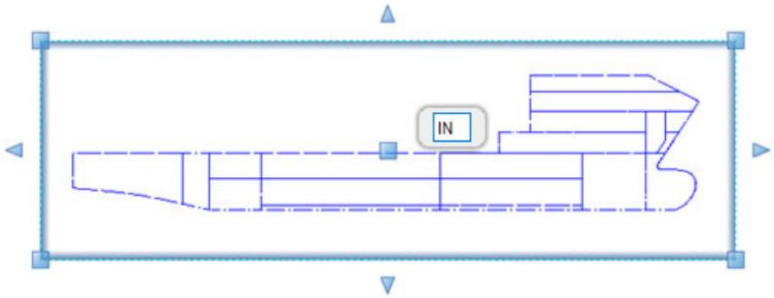
Note that the Feedback banner is also used when Hidden Annotation or Model Reference Check is active. If more than one of the modes are active at the same time there is one feedback banner for each of the active modes.

10.2.2 Properties Grid

10.2.2.1 Display Model Element Properties

Further to the display of Draw specific properties in the **Properties Grid**, Model elements may be selected in a view and the Properties Grid populated with the model element properties.

This is achieved using the **IN** command (in the Draw canvas) to enable model element selection for the currently selected view.

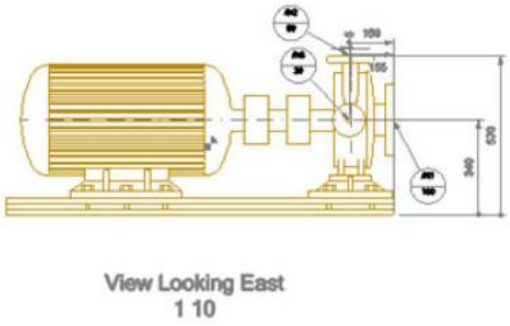


Alternatively, a user can double-click on a model element in a View to directly populate the **Properties Grid** with the model properties of a selected element.

10.2.3 View Loading Settings

If the number of entities in a view exceeds a set limit, a thumbnail (bitmap) of the view is displayed in the drawing canvas on opening the Sheet (instead of the model geometry). This introduced functionality enables the efficient loading of larger drawings.

The example here displays a view where the number of entities does not exceed the set (administrative) limit and where the number of entities exceeds the set (administrative) limit.



When a thumbnail is displayed the user is unable to access or select the entities in the view. The view can be loaded by making it the current owner i.e. by a double-click within the View boundary.

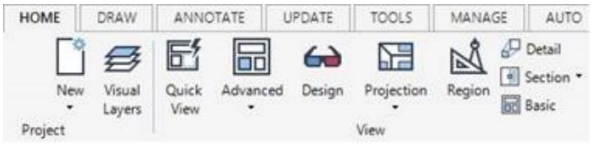
If no thumbnail exists, which is the case for drawings generated in AVEVA PDMS / Hull & Outfitting 12.1 or previous releases of AVEVA E3D Draw, the Views are not displayed when the number of entities in a view exceeds the set limit. This is remedied (thumbnail generated) on a Savework upon updating design or simply making the view the current owner.

10.2.3.1 View Loading Defaults

There are three administrative settings available to configure the loading settings. These options are defined via the configuration file at the following default location \%Users%\\AppData\Local\Aveva\AVEVA Everything3D\3.1\DrawSettings\Config\config.xml.

The EntityLimit value can be modified to specify a higher or lower entity limit threshold. The default value is 80000.

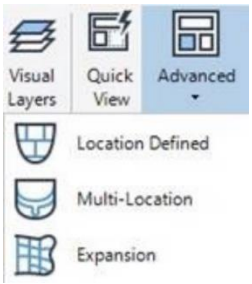
10.3 View Definition & Drawlist Management



The following methods of View creation may be utilised from the **View** group of the **Home** tab.

Quick

Quick view creation allows the user to produce a View directly from the **Model Explorer** to a default representation, scale and format.



Newly available at AVEVA E3D 3.1, the Advanced View types allow the creation of a location and mult-location views. There is also an option to create a Marine Expansion View.

Model

From Model view creation allows the user to produce a View from the Model Explorer using a 3D view. The View is created to a custom representation, scale and format.

Projection

Projection view creation allows the user to quickly form a projection of a defined orthogonal View.

Region

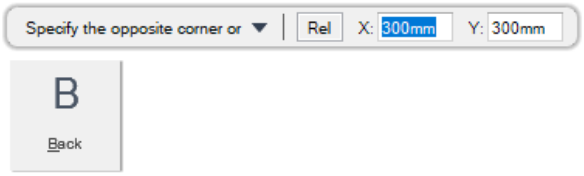
Region view creation allows the user to define a scaled area of the Draw Canvas for 2D drawing.

	Detail	Detail view creation allows the user to identify a View and select an area to form a Detail View of differing scale and representation.
	Section	Section view creation allows the user to quickly form a projection of a defined orthogonal view and form a section plane therein.
	Basic	Basic view creation allows the user to define a simple View for population at a later stage by any method e.g. the reference of a pre-defined project Drawlist.

10.3.1 Quick View

10.3.1.1 Centre Point and default Scale

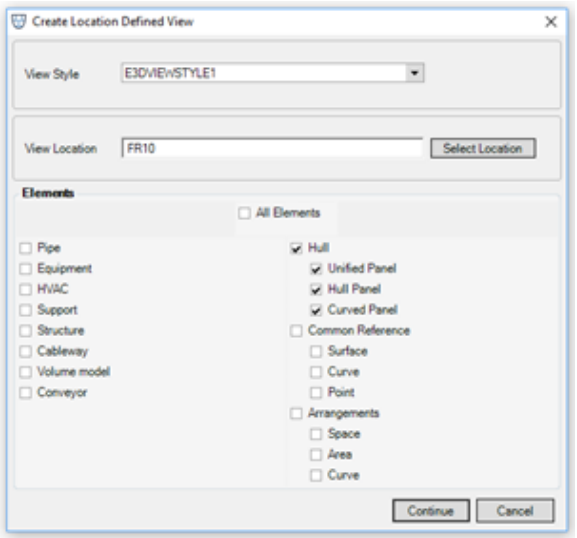
At AVEVA E3D 3.1 an additional quick view method has been introduced. The Create Quick View with Specified Centre Point and View Scale option creates a quick view with a specified centre point and view scale via the following steps.

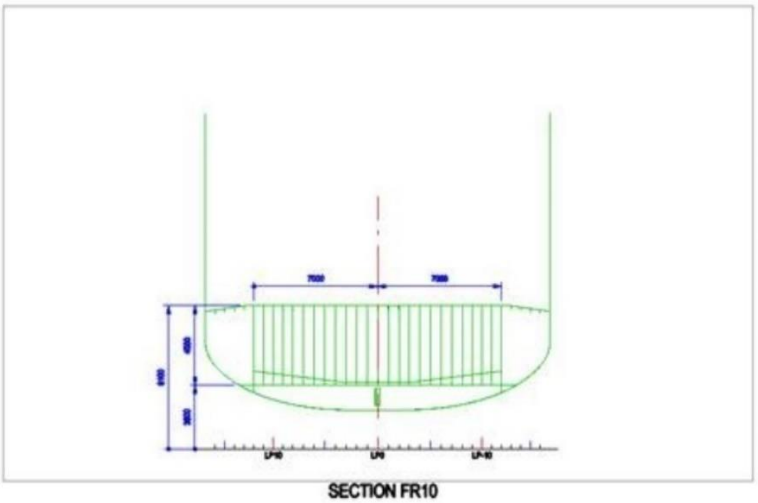


10.3.2 Location Defined View

The Location Defined View creation method is used to create symbolic views (with an appropriate symbolic view style set) at identified locations in the model; using grid locations or other model elements as a reference.

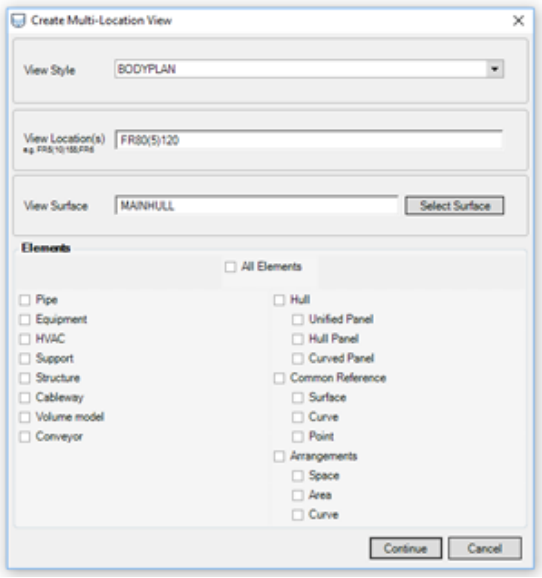
⚠ *This replaces the Hull View available in AVEVA E3D 2.1 and is available for both plant and marine industries.*

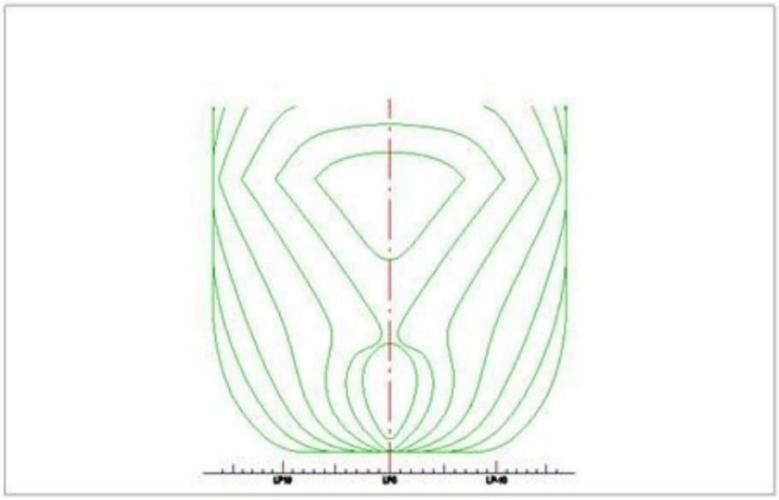




10.3.3 Multi-Location View

This Multi-Location view creation method is used to create (bodyplan style views), these are used on Hull early design/classification drawings to validate surface and curve creation.

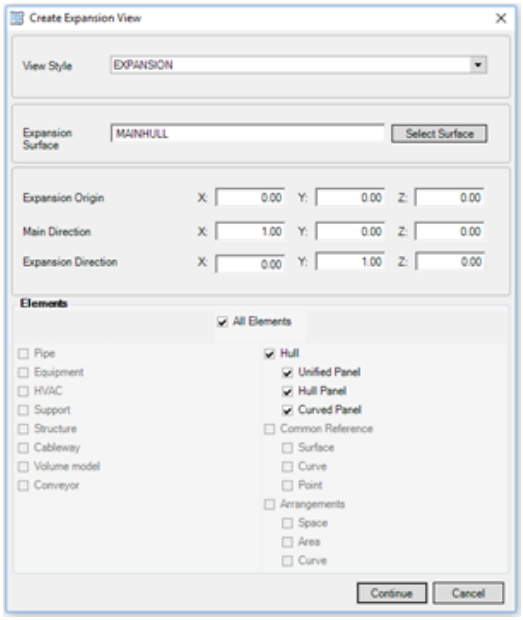


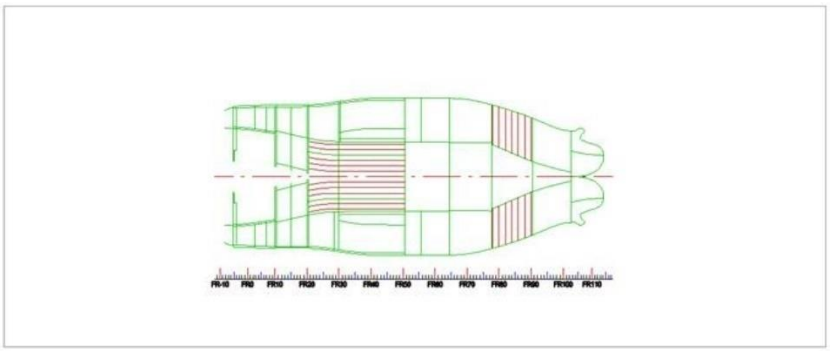


10.3.4 Expansion View

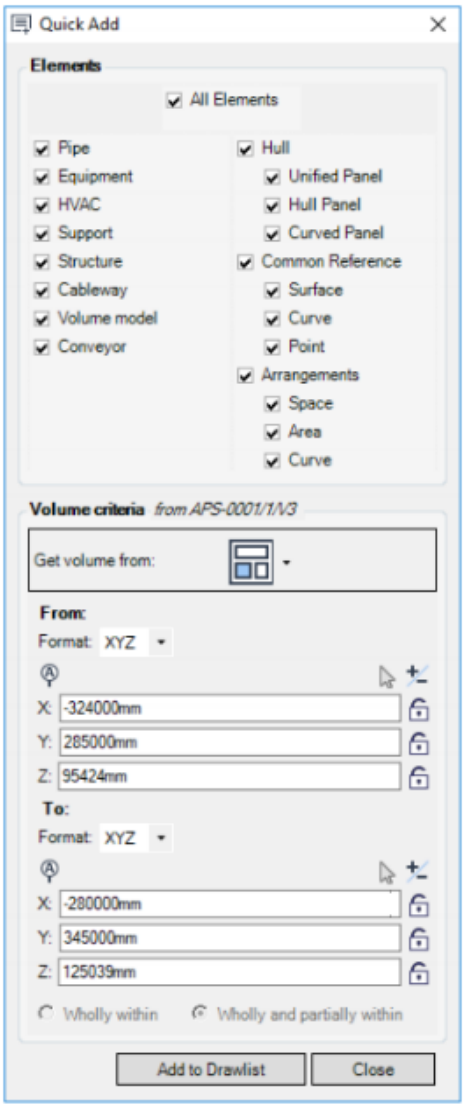
This view type is used to create Hull shell expansion views, these are used on early design/classification drawings to allow the shell plate arrangement to be viewed; including the shell seam and butt positions.

The Expansion View is different to the other advanced views, in that it is based upon using a surface (SRFSUR) as the reference for the view. The view will need to use an Expansion view style, to achieve the desired view.





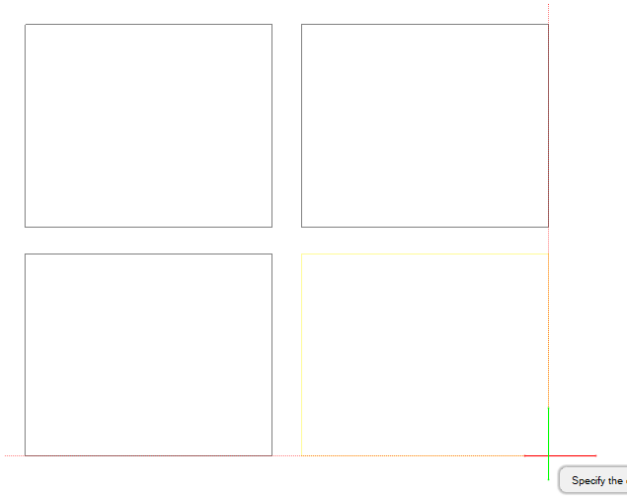
10.3.5 Drawlist Management – Quick Add



The introduced **Quick Add** form allows a user to efficiently and easily add model elements (by type and within a defined volume) to the currently selected view.

It should be noted that the form does not modify the scale or limits of the selected view.

10.3.6 View Alignment



Alignment of views has been made easier by the introduction of automated alignment of view frames. This feature works both at view creation and modification stages. The alignment is aided by both a visible dotted line and a cursor snap to the alignment line.

⚠ *Please note that the alignment method can also be employed with Symbols and Label annotation.*

10.4 View Representation

10.4.1 Enhance Elements

The Draw syntax facility has been extended to allow a user to select (and unselect) annotations on the Sheet (DRAENHANCE, DRAUNENHANCE). Further, the SOLELY keyword clears all previous selections before selecting the defined components.

For example:

`DRAENHANCE SOLELY CE`	Select the current element and unselect everything else.
`DRAUNHANCE TEXTPRIMITIVE1 STRA1`	Unselect TEXTPRIMITIVE1 and STRA1.

10.4.2 Highlight Elements

The Draw syntax facility has been extended to allow a user to highlight (and remove highlight) elements on the Sheet (HIGHLIGHT, UNHIGHLIGHT). Further, the SOLELY keyword clears all previous highlighting before highlighting the defined components.

Design geometry must be highlighted in a specific view. This defaults to the current owner but can be overridden with the IN keyword.

For example:

`HIGHLIGHT CE`	Highlight the current element in the current view.
`HIGHLIGHT IN /VIEW1 EQUI1`	Highlight EQUI1 in VIEW1.
`HIGHLIGHT SOLELY CE ALL STRA`	Highlight only the current element and all STRA components.

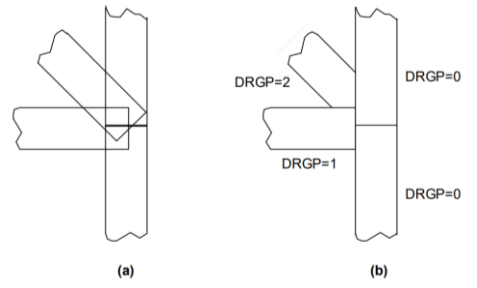
10.4.3 Representation of GENSEC Ends

Further to being available for SCTN elements, the DRGP (Drawing Priority) attribute has been added to GENSEC elements at this release to aid Draw to determine how to draw GENSEC ends in hidden-line removed views. DRGP can be set (in the Design Database) to any integer value between 0 (highest priority) and 50.

The illustration indicates plan views of four GENSECs meeting at a node point. The top flanges of the GENSECs are coplanar and none of the GENSEC ends have been cut back.

(a) the DRGP attributes of all four GENSECs have been left at 0; as a result, DRAW is unable to determine how to draw the intersection lines between the GENSECs and so draws the full outlines of all GENSECs.

(b) the DRGP attributes of the four GENSECs have been set as indicated, which confers a priority order on them. As a result, DRAW is able to determine the representation that is intended.



⚠ *Note that using this functionality in non-orthogonal Views can produce slightly distorted results. When producing the graphics, the SCTNs /GENSECs are 'shifted' slightly in the View direction by an amount relative to the SCTN's/GENSECs DRGP value to allow the hidden-line-removal code to function. Distortion is especially likely to be noticed if large values of DRGP are used. It is recommended that DRGP values are kept as small as possible and preferably less than 10.*

10.4.4 Hatching

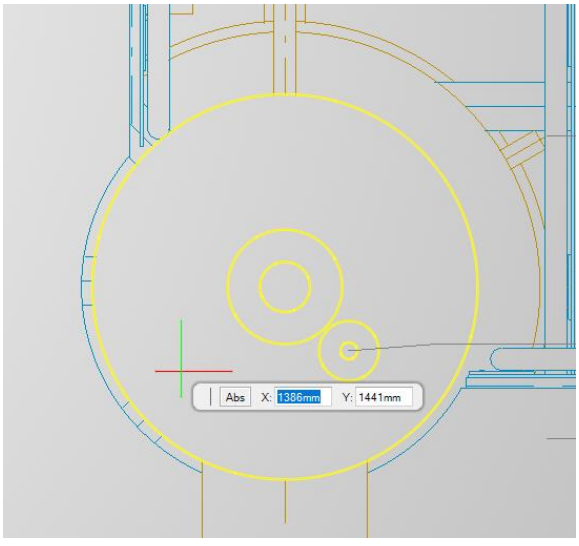
10.4.4.1 Hatching Islands

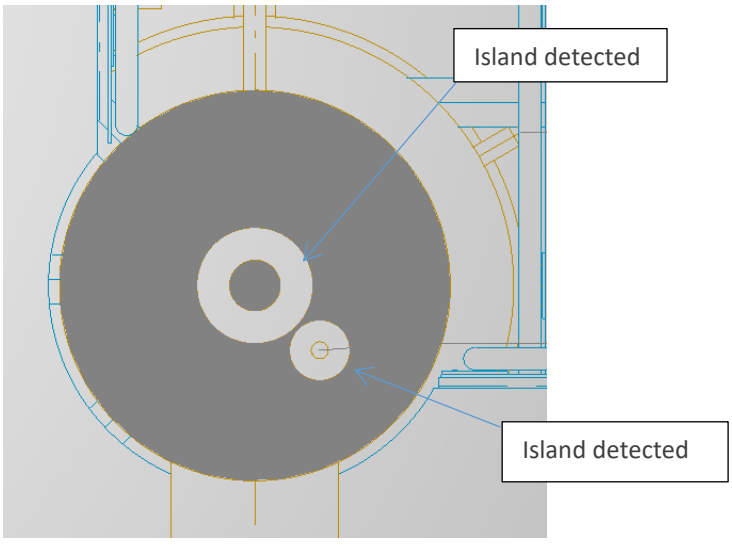
AVEVA E3D 3.1 introduces a new hatching mechanism enabling hatched areas bounded by Draw primitives and/or model elements. Moreover, the feature automatically detects islands inside hatched regions, which can be omitted through selection.

A typical usage case is as follows:

- A user invokes the newly introduced operation by entering the '**FILL**' command.
- The user selects elements, which can be either entities or design geometry, to be used to bound the required hatching area.

- On selection of the entities, the user identifies the area to be hatched from the selected entities by a pick within the required area. More than one hatch area can be defined with the same selected elements. In the image below two islands have been identified. The created hatch islands are created as standard 2D outlines (OUTL) and can be edited with the standard tools e.g. the Properties Grid.





Please note that it is observed that very small gaps in model element geometry may erroneously identify an area as being closed and not hatching will be created.

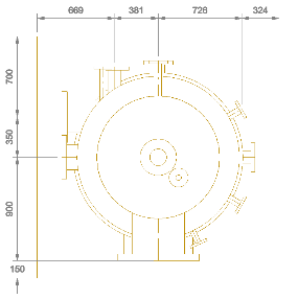
10.4.5 Line Types and Zoom Scale

At AVEVA E3D 3.1 graphical lines can optionally be made dynamic so that (non-solid) lines appear the same regardless of the zoom level.

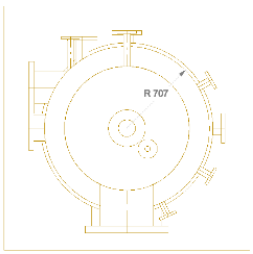
The option **Dynamic Line Styles** is available via the **PROJECT** tab, Options menu (View > Configuration).

10.5 Dimensions

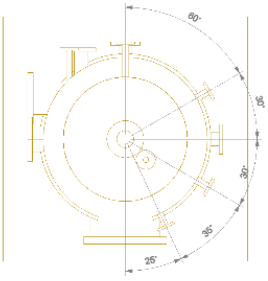
Dimensions are calculated directly from the model with the user able to control the format, content and appearance of the created dimension. There are four generic dimension types available in AVEVA E3D Draw that allow intelligent dimensions to be created.



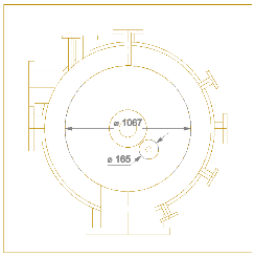
Linear Dimension (LDIM)



Radial Dimension (RDIM)



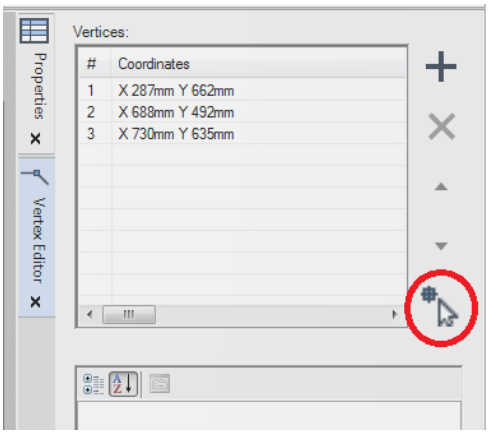
Angular Dimension (ADIM)



Pitch Circle Dimension (ADIM)

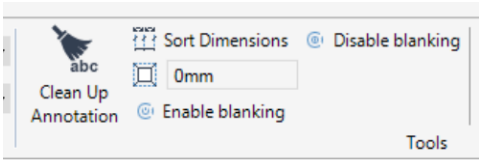
10.5.1 Vertex Editor Improvements

An additional button has been added to the **Vertex Editor** window to allow a user to identify a Vertex via a canvas selection.



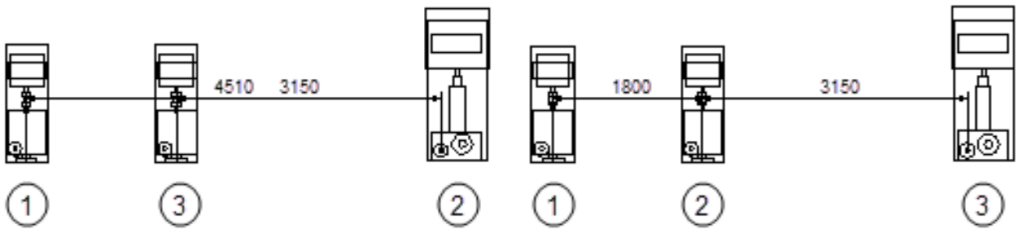
The selected vertex is the one nearest to the selection position.

10.5.2 Sort Dimensions



Further to the command that has existed in previous releases, a button to sort dimension points has been introduced in the **Tools** group on the **ANNOTATION** tab.

Dimensions are drawn in the same order as the LDIM member list order. If the elements become out of order, the display of the dimensions becomes confused. The situation can be corrected by using Sort Dimensions at dimension or dimension point level. The example indicates the effects of the function.



10.6 Labels

Labels are a form of drawing annotation associated with model elements and comprise text and/or graphics. AVEVA E3D Draw principally uses template labels, of which there are two variations:

General Template Label (GLAB)	User can adapt the label content and format to a specific purpose. This may include the use of Intelligent Text to derive the label content from the model.
Symbolic Template Label (SLAB).	The label is formed by a pre-defined label template often containing a symbol and/or Intelligent Text for a specific purpose.

Labels can be attached to a model element and used to display any attribute of the element. Direct reference to the model data, combined with a simple update annotation operation, ensures the annotation reflects the current state of the 3D model.

10.6.1 Flexible Connection Points

Flexible attachment points for Symbolic Template Labels (SLABs) are defined in the template. If a template includes connection points (SYCNPT), the leader line of a label is positioned to the nearest connection point automatically as the label is located.

Please refer to the AVEVA E3D 3.1 Draw user documentation for further detailed information on the definition and use of flexible connection points.

10.6.2 Auto Labelling

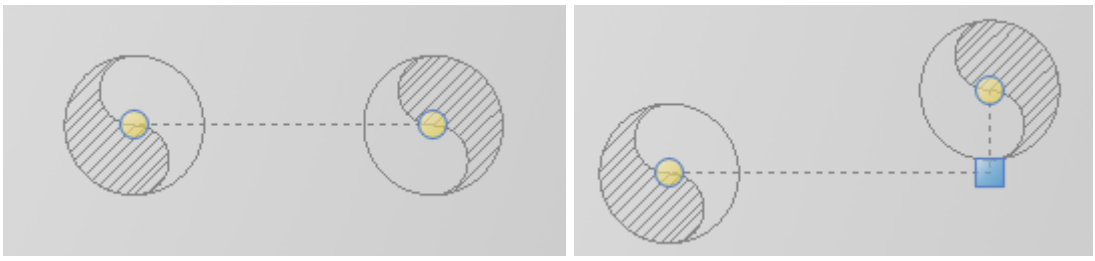
The following features have been introduced at AVEVA E3D 3.1 to aid automatic label creation and definition. This feature follows the logic of Autotagging regarding tag rule definition but has extended capability in regard to:

- Multiple rules within a Ruleset.
- Automatic update with update design.
- Increased options to place the label in relation to the model e.g. along a p-line and aligned with a specific p-point.

Annotations for design elements on a view are enabled using the **Properties Grid**.

10.7 Connectors

The principal purpose of this introduced entity is to, as the name suggests, make a connection between entities and annotations that will be preserved when moving or editing them.

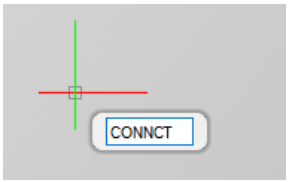


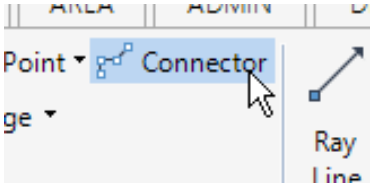
A Connector is built on an OUTL entity and is created using a set of vertices to define its shape.

While the OUTL entity supports curved segments based on ARCs and SPLINEs, Connectors allow only straight segments to connect its vertices. Connectors use reference positions – but not only can be attached to other entities via references, but it can contain connection points, so any other entities can be connected to it too.

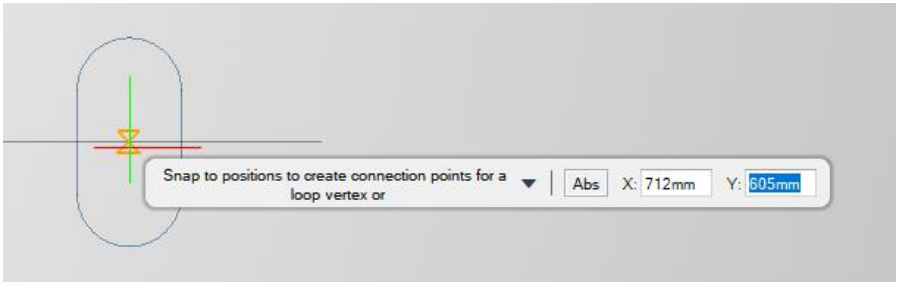
Please refer to the AVEVA E3D 3.1 Draw user documentation for further detailed information on the introduced Connector element.

The Connector operation can be invoked by two methods: using in-canvas command ***CONNCT*** or by the button in the **Draw** section of the Draw tab.

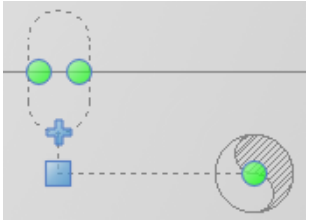




On invoking the Connector option, the user can define a starting point and subsequent connection points.



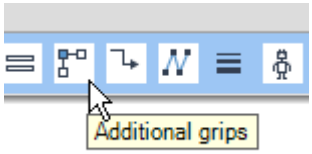
Alternatively, a shield vertex can be employed as a point.



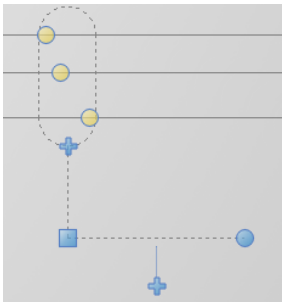
Unlike standard vertices, shield vertices use only intelligent positioning. Its purpose is to create a connection from more than one component position. For example, using this feature, the user can attach one CONNCT to others and its shape will be generated based upon referenced positions:

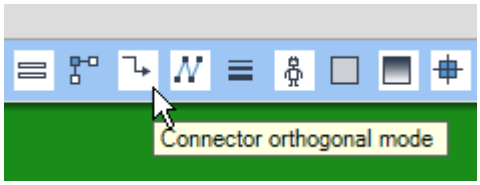
Connector shields are not designed to work within views. They can be drawn in regions just like under a sheet.

The following **status bar** options can be utlised to aid connector creation and modification:

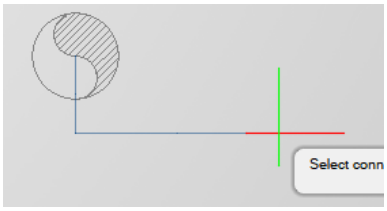


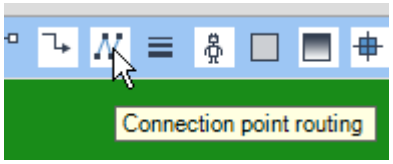
Direct modification of a connector is aided by several grips. These grips are enabled by the **Additional grips** option.



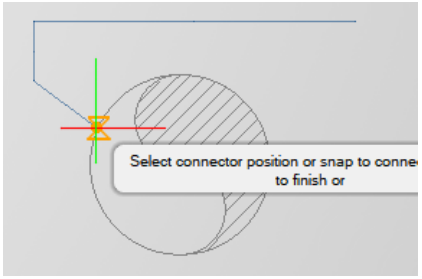


The **Connector orthogonal mode** option ensures the path of the connector is orthogonal.

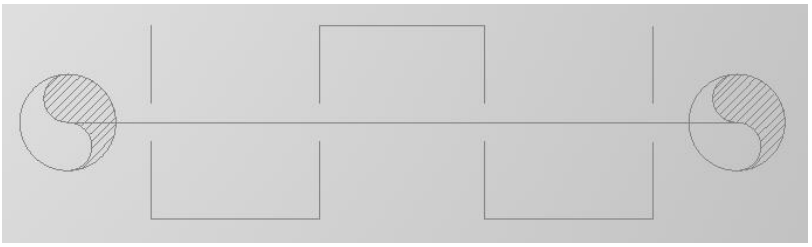




Connector point routing is controlled by a toggle in the status bar. Connector routing creates connection points automatically. The angle of the connection points, which is relative to the owner of the connection point, defines the direction of the connector segment.



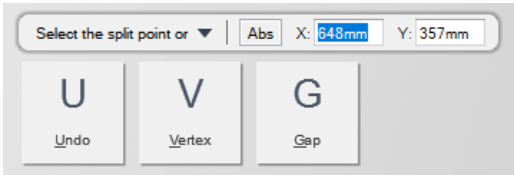
To aid clarity where connectors cross, a user can define jumpings (gaps). Jumpings can be customized with glyphs and created according to the order of entity creation; and may also be modified by using a flag in **Properties Grid**.



10.7.1 Connector specific operation

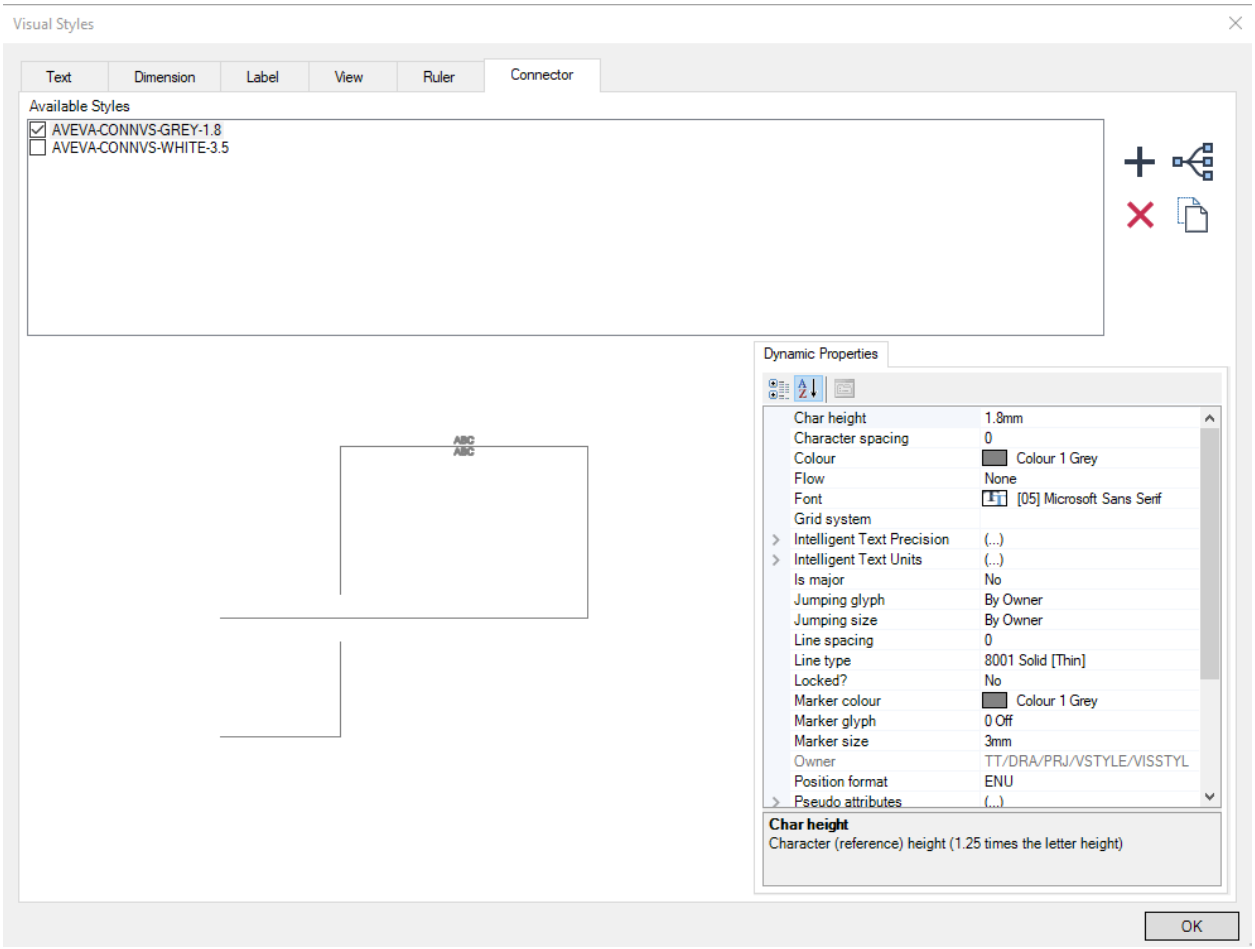
There are some operations that are specific to Connectors.

- **HEAL** in-canvas command will invoke Connector Heal operation to merge two connectors.
- **CONNCT_SPLIT** in-canvas command will invoke a Connector Split operation. After specifying an entity to split, the user is able to choose between three options:

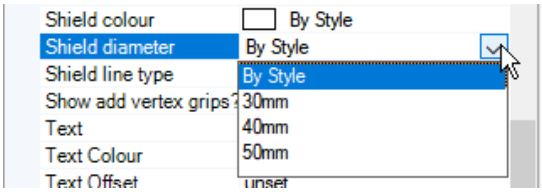


10.7.2 Visual styles

The appearance of a connector may be determined by the introduced connector Visual Style.



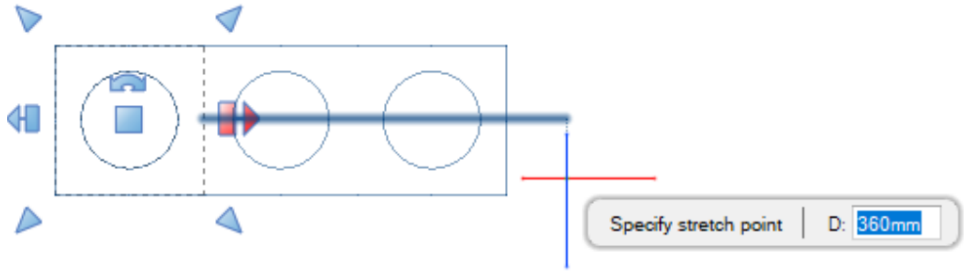
Connector entity appearance can be further controlled via the **Properties Grid**.



10.8 Symbols

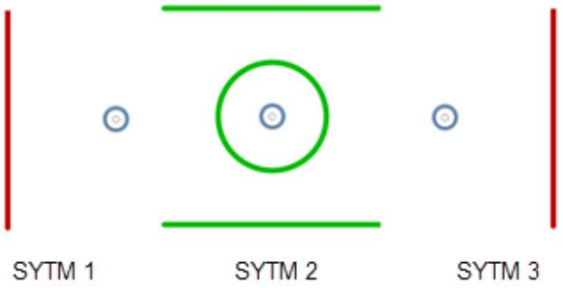
10.8.1 Extendible Symbols

Extendable symbols are indicated and modified by grip points that display as arrows. Objects that are defined as repeatable are copied during the process.

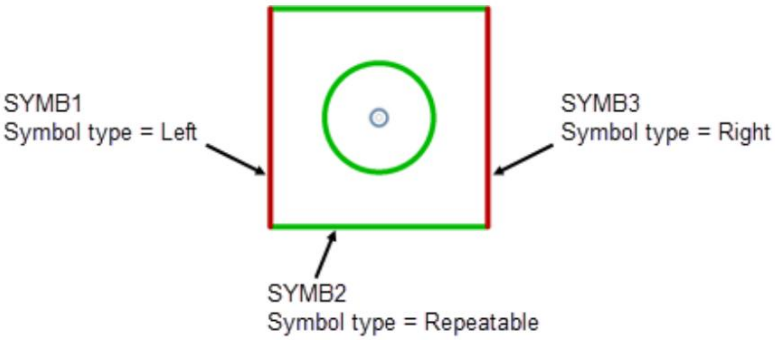


10.8.1.1 Create Symbol Template with Extensible Symbols

On creating a Symbol Template (SYTM) element, which is constructed using a set of symbol (SYMB) elements, the administrator can specify which SYMB elements can and cannot be repeated. The SYMB elements must first be created using individual SYTM elements. The example displays SYMB elements that are created using three SYTM.

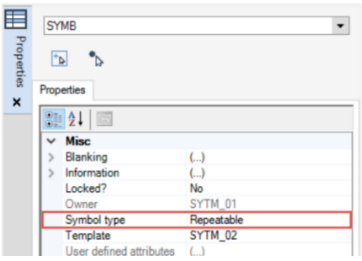


The SYMB elements are then inserted and positioned on a single SYTM element.



The SYMB properties can be updated via the Properties Grid.

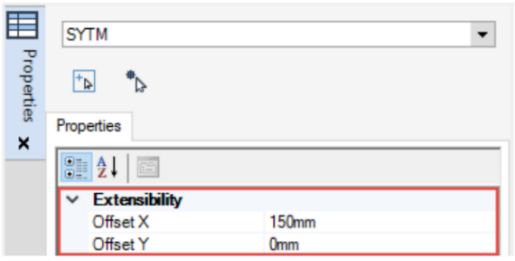
10.8.1.2 Symbol type



- Select **Top** from the drop-down list to specify a top symbol. The top symbol is not repeated when stretched along the Y axis. The top symbol is positioned at the top of the extended symbol.
- Select **Bottom** from the drop-down list to specify a bottom symbol. The bottom symbol is not repeated when stretched along the Y axis. The bottom symbol is positioned at the bottom of the extended symbol.
- Select **Left** from the drop-down list to specify a left symbol. The left symbol is not repeated when stretched along the X axis. The left symbol is positioned at the left of the extended symbol.
- Select **Right** from the drop-down list to specify a right symbol. The right symbol is not repeated when stretched along the X axis. The right symbol is positioned at the right of the extended symbol.
- Select **Repeatable** from the drop-down list to specify a repeatable symbol. The repeatable symbols are repeated when extended along the X or Y axis.

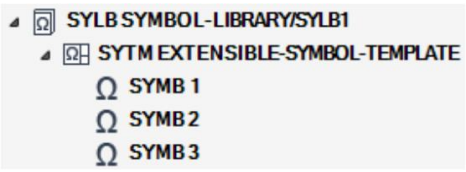
The SYTM properties can be updated via the **Properties Grid**.

10.8.1.3 Extensibility



The repeat distances for repeatable symbols along the X and Y axes can be defined via the **Properties Grid**.

The new SYTM and SYMB elements display in the **Draw Explorer**.

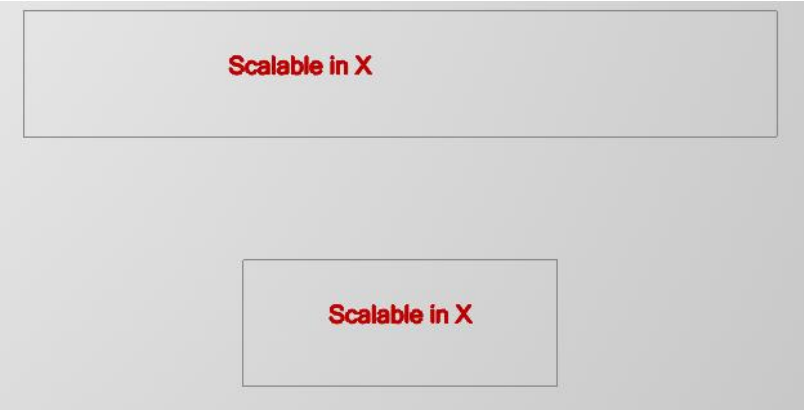


10.8.2 Configurable Scaling

Symbols are now enhanced so that they can be changed to be scalable in a single axis, both axis or none. This can be selected in the **Properties Grid** (**Scale Axis**) where only the possible values are listed or via the attribute **Scalap**.

The grips in the canvas will reflect the scalability so that it is immediately obvious to a user whether a selected symbol is scalable or not, and in which direction.

Text scaling can be configured separately from the scaling of the symbol. Texts have the new property **Scale Text** (attribute **LSCSYM**) in the **Properties Grid**, which is **Yes** by default but can be changed to **No**. When set as **No** the text is not changed when the symbol is scaled. The below shows two symbols with the same symbol template, the top example is scaled up along the X axis but as can be seen the text is not scaled.

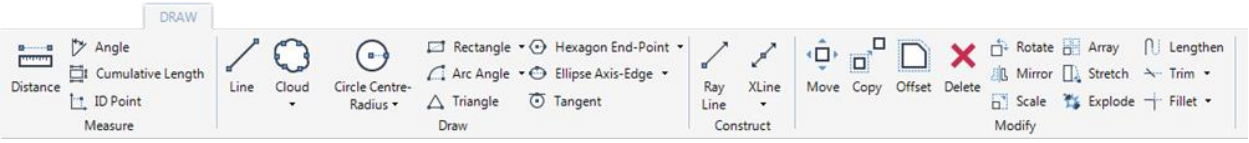


10.8.3 Symbol groups

DGROUP is a new element type which allows SYMB elements to be grouped together so they can be easily manipulated as one element e.g. scaled or moved as one. A **DGROUP** can also be copied with the standard <CTRL+C> and <CTRL+V> operations in the canvas. The new alignment lines, introduced earlier in this document, are also available for groups to assist in positioning.

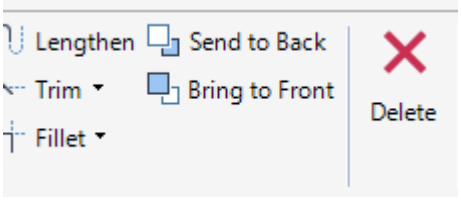
10.9 2D Drawing

The **Draw** tab contains functionality pertaining to the creation, measurement and modification of 2D drawing elements.



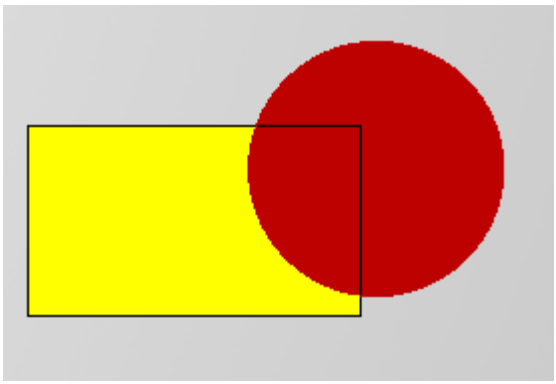
2D Primitives may be created at the Sheet level or within a Region. A Region is a type of View and defines a scaled area of the Drawing Sheet which can be used for drafting. A Region has a pre-defined, independent scale and can be created at any point in the drawing process.

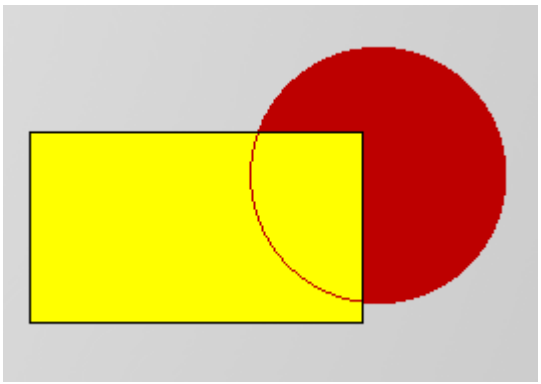
10.9.1 Primitive Order in Canvas



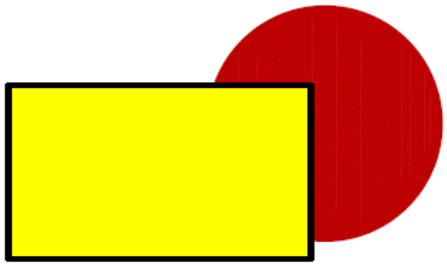
Annotation elements can now be ordered in the Draw canvas. To support this operation, **Send to Back** and **Bring to Front** fucntions have been introduced to the **Modify** group of the **DRAW** tab.

The images below illustrate the introduced behaviour. In the first image the circle is on top and in the second image the rectangle is on top. The outline of the primitive that is not in front will always be shown in the canvas, this is to aid selection of primitive.





When exported, here to PDF, the outline of the (behind) primitive is obscured by the (front) primitive.

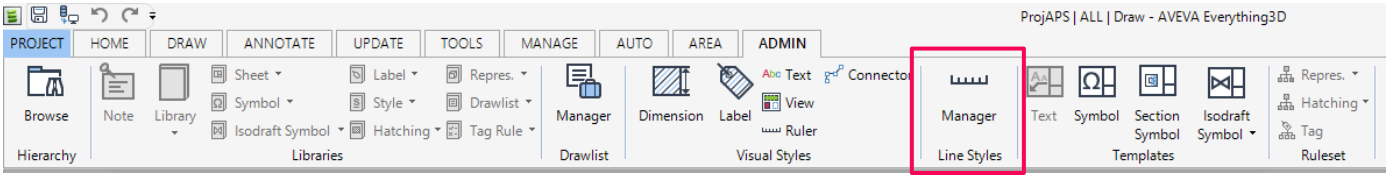


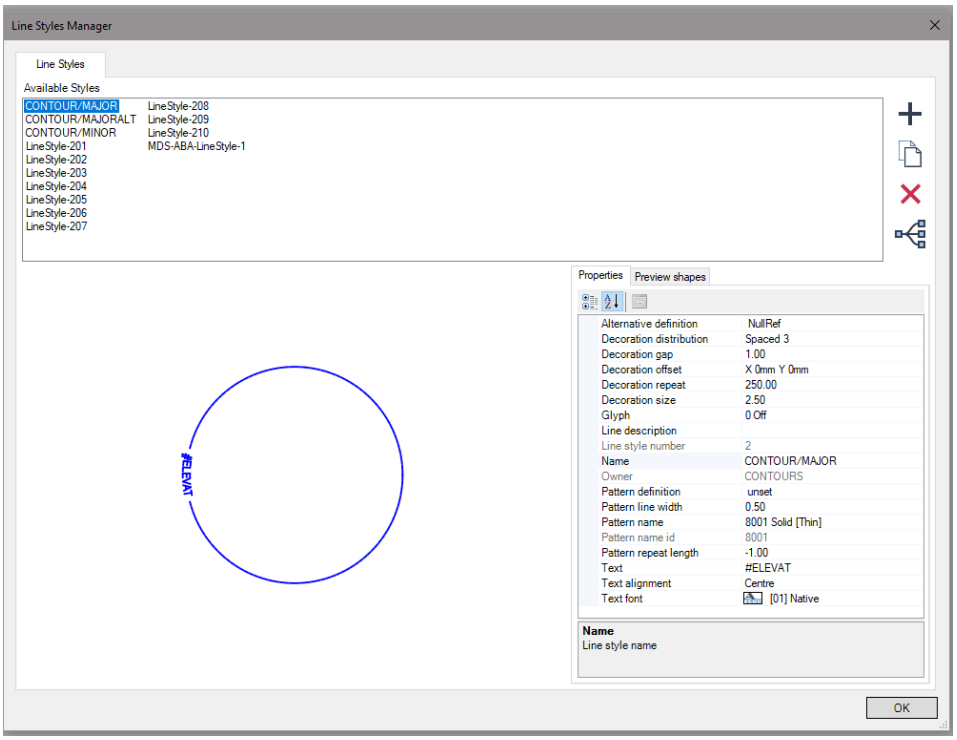
10.10 Draw Administration

10.10.1 Line Styles Manager

To aid the definition of Line Styles in Draw, a **Line Styles Manager** has been introduced to the **ADMIN** tab. The form allows the Draw Administrator to control the appearance of Line Styles when utilised in a Drawing e.g. line pattern and decoration (text/glyph).

Draw is supplied with a default visual style which is initially assigned to lines by default. Further, an Administrator can also create and define line styles with a user-defined line style set as a default style. The Preview shapes tab can be used to view the line style as various shapes using the currently defined properties.

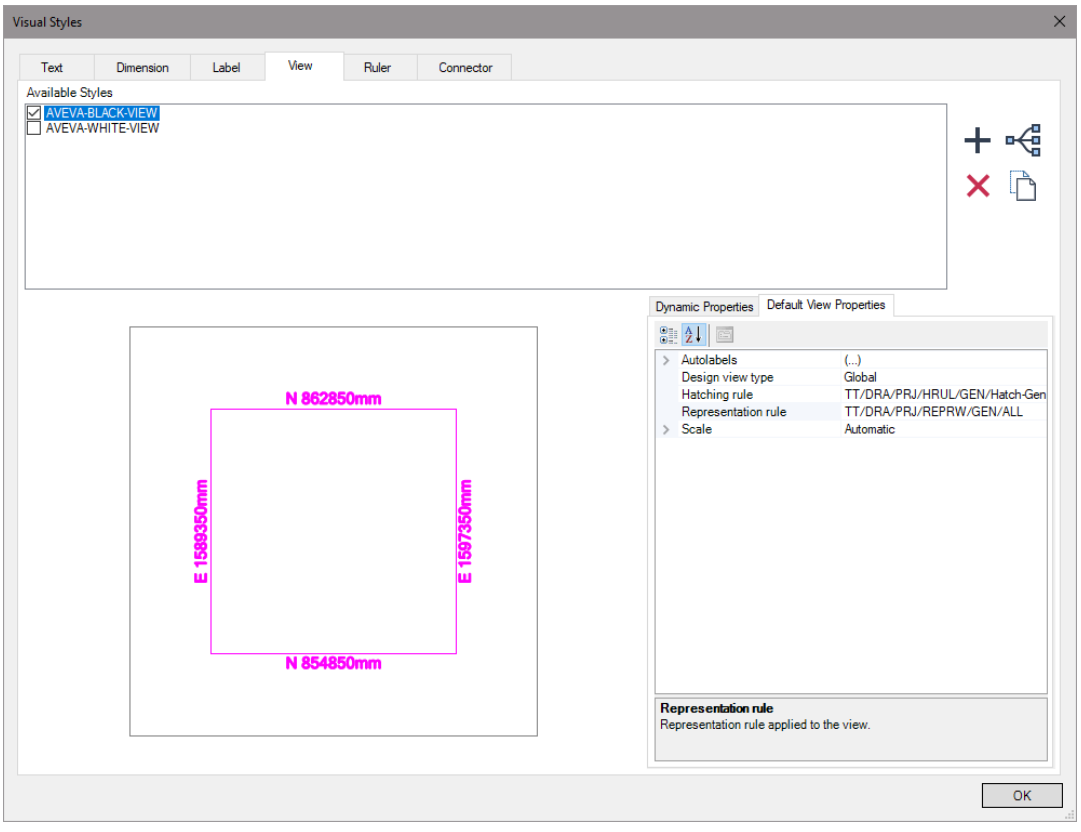




*Please refer to the **Draw Administrator User Documentation** for further information on the definition and properties of Draw Line Styles.*

10.10.2 Visual Styles

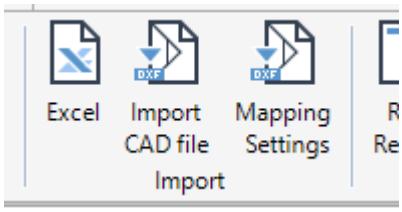
The definition of the View Visual Style has been extended through the introduction of a **Default View Properties** tab. The tab enables the Draw Administrator to modify the default View style properties for Autolabels, view type, hatching rule, representation rule and view scale.



⚠ *The values on the Default View Properties tab are not reset when Set all the visual properties of the selected objects to default is clicked on the Properties window. The scale value on the Default View Properties tab is only used when creating basic views or quick views. When creating a design view, for example, a projection view, the scale value is not used.*

10.11 Import

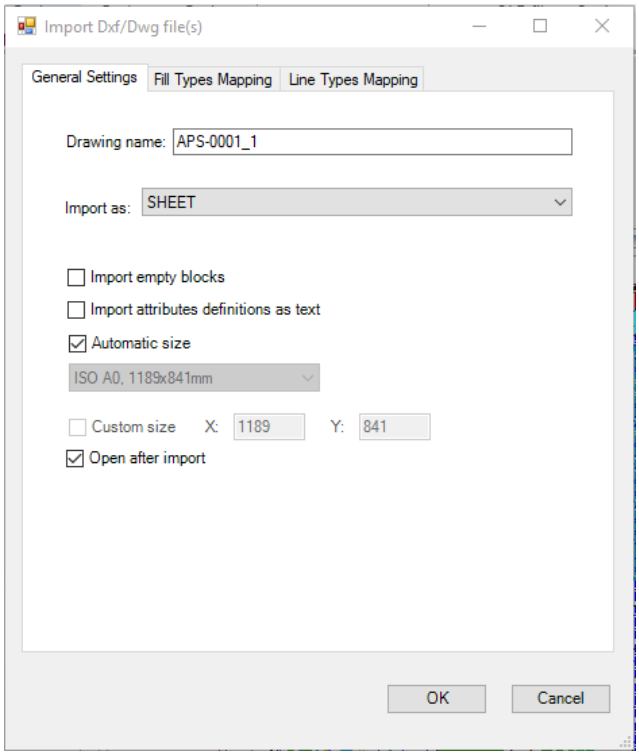
10.11.1 CAD Import



The CAD import functionality has been revised in this release. Both performance and maintainability have been improved, and new functions have been added. The new import allows the user to map fill types in order to achieve as accurate a result as possible. Also, blocks are now imported as symbol elements with a defined and referenced symbol template (SYTM).

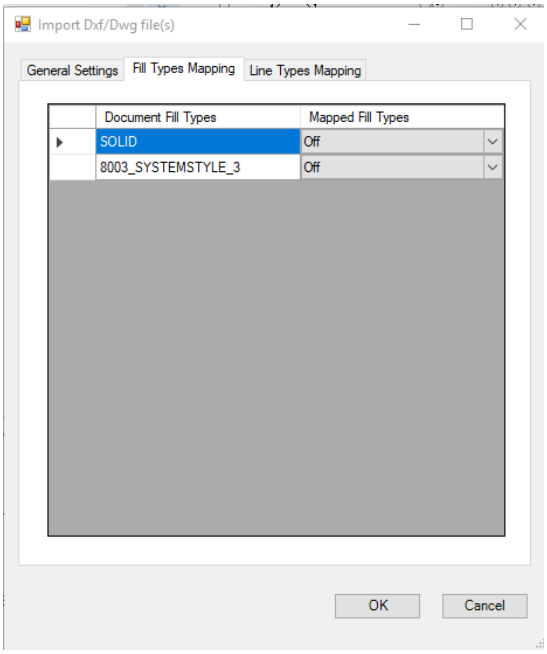
An **Import Blanking** feature has been created to support wipeouts created in CAD. Blanking is an attribute of a DRAW entity, creating a closed outline that masks underlying objects. The line style is set to none.

When clicking the new **Import CAD File** button the user is first presented with a dialog that allows a file to be selected for import. After selection of a file and selecting open, the main import form is opened. The form has three tabs, **General Settings**, **Fill Types Mapping** and **Line Types Mapping**. The general tab has the following settings:



- **Drawing name**: Name of the imported element. The default is the name of the file that is being imported.
- **Import as**: SHEET is the most commonly used type, but it can also be changed to BACKINGSHEET, ISOSYMBOLTEMPLATE, OVERLAY, SHEETTEMPLATE or SYMBOLTEMPLATE.
- **Import empty blocks**: Enabling this option imports any block that is defined but empty in the CAD file being imported. Imported blocks will be defined as SYMB elements and the symbol templates (SYTM) elements will be created.
- **Import attribute definitions as text**: Import any attribute defined in the DWG/DXF file as TEXP elements.
- **Automatic size**: Unticking this tick box enables the drop-down menu, which has a list of all defined paper sizes. Selecting a size from this list will import the CAD file to this size.
- **Open after import**: Disabling this option will only import the file without opening the result.

10.11.1.1 Mapping Settings

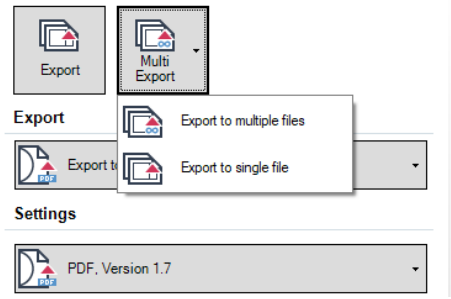


The CAD import allows mapping of fill types and line types to allow the highest possible quality. The tabs **Fill Types Mapping** and **Line Types Mapping** on the import form can be used to modify existing mappings or to create new mappings.

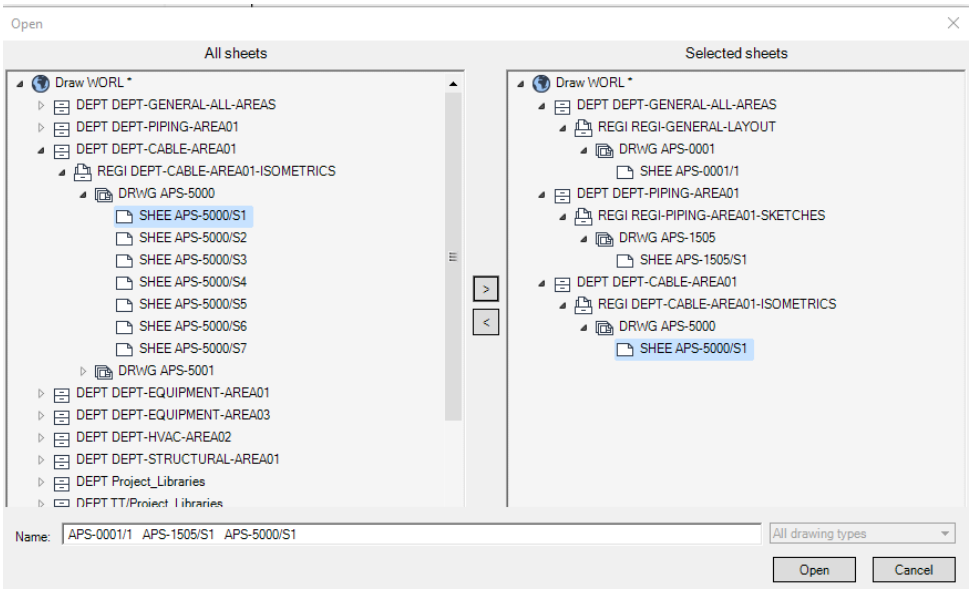
The column **Document Fill Types** is a list of what is found in the file being imported, and the **Mapped Fill Types** is what the fill type is mapped to. The entries in the drop-down menus in **Mapped Fill Types** are all fill types that are available in the current MDB.

10.12 Export

10.12.1 Multi Export



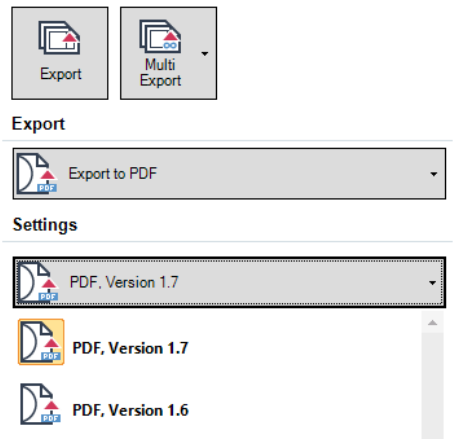
Multi export has been introduced for easy export. Multiple drawing sheets can be selected for export in one action, and as the image below demonstrates, drawing sheets can be selected from any part of the hierarchy.



10.12.2 PDF Export

The multi export functionality has the ability to export multiple drawing sheets to a single file when exporting to PDF. When the PDF destination is selected the button labelled **Multi Export** on the export page changes to a drop-down button with the selections **Export to Multiple Files** and **Export to Single File**.

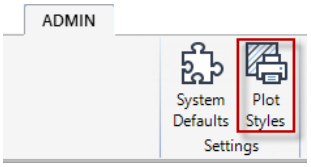
10.12.2.1 Specify PDF file version



The exported PDF file version can now be specified.

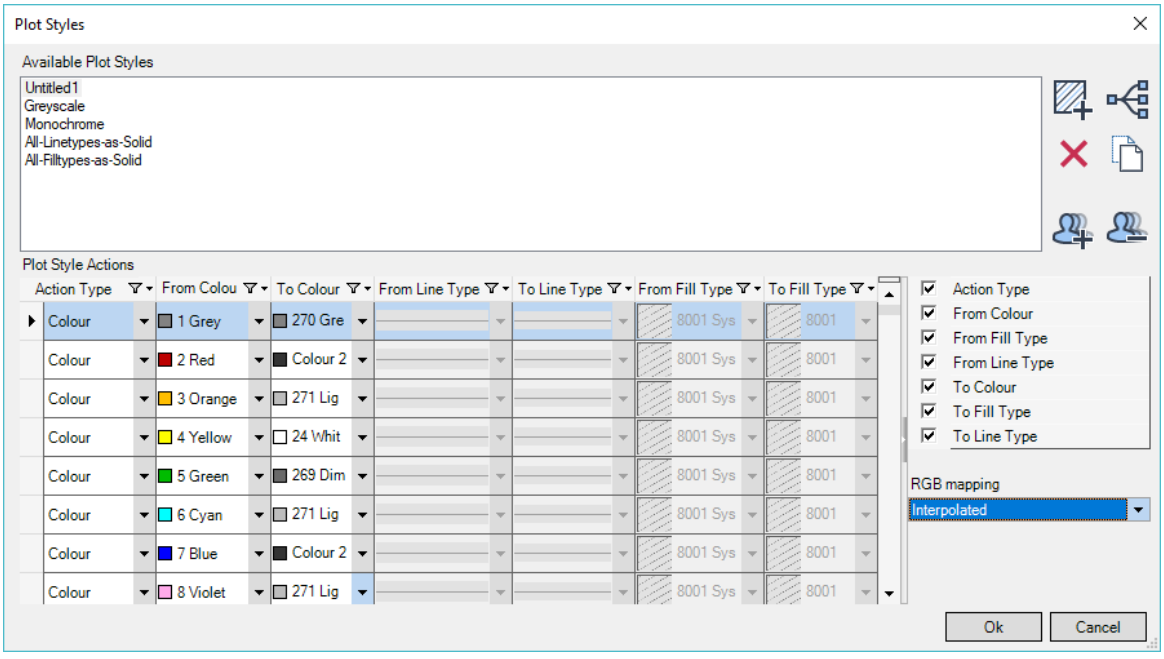
10.12.3 Plot Styles

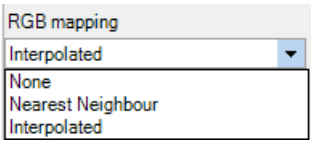
The user interface introduced at AVEVA E3D 2.1 to create and administer Plot Styles has been extended at AVEVA E3D 3.1 to allow the control of RGB colours.



To create or modify Plot Styles, the **Plot Styles** button is clicked in the **Settings** group of the **ADMIN** tab.

The **Plot Styles** form is displayed; listing the existing Plot Styles. The list(s) of actions that comprise the Plot Style are displayed in the Plot Style Actions area of the form. In the example below colours in the Sheet are to be transformed to a shade of grey (**Monochrome**) through a colour **Action Type**.





The **RGB Mapping** dropdown controls the behaviour of RGB colours for the identified plot style.

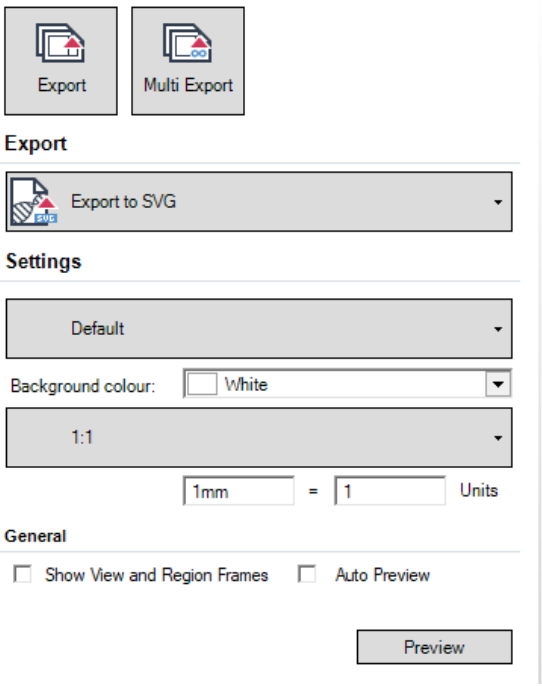
The options are:

- **None:** RGB colours are not mapped.
- **Nearest Neighbour:** RGB colours are mapped the same way as their closest colour index.
- **Interpolate:** RGB colours are mapped according to an approximation of the plot style.

*Please refer to the **AVEVA E3D 2.1 User Bulletin** for further information and the **AVEVA E3D 2.1 Migration & Interoperability Guide** for advice on the migration of Plot Styles to the Draw database.*

10.12.4 SVG Export

The SVG export has been enhanced in forming a SVG file directly. The performance of the export mechanism has been greatly improved as a result. The following new features have also been introduced:

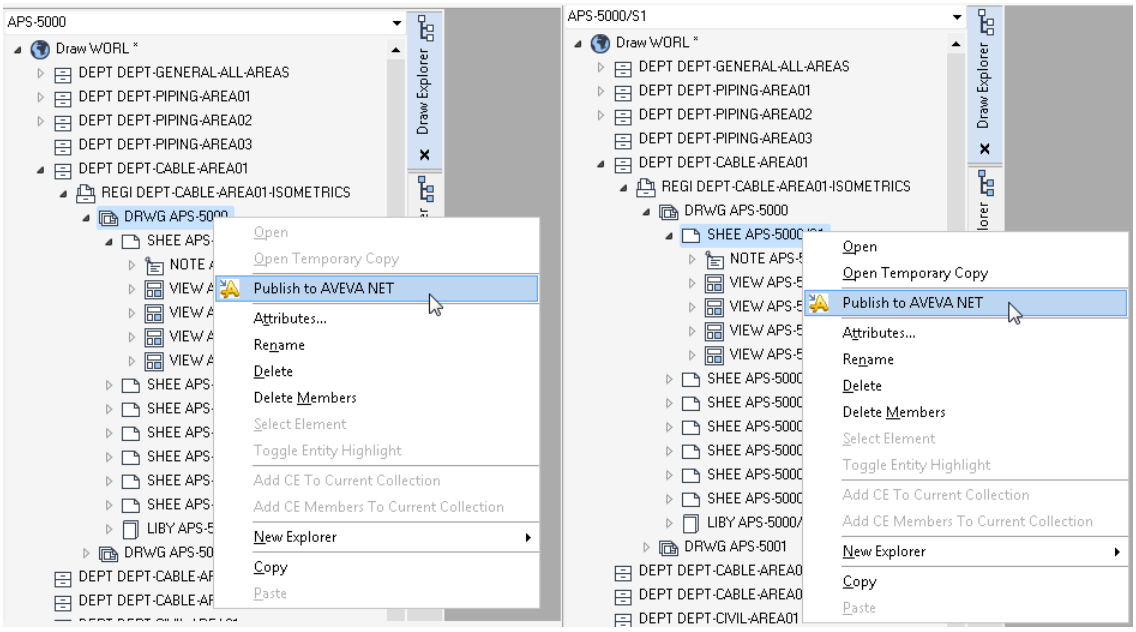


- Selection of Plotstyle to be used.
- Selection of Background colour.
- A scale can be applied to the produced file

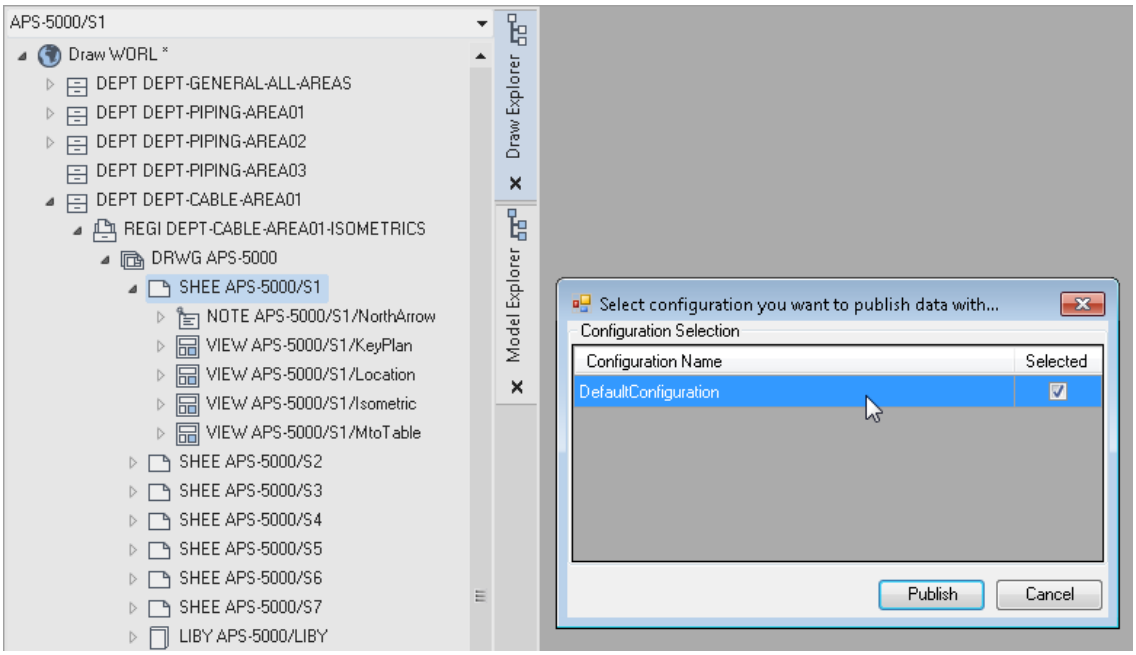
10.13 Gateways

10.13.1 Export: DRWG or SHEE via Explorer

With the AVEVA IE&D Gateway installed the **Publish to AVEVA NET** option via the right-click menu on a DRWG or SHEE element becomes active for use.



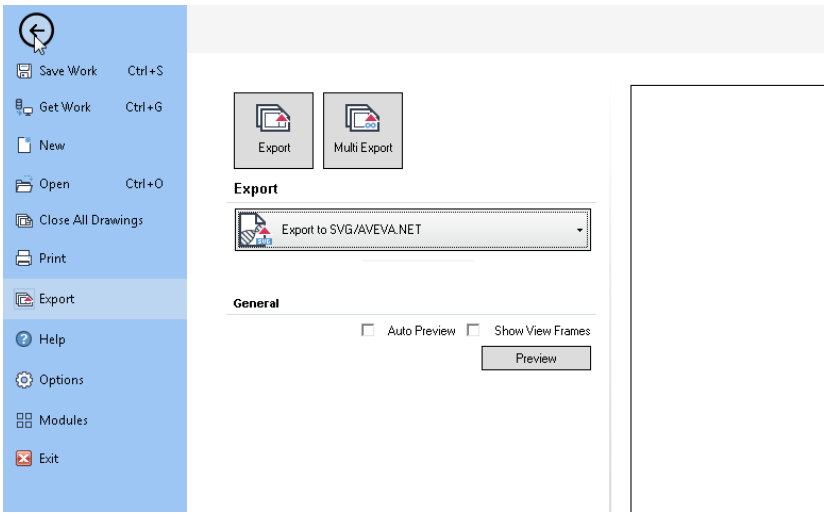
Selecting the **Publish to AVEVA NET** button presents the user with export configuration options.



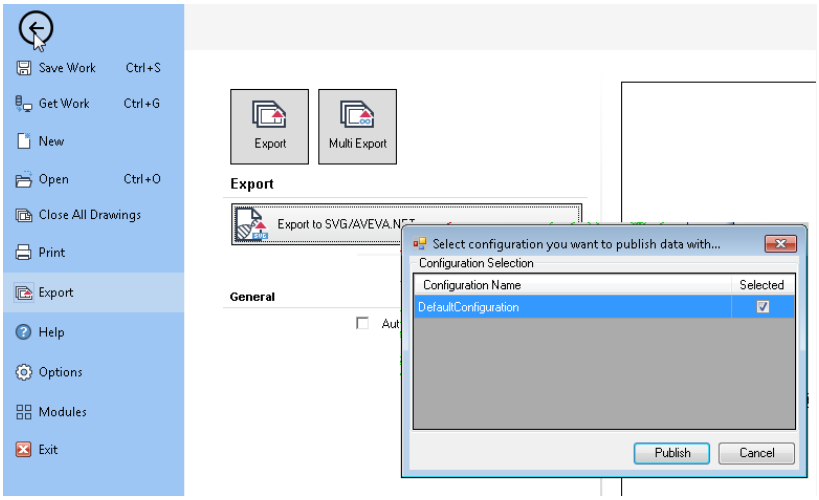
Selecting **Publish** will start export process for the selected DRWG or SHEE. In the case of selecting a DRWG, all the child SHEE elements will be processed using the selected configurations.

10.13.2 Export: SHEE via Project tab

To export one or multiple SHEE elements to SVG/AVEVA.NET via the **Project** tab the AVEVA IE&D Gateway must be installed. Without installation, the **Export** and **Multi Export** buttons will be disabled.

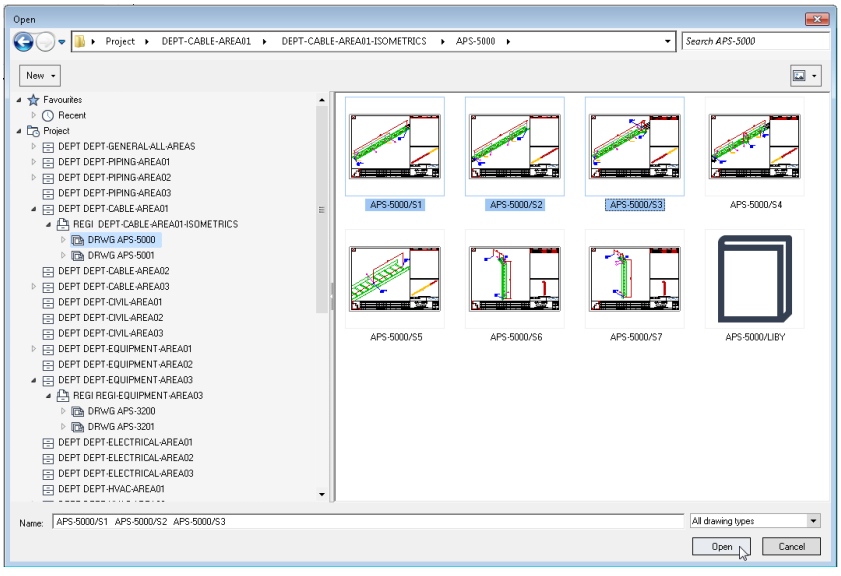


Selecting the **Export** button prompts the export configurations form.



Selecting **Publish** will start export process for the current SHEE element by the IE&D Gateway using the selected configurations.

Selecting the **Multi Export** button prompts selection of multiple SHEE elements via a browser.



Appendix A Keyboard Shortcuts & Commands

The following shortcut keys and commands may be used in AVEVA E3D 3.1.

Function Keys

F1	AVEVA Help
F2	Clear Canvas
F3	Object Snap On/Off
F4	Object Snap Projection On/Off
F5	Toggle Walk Mode On/Off
F6	Toggle Fly Mode On/Off
F7	Grid On/Off
F8	Orthogonal drawing On/Off
F9	Grid Snap On/Off
F10	Polar Tracking On/Off
F11	Toggle Shaded/Wireline mode
F12	Dynamic hints On/Off

General Keys

Delete	Deletes selected elements in 3D View with confirmation
Tab	Navigates between in-canvas input boxes
Space	Locks value in the in canvas input boxes / Repeat Command
Home or Page Up	Navigates to WORL* level in any Explorer
End or Page Down	Navigates to Bottom Level in any Explorer
Esc	Exits current CIE Operation / cancels position input/ removes selection/exits edit mode
Arrow UP	Shows In-Canvas command of last used CIE Operation
Arrow Down	Shows available Tile Icons during CIE Operation
Insert	Toggle Feature Highlight function On/Off
Backspace	Removes selection from 3D view
Enter	Confirms position, selects default option, executes command, etc.
Ctrl + A	Select All Elements in the View
Ctrl + C	Copies via Mid Position of all selected element(s)(Clipboard operation)
Ctrl + E	Toggles Distance Snap Mode On/Off
Ctrl + F	Triggers Find/Search form

Ctrl + G	GETWORK
Ctrl + I	Toggles Property Grid On/Off
Ctrl + P	Print
Ctrl + S	SAVEWORK
Ctrl + T	Toggles Pick Through Translucency On/Off
Ctrl + V	Paste Clipped
Ctrl + Y	Redo
Ctrl + Z	Undo
Shift + F4	Toggles between Perspective and Parallel modes
Shift + F7	Toggles between About Model and About an Eye modes
Shift + Insert	Paste Clipped
Ctrl + Shift + C	Copies element(s) with basepoint(Clipboard operation)
Alt + Left Arrow	Pans 3D view towards Left
Alt + Right Arrow	Pans 3D view towards Right
Alt + Up Arrow	Pans 3D view towards Up
Alt + Down Arrow	Pans 3D view towards Down
Alt + F4	Quit Application

In Canvas Commands (Model)

Command	Description
AIDARC	Invokes function to create AID type Arc
AIDBIS	Invokes function to create an AIDLIN bisecting between two non-parallel AIDLINs
AIDCIR	Invokes function to create AID type Circle
AIDFIL	Invokes function to create filleting AIDARC connecting two non-parallel AIDLINs
AIDLIN or L	Invokes function to create AID type Line
AIDPOI	Invokes function to create AID type Point
AIDTAN	Invokes function to create an AIDLIN tangential to two circles which are non-concentric
AIDTEXT	Invokes function to create AID type Text

Command	Description
ANGLE	To calculate angle between any two entities
AREA	To create area arrangement
BRACING	To specify bracing gaps for existing diagonal elements or members
CAMERA	Enables to lock view wrt an object. Also disables 3D orbit mode when it is enabled
CANCEL	Cancels any current operation in-progress
CO or COPY	Invokes function to copy selected entities with respect to a base point selected and also paste them at required locations in a loop
COPYBASE	Invokes function to copy selected entities with respect to a base point selected
COPYCLIP	Invokes function to copy selected entities without any base point
CONNECT	Enables function to connect any two GENSECs
CUTBASE	Invokes function to CUT/PASTE selected entities with respect to a base point selected
CUTCLIP	Invokes function to CUT/PASTE selected entities
CURVE	To create curve from plane
D or LINDIM	Invokes function to create db type Linear Dimension
DECKS	To create decks
DELETE	To delete selected entities
DISCONNECT	Enables function to disconnect any two connected GENSECs
DIST or DI	To calculate distance between any two entities
EM or EDITMODE	Triggers Edit Mode
ENDATUM	Create an ENDATU Fixing at selected End of GENSEC. Specs can be set only for old BS Column and Beam type profiles
EXTEND	Enables function to extend the end of a structural element to a reference element.
FILLET	To create a Fillet between two non-connected structural elements
FLY	Enable FLY mode operation
FORCETRIM	To trim an attached GENSEC to selective Pline of Owning GENSEC
FOVY	Enables option to enter new Vertical field-of-view angle(Projection mode should be in Perspective to enable this option)
GENSECDEF	Triggers function to set default specification wrt. existing GENSEC
GFITT_CRE	Enable function to create a GENSEC Fitting
GFITT_MOD	Enable function to modify a GENSEC Fitting
GRIDCY	Invokes function to create a new GRID CYLINCER for Radial Grid only in In-Mode
GRIDID	Resets IDs of REFGRDs
GRIDPL	Invokes function to create a new GRID PLANE for REFGRD in IN-Mode(Currently works for a single REFGRD)

Command	Description
ID	Queries Coordinate Positions at snapped position
IN	Triggers IN or Include mode
JMOD	Enables user to modify joints on a SECTION
LCS	Invokes operation to change Coordinate system between Local and World
LINDIMA	Invokes function to create db type Aligned Dimensions
LOOKROUND	Enables 3D Orbit mode option to look around a locked view in Perspective ProjMode
M or MOVE	Invokes function to move entities with respect to a base point selected and also paste them at required locations in a loop
MERGE	To merge two members of same element type
MI or MIRROR	To mirror any selected Structural Elements by defining a Mirror Plane
MITRE	Enables option to Mitre two ends of GENSECs
MLABEL	Invokes a function that creates a Label in 3D Canvas
MREDO	Enables user to REDO all previous actions or to desired no. of actions
NEXT	To go Forwards through Views
OUT	Trigger OUT mode by exiting IN mode
OUTALL	takes user all the way out
OSNAPD	Triggers Distance Snap Mode function
P or PAN	Enables REALTIME PAN option
PANARC	Enables function to Create a ARC PANEL using three point or two point methods
PANCIRC	Enables function to Create a CIRCULAR PANEL with multiple options
PANDIR	Pans View towards selected PLAN VIEW directions
PANDISC	Enables function to Create a DISC PANEL using Centre+ or two point methods
PANELSURF	To create panel from surface
PANELPLANAR	To create pane from grid plane
PANELNXTRDISC	Creates a Negative extrusion of a PANEL in Circular Shape in 3 different Modes
PANELNXTRMULT	Creates a Negative extrusion of a PANEL in Rectangular Shape using Multiple Points
PANELNXTRRECT	Creates a Negative extrusion of a PANEL in Rectangular Shape using Two Points
PANMULT	Enables function to Create a RECTANGULAR PANEL with multiple points
PANOFFSET	Enables function to Create a an Offset Perimeter of PANEL with multiple points
PANRECT	Enables function to Create a RECTANGULAR PANEL using two points
PANRING	Enables function to Create a RING PANEL using three point to two point methods
PASTECLIP	To paste any copied or cut elements that are available in current session
PFITT_CRE	Enable function to create a PANEL Fitting

Command	Description
PFITT_MOD	Enable function to modify a PANEL Fitting
PL or PLINE	Enables function to create a Polyline
PLAN	Set the current View to Plan View mode
PR or PROPERTIES	Open Property Window if not opened already in the application
PREV	To go Back through Views
PROJMODE	Toggles between Projection modes Orthogonal or Perspective
RADIAL	Enables option to create a Radial Grid
REDO	Redo any operation that was previously called back(Performed Undo)
REFGRD	Enables option to create a Reference Grid
RO or ROTATE	Invokes function to rotate any object around any defined axis
SCALE	To Scale a Structural Element by selecting a Base Point
SECARC	Creates an ARC GENSEC and also gives multiple options to choose the way they are created
SECCUR	Creates a Curved GENSEC and also gives multiple options to choose the way they are created
SECRING	Creates a RING GENSEC and also gives multiple options to choose the way they are created
SECTION	Creates a Straight GENSEC and gives multiple options to choose the way they are created
SELALL	To select all the elements in 3D View
SPLICE	To Splice any Structural Element(s) in multiple ways
SPLIT	To split any Structural Element(s) in multiple ways
STRETCH	To Stretch any Structural Element along a defined path
SURFACE	To create Surface
SPACE	To create space arrangement
TOWER	Enables option to create a Rectangular Tower Grid
TOWERT	Enables option to create a Triangular Tower Grid
U	To Undo any current operation
UNDO	Enables user to UNDO all operation or to desired no. of counts
WALK	Enables user to WALK around a Model
Z or ZOOM	Enables Zoom options
-VIEW or -V	To change any View between Isometric or Orthographic or Plan View
-PAN or -P	PANs view wrt base point selection
3DO or 3DORBIT	Enables 3D Orbit mode

In Canvas Commands (Primitives)

Command	Description
BOX	Invokes function to create BOX
CYLI	Invokes function to create CYLINDER
CONE	Invokes function to create CONE
CTOR	Invokes function to create CIRCULAR TORUS
DISH	Invokes function to create DISH
EXTR	Invokes function to create EXTRUSION
PYRA	Invokes function to create PYRAMID
RTOR	Invokes function to create RECTANGULAR TORUS
REVO	Invokes function to create REVOLUTION PRIMITIVE
SLCY	Invokes function to create SLOPING CYLINDER
SNOU	Invokes function to create SNOUT
NBOX	Invokes function to create BOX
NCYL	Invokes function to create CYLINDER
NCON	Invokes function to create CONE
NCTO	Invokes function to create CIRCULAR TORUS
NDIS	Invokes function to create DISH
NPYR	Invokes function to create PYRAMID
NRTO	Invokes function to create RECTANGULAR TORUS
NREV	Invokes function to create REVOLUTION PRIMITIVE
NSLC	Invokes function to create SLOPING CYLINDER
NSNO	Invokes function to create SNOUT
NXTR	Invokes function to create EXTRUSION

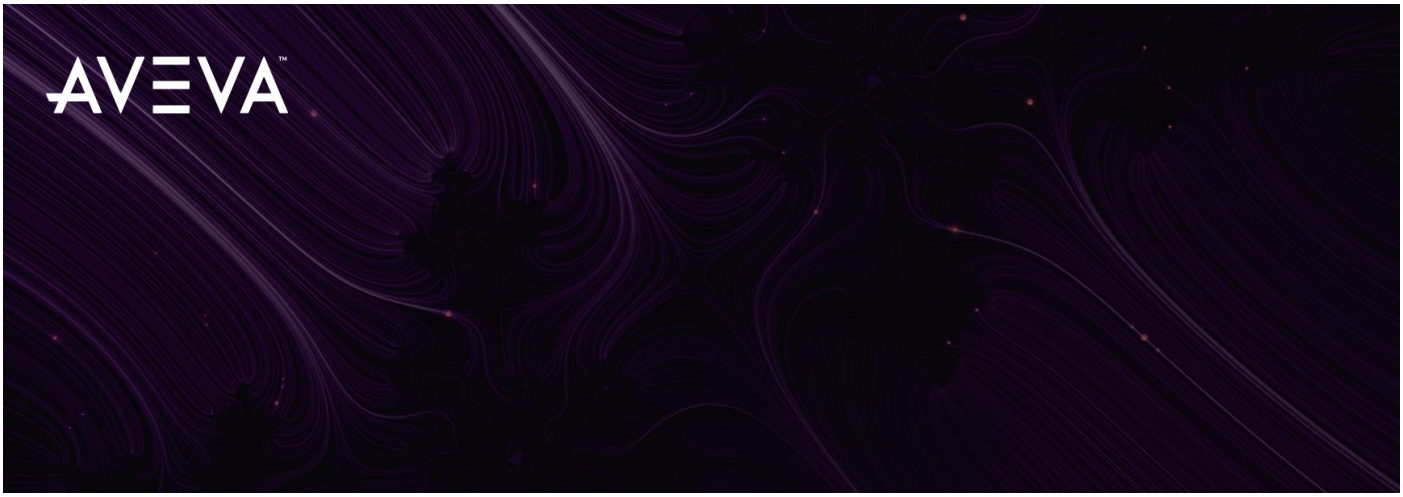
In Canvas Commands (Draw)

Command	Description
ADIM	Prompts the Annotate > Angular Dimension action.
ALIGN	Prompts Label Alignment operation
ANGLE	Prompts the Draw > Angle Measure action.
ARC	Prompts the Draw > Draw Arc action.
ARRAY	Prompts the Draw > Array Form.
BACK	Send an annotation element to the back of the stack
CANCEL	Cancels the current action.
CHAMFER	Prompts the Draw > Modify Chamfer action.
CIRC	Prompts the Draw > Draw Circle action.

Command	Description
CLOSE	Closes the current Drawing.
CLOSEALL	Closes All open Drawings.
CONNCT	Create a connector.
CONNCT_SPLIT	Split a connector into two separate CONNCT elements
COPYBASE	Prompts the Home > Copy with Base Point action.
COPYCLIP	Prompts the Home > Copy to Clipboard action.
CNPTIN	Create CNPTIN, Connection Point Instance on e.g. a symbol
CUTBASE	Prompts the Home > Cut with Base Point action.
CUTCLIP	Prompts the Home > Cut to Clipboard action.
DELETE	Prompts the Draw > Delete action.
DIST	Prompts the Draw > Distance Measure action.
DMND	Prompts the Draw > Draw Diamond action.
ELLI	Prompts the Draw > Draw Ellipse action.
ETRI	Prompts the Draw > Draw Equilateral Triangle action.
EXCEL	Prompts the Annotate > Import Excel Sheet browser.
EXPLODE	Prompts the Draw > Modify Explode action.
EXTEND	Prompts the Draw > Modify Extend action.
FILL	Prompts the “manual hatching” operation
FILLET	Prompts the Draw > Modify Fillet action.
FILLETR	Prompts the Draw > Modify Fillet with Radius/Trim action.
FLY	Prompts to set Fly mode in 3D view
FRONT	Send an annotation element to the front of the stack.
GAP	Prompts the Annotate > Insert Gap in Dimension / Label action.
GRIDRULER	Prompts Grid Ruler creation operation
GROUP	Create DGROUP element out of identified symbols
HEAL	“Heal” two connectors, join them into one.
HEXA	Prompts the Draw > Draw Hexagon action.
ID	Allows identification of Sheet Position.
IMAGE	Prompts the Annotate > Insert Image browser.
JUMP	Manually add jumps to a connector.
LABEL	Prompts the Annotate > Insert Label browser.
LAYER	Prompts the Home > Layers form.
LDIM	Prompts the Annotate > Linear Dimension action.
LENGTHEN	Prompts the Draw > Modify Lengthen action.

Command	Description
LWT	Toggles Canvas Line Width Thickness. STYLWLB
MERGE	Prompts the Draw > Modify Merge action.
MIRROR	Prompts the Draw > Modify Mirror action.
MOVE	Prompts the Draw > Modify Move action.
MREDO	Prompts the Home > Redo of Multiple actions.
MRKP	Prompts the Annotate > Marker Point action.
NAVIGATOR	Prompts the Navigation Window
NEWVIEW	Prompts tooltip to create a basic view
UNGROUP	Remove the DGROUP and place the symbols in the owning element
OFFSET	Prompts Draw > Modify Offset action.
OLAY	Prompts the Annotate > Insert Overlay form.
OUTL	Prompts the Draw > Draw Outline action.
PAN	Allows Pan Navigation of Sheet.
PANDIR	Allows Directional Pan Navigation of Sheet.
PASTECLIP	Prompts the Home > Paste from Clipboard action.
PASTEORIG	Prompts the Home > Paste to Original Coordinates action.
PDIM	Prompts Pitch Circular Dimensions
PICK	Prompts the Pick action.
PLOTSTYLES	Prompts the Home > Plot Styles form.
PREV	Returns Canvas to previous view.
PRINT	Prompts the Project > Print area.
PROPERTIES	Prompts the Home > Property Grid.
QUADD	Open the Quick Add form to quickly and easily add elements to a view.
QUIT	Quits the application.
QVPROJ	Prompts the Home > Create Quick Projection View action.
RAY	Prompts the Draw > Draw Ray Line action.
RDIM	Prompts the Annotate > Radial Dimension action.
RECT	Prompts Draw > Draw Rectangle action.
REDO	Prompts the Home > Redo of an action.
REGION	Prompts the Home > Create Region action.
REVISION	REVISION Prompts the Manage > Revision Control form.
ROTATE	Prompts the Draw > Modify Rotate about Base Point action.
SCALE	Prompts the Draw > Modify Scale action.
SECV	Prompts the Home > Create Section View action.

Command	Description
SELALL	Selects all elements in canvas.
SETCOLOUR	Sets the Current Colour in the Active Properties.
SETLT	Sets the Current Line Type in the Active Properties.
STRA	Prompts the Draw > Draw Straight action.
STYLES	Prompts the Visual Styles form.
SYMB	Prompts the Annotate > Symbol Selection browser.
SYCNPT	Create a SYCNPT element
TABL	Prompts the Annotate > Add Table action.
TANGENT	Prompts the Draw > Draw Tangent action.
TEXP	Prompts the Annotate > Add Text action.
TOTLENGTH	Prompts the Draw > Cumulative Length Measure action.
TRIM	Prompts the Draw > Modify Trim action.
STRETCH	Prompts the Draw > Modify Stretch action.
U	Prompts the Home > Undo action.
UNDO	Prompts the Home > Undo of Multiple actions.
UPDATEDESI	Prompts the Update > Update Design action.
IN	Select View and type 'IN' - Enters into Design view mode.
OUT	Exits Design view mode.
VDETAIL	VDETAIL Prompts the Home > Create Detail View action.
VLOC	Create Location Defined view
VMLOC	Create Multi Location view
VMODIFY	Prompts the 3D View Tools Tab.
VPROJ	Prompts the Home > Create Projection View action.
VSEC	Prompts the Home > Create View Section action.
WALK	Prompts to set Walk mode in 3D view
XLINE	Prompts the Draw > Construct XLine action.
ZOOM	Allows Zoom Navigation of Sheet.
3DORBIT	Prompts a 3D Orbit operation in 3D View Mode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