



TRICAD_{ms}

Building Services Engineering



The well-proven 3D solution for the engineering design of buildings.



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Well-engineered, well-proven and efficient.

VenturisIT Building Information Modelling (BIM) provides you with the complete set of tools for the software-aided design, implementation and management of buildings.

Using this unique variety of design modules, you combine and network all the relevant building data in one three-dimensional virtual model. TRICAD MS® – the leading industry solution for building services engineering, digital factory design and plant design – has been optimising the intelligent management of data for more than ten years. This enables you to save time in the realisation of your ideas using a single environment. The main advantage: Even with complex projects your designers do not need to work with different tools. Instead, they always remain in the familiar, trusted environment. This means that you can cover all aspects of construction even with a smaller project team and share the data with your design engineers.

Identical handling in all aspects of construction.

The principle of operation with TRICAD MS® is almost identical in each module. Not only that, the data are available throughout, i.e. they only need to be entered once. In this way you significantly reduce your time and labour outlay. Also important are the integral computa-

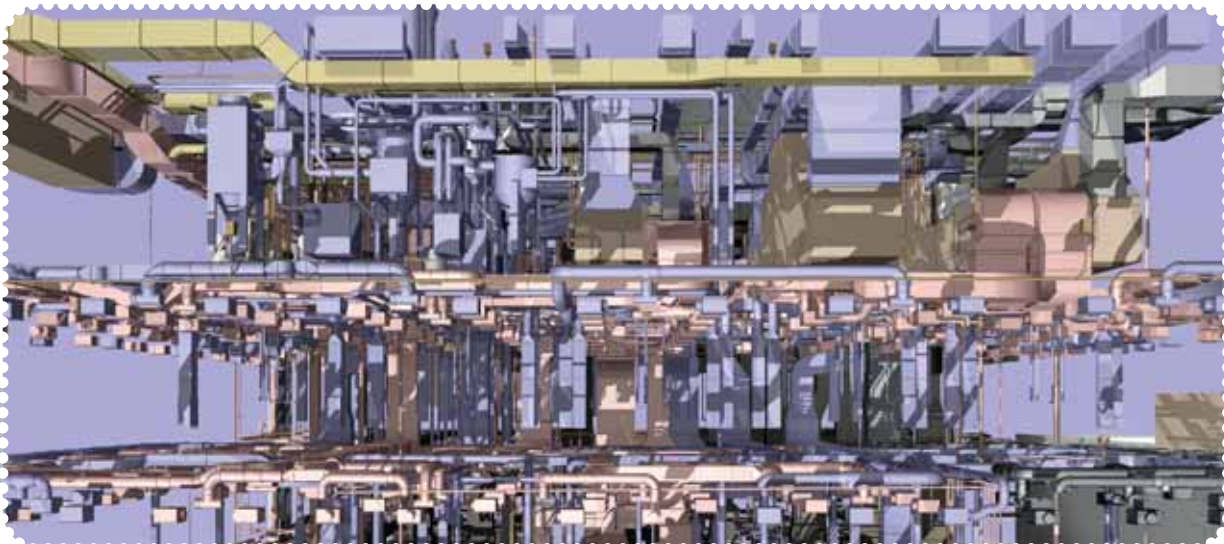
tion features. These include the sewer system and pipe network, waste water and radiators through to the VdS sprinkler calculation using IDAT. The advantages of the universal, networked TRICAD MS® design package are plain to see: With several licenses in the company you effortlessly establish a standardised environment for all modules. With the aid of this standard your design engineers can work together following the same guideline.

Easy familiarisation and a fast learning curve.

The introduction of TRICAD MS® increases your productivity. Due to the simple structure, you can be working productively with the software within a few days. Each module is structured in the same way. A database is not essential since all information is contained in the DGN file. Our ground-breaking software solution also secures your investment in training and building data, providing direct competitive advantages through high versatility.

The main advantages at a glance:

- Universal process from design through to installation
- Fast implementation of changes in the 3D model
- Different views or mass assessments at the press of a key
- Extensive exclusion of collisions by the designers
- Consistency over more than ten construction trades



General information on TRICAD MS®

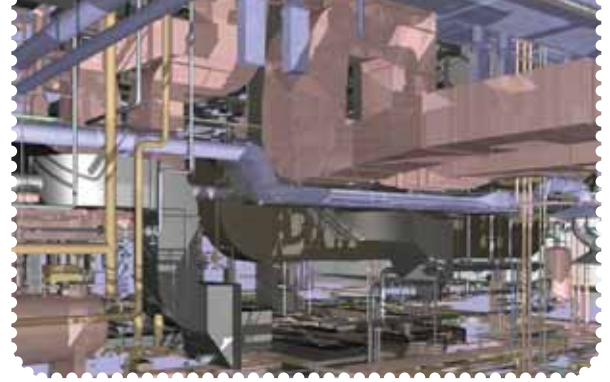
All TRICAD MS® modules are fully integrated into the CAD basic platform, MicroStation. Consequently, in our software you have whole functional range of the basic core system available. This includes:

- Accudraw
- Reference technology
- PDF output
- Standard interfaces such as DWG, DGN, DXF, IGES, STEP, etc.
- Wide variety of image formats (tiff, bmp, jpeg, etc.)

Furthermore, with TRICAD MS® you make use of many additional functions, such as for example setting up floor heights and installation levels or the definition of design angles and much more. You edit the settings files located in TRICAD MS® and in this way adapt the system to your individual CAD guidelines.

Even in the standard version, the software enables you to fully hatch conduits, pipes and components and to also display the covered edges (online) or a wire frame model. The 3D modules are the ideal tool for the model-orientated design and processing of highly complex plants and control facilities. The size of the plant does not matter. The automatic generation of shadow and tier symbols as well as covered edges, dimensions and positions and mass assessments takes place identically in all TRICAD MS® trades.

Using the Report manager various list assessments are available via Excel. For example, you can calculate screw lengths and list the quantities. You have the possibility of implementing the design of apertures in each trade independently of the architecture. You can produce legends for the positioned components automatically in the model. All the attributes of each object can be displayed using the Info button. The labelling of the objects is associative and therefore changes automatically.



You can design the insulation at any time later. From over twenty different types of insulation you choose the one required or you can define your own insulation. Realise your design as external or internal insulation with an appropriate thickness. In particular for the AutoCAD® area, you can convert all the attributes (object data) into a DWG format. In this way you enable an AutoCAD® user to read out the complete information on object attributes from TRICAD MS® using pure AutoCAD® without running any application.

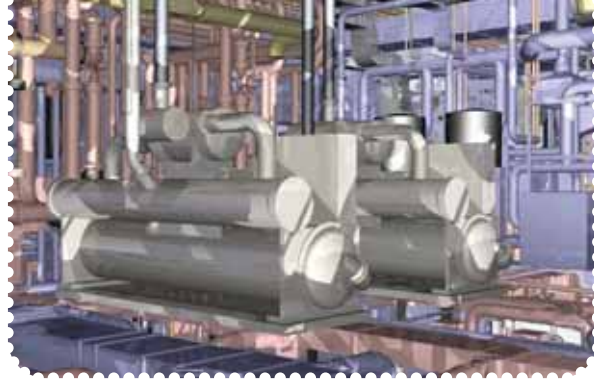
You can map a plant using a tree structure as found in Microsoft Explorer and search for components which can be changed very easily. To do this you do not need to find the component in the CAD drawing itself, but rather just modify the attributes.

Building Module

Using the Building Module you can produce 3D ground plans quickly and easily. This is done by simply positioning the floor slab by defining the corner points. You can parametrically position the walls via the start and end points. Alternatively, you have the possibility of selecting the lines in the 2D ground plan and of arranging the wall according to the line.

Materials are easily assigned for all components. You can simply fit windows into the wall, irrespective of whether pivoting or sliding windows are involved. All the assigned attributes can be displayed. The Building Module enables you to insert openings at any time and to modify them retrospectively in the design.

Heating /Sanitary



These modules are suitable for use from the draft through to the installation planning. From 2D inclusive schematics through to 3D for the most complex plants, TRICAD MS® offers specially developed solutions for planners, engineers and designers in building services engineering.

You make the choice of media – which particular medium with the automatic assignment of colour, line thickness and level is the correct one. You can change the types of media at any time or define them yourself. You can freely specify the supply lines, cooling lines, gases and oils as required. Depending on the trade involved, you have more than 25 different materials available for your design. Choose between different types of joints, such as welded, coupled, flanged or pressed pipes. The shaped parts include a wide range of possibilities, for example, pipes, bends, T-pieces, swept lateral elbow fittings, bifurcated pipes or flexible pipes.

High performance for complex building systems.

You can define a pipe very quickly by selecting the start and end point. The bends are set automatically. You can adjust the gradient during the design or retrospectively. You determine the exact point on the pipe by specifying the design angle. You can do this very simply by selecting an existing wall and entering the dimension for the spacing of the pipe to the wall. To do this you only have to trace along the wall.

The Multipipe function enables you to plan any number of pipes, adjacently or one above the other, by selecting a point. Of course, here you can specify various media, materials, insulation, dimensions and spacing. With the design aids you can easily join pieces of pipe using bends, T-pieces and connection pieces. You have a configurator available, which has been developed in-house, for quickly and individually generating boilers, vessels, manifolds and other equipment features.

With regard to boilers, you can generate wall-mounted, vertically or horizontally mounted boilers with and without a substructure as well as insulating boards. You select the connecting branches individually according to the relevant type of connection. With manifolds, by specifying the height for fittings, you can carry out their complete alignment later. Since the fittings are filed parametrically, their size is adapted without further ado when selecting the position of a pipe.

Automatic functions increase productivity.

The retrospective modification of pipe dimensions produces an automatic adaptation of the fittings. You can assign new dimensions simply using Excel. Flanges are automatically set following the piping design. The calculation of pipe networks has already been integrated into TRICAD MS® Heating and can take place directly after the piping design. The computed values are accepted and the pipe network adapted appropriately.

Make use of the possibility of insulating pipes using solids and lines. You can define them completely freely or according to DIN. You can lay out and position radiators both as dummies or according to BDH EN 442. With a retrospective change of size the connected pipes are adapted automatically. You can design the under-floor heating according to your requirements and display it completely in drawing form. A separate approximate calculation for the waste water piping can be implemented. For production you can produce optional isometric drawings at any time for the planned pipe networks. Automatic dimensioning, issuing of position numbers and mass lists are integrated into the isometrics.

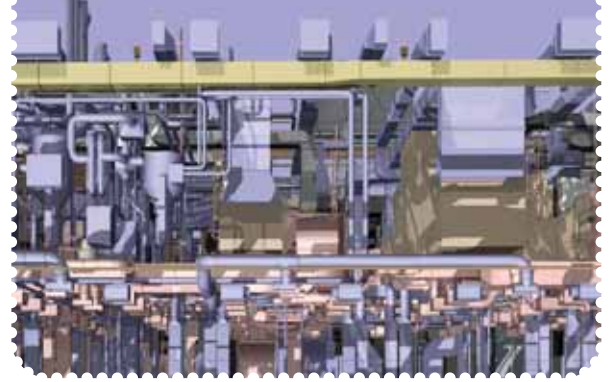
Ventilation

You can use the TRICAD MS® Ventilation Module as a 2D solution incl. schematics just as easily as a 3D design and construction tool. This means that it is suitable for designers, construction companies and operators. The main advantages of our Ventilation Module are the extensive 2D and 3D functional features and easy operation.

Using a space plan, you can acquire the size of the space and define the volume flow depending on the air change rate. Before the first design the duct slide supports you by accepting the volume flow from the space macro and the computation of the duct cross-sectional area. With the duct you define the a or b dimension and the speed for the computation of the cross-sectional area. You can make use of the possibility of freely adjusting the medium and material, the frame and the connection, through to the floor cavity and the insulation. Using a tier file, you can simply define the appropriate height for the duct. You have the following basic variants available for the ducts: rectangular ducts, pipes and oval pipes. The component sizes are specified by parametric inputs.

Select the appropriate shaped parts for the respective basic variant. These include:

- Rectangular or round bend, symmetrical or asymmetrical elbow transitions
- Symmetrical/asymmetrical tiers
- T-pieces
- Bifurcated sections
- Rivet plates
- Separators
- Reductions/expansions
- Muff transition
- Inspection cover, etc.



Once the size is established, you design the duct by selecting the start and end points. You can modify the cross-sectional area any time retrospectively using the Info button and then adapt the duct cross-section. Using the design aids, you have the possibility of drawing just sections of a duct. With the selection of two ducts they are automatically joined together, using bends, T-pieces or saddle fittings.

You modify the straight duct, in particular with bearers, by clicking on a tier. Assign the outlets using VDI 3805 or a component catalogue. Select outlets, for example, from TROX, Schako, Krantz or Siegle and Epple. You can also specify the volume flow for the respective outlet. Connect the outlets automatically or choose one of the specified methods for this. In this way you quickly cover all the variants. Make use of the possibility of computing the dimension of the connection without further ado or of accepting the cross-section of the outlet. You can carry out a calculation of the cross-sectional area at any time and the dimensions are adapted appropriately. Optionally, you can compute the pressure loss for the duct network.

Specifically for Promat, you have available a special functional feature with appropriate displays for direct differentiation. For the ventilation unit you can use the existing configurator which supports you in the variable design of the feed and exhaust units. Assign the fitted length or specify the actual and fitted lengths of the pipes retrospectively. The positioning of the ducts occurs automatically. Click the start and end elements and the components are then positioned singly or as a sequence. You can transfer the design data directly to production via Klimax.

Sprinklers



From draft to installation planning, with this module you cover the complete spectrum for the purely 3D-oriented design, rating and evaluation of sprinkler systems according to VDS, SES or VKF. After deciding on a standard or fire hazard category, you can select the appropriate sprinkler types in order to determine the distances and maximum areas to be maintained according to the relevant standard.

Specify an installation height for the sprinkler heads as a position or Z coordinate. Determine the space using a border or a polygon area and produce a grid automatically. You can modify the default values at any time and thus adapt the grid. In addition, the sprinklers can be automatically assigned to the grid. Here you have the choice: Assign a dummy sprinkler to the grid or select the appropriate type of sprinkler which you want to assign. You can then check the sprinklers.

For this you have the following filters available:

- Maximum area per sprinkler
- Maximum spacing between sprinklers
- Maximum distance to the wall
- Minimum distance to the wall

The various selection filters are illustrated in colour in the drawing. Of course, you can also move the individual sprinklers after positioning them. By placing a border around the sprinklers and clicking the distributing pipe you connect the sprinklers using a comb or double-comb connection. Alternatively, you have the possibility of selecting an individual sprinkler or of using a method of connecting them individually. You can then also use this method for other sprinklers.

Tools required for precise working.

For the design of piping you have a wide range of materials available with various types of connection, such as for example, "fluted" and "flanged". Using the media selection, you control the specific medium with the automatic assignment of colour, line thickness and level. You can change the types of media at any time or define them yourself. Design aids support you in the connection of pipe sections using bends, T-pieces and connection pieces. You can generate vessels, distributors and devices quickly and easily using special configurators.

A pipe can be defined very easily by selecting the start and end points. The bends are set automatically. You can define the point on the pipe exactly by specifying the design angle. And even easier: Select, for example, an existing wall so as to enter the dimension for the distance to the pipe. In the further design you only need to move along this wall. Most fittings are assigned parametrically and on the selection of the positioning point in a pipe they change their size automatically. When the pipe dimensions are changed retrospectively, the fittings adapt automatically. You can expand new dimensions simply using Excel.

Optionally, you can compute the sprinkler network using the IDAT computation. We would be pleased to supply further information on request. Using the supplementary tool Iso X, you can produce the production geometry of the designed pipe networks. Automatic dimensioning, issuing of position numbers and mass lists are integrated into the isometrics. This facilitates the prefabrication of the pipes.

Electric



This module is excellently suited to electrical installations in 2D architectural ground plans and to 3D building models. Here, you have comprehensive libraries available in 2D and 3D for the complete scope of the electrical installation. They extend, for example, from fire detection and communications technology, the European Installation Bus (EIB), through to the planning of escape and rescue routes. Position a wall freely or by selection. Each component can be simply aligned by moving the mouse.

Simplify the positioning of luminaires by placing a grid over the relevant area using a space polygon or border. You can calculate the luminance or the luminous intensity using the efficiency method. Simply define the control cabinets (2D/3D interfering contour) using a specific configuration interface. With this aid you can individually design the control cabinet, for example, with one door or two doors at the front or rear, closing to the left or right, with the position defined by the side and upper or lower spacings.

2D/3D Cable Routes

For the design of cable support systems you have the choice of a wide variety of manufacturers such as Rico, PUK, Niedax, Bettermann, MFK, etc. You therefore have the possibility of designing cable and mesh trays as well as cable ladders. From the various shaped parts in the relevant system you select the right one. This includes bends, branches, crossing sections and reducers. Without further ado you can select routes in size and type and display them as volume models. You can provide all routes with partitions. Supports, such as for example, cantilevers and brackets as well as suspended stays and end plates, can be automatically positioned along the route. Use the integrated design aids for the easy connection of cable routes around corners. In addition, you can move and copy route installation parts, such as T-pieces and reducers, very easily within a route.

Cable Route Allocation

With cable routes you have the possibility of appending the information "assigned to cable XY" to the relevant segments, the start and end of the route, T-piece, branch or reducer. Here, the total weight of the cables laid in this segment is added up and stated. Also the extent to which the segment is filled can be calculated and interrogated based on the cross-sectional areas of the cables. As a result, you obtain a list assigning the individual cables and route segments. Retrospectively you can append further nodal points and cables and, where necessary, select a different, stronger or larger type of cable tray for the segment.

3D Busbars

This module helps you in the 3D design of busbars as an edge-interference model. It comprises commonly-used components in heavy current engineering. To ensure the correct phase relation and spatial alignment, the positioning of follow-on elements occurs in dependence of elements which have already been positioned. You can assign position numbers to the outgoing feeders and manually block them.

Define the graphical characteristics using various display rules, for example, as a rail, centre line or as working space for straight sections with outgoing feeders. Generate type or order numbers for all components during positioning. You can output these again appropriately in lists via Excel. Label the components with all properties. Currently, the catalogues KHF, KTA, KS from the Canalis system from Schneider Electric and BD2A/C and LDA/C from the Sivacon system from Siemens are included. Further catalogues can be integrated as required.

Schematic

You can use the TRICAD MS® Schematic module for designing the Heating, Ventilation, Sanitary and Sprinklers. In this way you quickly and easily generate a schematic with grid features and the automatic detection of pipes for the positioning of components.

Decide based on module orientation which application is relevant to your field of work. Design pipes using the single or double-line mode in the relevant trade via the grid. Make use of the possibility of selecting materials, types of media and dimensions or design simply only using lines. Furthermore, there is the possibility of assigning plant and pipe names. Comprehensive component libraries with the most important standards offer you the required support in this respect.

Select a component and move along the relevant pipe with the mouse. In this way the component aligns itself automatically. Confirm your action and thus define the relevant direction of the fitting. The pipe is parted and the component inserted. Of course, you have the opportunity of copying, moving and rotating all components. All component attributes are integrated into the drawing and can be displayed individually via the TRICAD MS® Info button. Using the rubber-band function you can modify the pipe network at any time. The complete plant can be displayed in the sequence of the components used with the aid of the structural tree. Furthermore, this function enables you to simply modify the attributes. Finally, you can generate a list of the positioned components using Excel.

Infrastructure

With this tool you can design and evaluate all the main pipe and duct systems located underground with their associated fittings and components. The functional scope is identical to that of the Sanitary section.

Furthermore, specific manufacturers, such as Brugg, PAM and Rehau, are available for the expanded design. The types of media can be freely selected, whereby standards such as sewerage, mixed water, gas pipework and electrical cable are already assigned. Pipe runs can be designed with a gradient to suit the pipe bed and electrical lines can be laid with the appropriate bending radii. Furthermore, you have the possibility of designing pipes and cables simply as bundles in various types of media and sizes, etc. You can then bring out individual pipes or cables.

Insert single parametric shafts and then link them by clicking on a pipe with a gradient. Apart from shafts, for your design you can use rain and drain channels, hydrants, round and rectangular vessels, street lighting, expansion cushions, floor drains, grease separators, pump stations and much more. The freely definable selection of these components occurs analogously to all other trades using XML files.

Qualitool

It is difficult to overestimate the importance of the Qualitool, because the CAD data quality of your projects is becoming increasingly important. The inspection should take place as early as possible in the process, particularly because the data inspection and documentation take up so much time. Using the Qualitool check the design files for the specified company standards and document the inspection results directly in the drawing. This enables you to implement the automatic correction of your data.

Here is a summary of the functions in more detail:

- Inspection of MicroStation elements (level, colour, type of line, etc.)
- Checking of the TRICAD MS® intelligence via rules
- Comparison of the data with env (CAD specification)
- Generation of inspection logs and issuing of an inspection stamp in the drawing
- Examination of single or multiple files (batch) and issuing of an inspection stamp
- Statistics function with log
- Checking of open strings

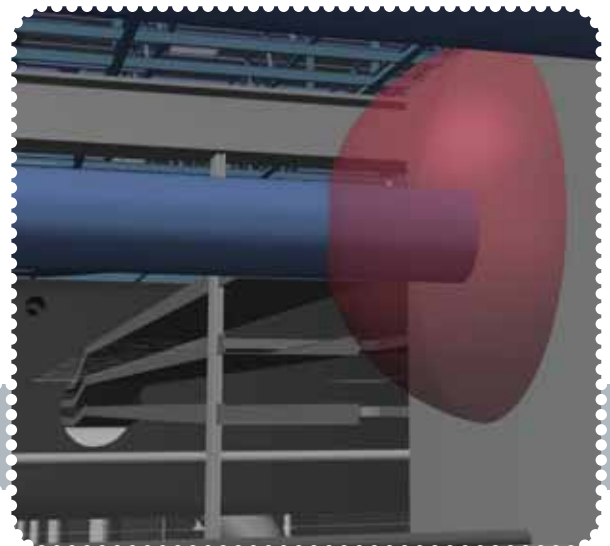
NavisClashBack

This programme allows you to read any Autodesk®-Navisworks®-XML collision file. NavisClashBack checks whether all drawings belonging to the entered collisions as master or reference files are loaded in MicroStation and displays missing DGN files.

Display all collisions at once in MicroStation and then process them. By clicking on the listed collisions centre the colliding units in a set view and mark them with a ball on the collision point.

To allow you to quickly find the complex models, the following aids are available:

- Extract external reference files
- Extract all objects from collision units
- Flashing display of collision units
- Automatic preparation of segment volumes around collision units
- Display of collision density
- Simple change in size and display of marking ball



Fire Protection Layout

Use the TRICAD MS® Fire Protection Layout to prepare escape and rescue plans, complete with fire protection symbols, guides and labels, and including planning of direction arrows, area identification and edge markings.

This module was developed for Daimler AG. Care was taken to achieve easy expandability and adaptive functionality, so it can be used successfully throughout the world.

Its use was adapted to the entire TRICAD MS® product assortment, so every TRICAD MS® user can quickly learn to use this module. Cells saved by the user can be made globally available by the key user, so double cells and the time needed for them are now things of the past.

With the TRICAD MS® Cell Selector, cells are placed in MicroStation drawings. The program reads various XML files and graphically replicates the XML tree structure. The cells assigned to the active XML node are listed, and the attributes and graphics belonging to the active cell are displayed. The cell can be placed by double-clicking on the cell in the list box. The tree structure can be built up independently of language; all displayed texts are replaced by the layout program depending on the set language.

With the list function, the layout cells in the MicroStation file can be recorded in terms of their number, and the attributes in the cells can be evaluated. The list is output through a Microsoft Excel file (optional).

The rules of behavior in case of fire and in case of accidents are presented clearly and in short, concise form. For the behavior in case of fire, the same presentation is normally chosen as for the Fire Protection Code Part 1.



The escape and rescue plans are presented in accordance with DIN 4844-3 and BGV A8 (German Employers' Liability Insurance Association regulations). Especially in public buildings, it can also make sense to prepare the documents in multiple languages.

With this tool, owners and operators of buildings and large-scale facilities can easily meet the legal obligation to post escape and rescue plans "when location, extent and type of use of the workplace require it" (§4 par. 4 Arbeitsstättenverordnung (German Work Safety Regulation) of 20 July 2007):

- the building floor plan or parts thereof,
- the course of escape and rescue routes,
- the location of first-aid equipment,
- the location of fire protection facilities,
- the location of assembly points,
- the location of the viewer.

Highlights:

- Placement of fire protection symbols
- Leader lines
- Planning of direction arrows
- Symbol groupings
- Adaptation of symbols
- Expansion of symbols
- Dimension evaluation

Symbols:

- Fire protection symbols
- Rescue symbols
- Hazard symbols
- Firefighter symbols
- Own symbols

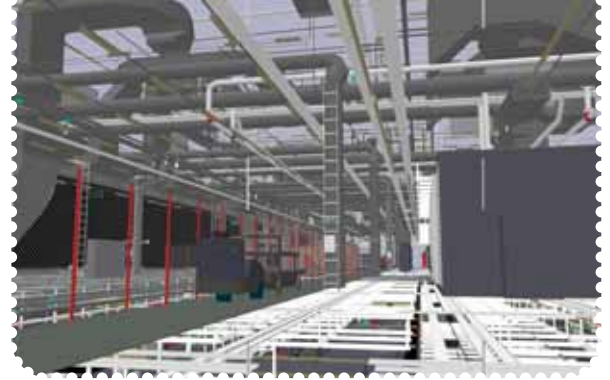
TRICAD MS® Digital Factory Design

In the Automotive factory design segment TRICAD MS® has in the last few years developed into an essential application for the German automobile industry. In cooperation with the VDA (Verband der Automobilindustrie/German Automotive Industry Association) VenturisIT has implemented several CAD orders to complete the layout product range in the context of the digital factory.

In addition to the automobile industry TRICAD MS® is also involved in many other factory design market segments. On the basis of its ability to penetrate into technical building services and plant design, you can cover the digital factory planning with just one tool. This means that TRICAD MS® represents the ideal addition to your company.

Using the following modules determine which application you would like to handle:

- Conveyor Systems
- Steel Platforms/Steel Construction
- Paint & Coating Systems
- Tractory Curves
- Crane Units
- Swarf Conveyors
- Layout Module



Using this unique variety of planning modules, combine and network all relevant building data in three-dimensional virtual mode. Use TRICAD MS® to optimise the intelligent depositing of data. This allows you to implement your ideas in a unique environment while saving time. Its essential advantage is that even with complex projects your construction engineers will not work with several different tools but always remain in their usual environment.

Make data constantly available by just entering everything once. This considerably reduces your consumption of time and energy. Use TRICAD MS® to increase your productivity. Thanks to a simple structure, within a few days you can work productively with the software. Each module is built in the same way. There is no need for a database, all the information is contained in the DGN file.

Its special features include the fact that all components come in a parametric geometry and can be configured in any way you like. Hence the TRICAD MS® 3D model allows you not only to map the complete building or factory, it also guarantees your investment in training and building data, thus creating direct competitive advantages with a high level of flexibility.



TRICAD MS® Plant Design

TRICAD MS® represents the ideal supplement for your company for plant design, pipe network construction or paint and coating technology. Due to the interfacing with building services engineering and factory design, you are able to cover all aspects of plant construction.

Here, you decide based on module orientation which application is relevant to your field of work:

- P&ID
- 3D Piping
- Pipe Categories
- Database (vDB)
- Isometrics (Iso X)
- Report Manager
- Construction Modelling
- Structural Steelwork

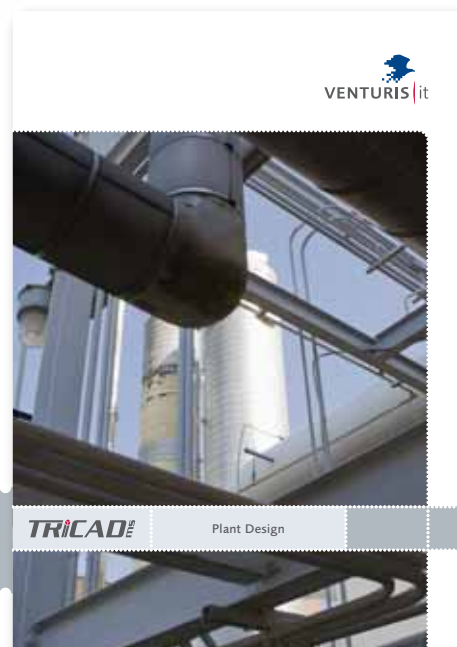
Use the unique possibilities of combining intelligence and intuitive features through synergies between the individual modules. The impressive highlights include the full integration of P&ID and Piping 3D for plant construction in the standard functional features of MicroStation with its intuitive operation. Avoid redundant data by saving the drawing intelligence directly in the design file.

You can obtain more information from the TRICAD MS® Digital Factory Design and TRICAD MS® Plant Design brochures that we can send you if you wish.



Work interactively between the modules thanks to a central database which you can switch in as required. In this way you expand the possibilities presented to you by the TRICAD MS® modules P&ID and Piping 3D. You can make this combination of modules an even more powerful and effective design tool by the 100% matching between 2D and 3D.

The linking of existing databases to TRICAD MS® is also possible. You can also assign externally available documents and specification sheets and/or parameters for vessels, pumps, etc. to the object. Finally, you can generate the production isometrics incl. dimensions, parts and welding seam lists using Iso X. The PCF file generated thus contains all the key data you need for the stress computation with ROHR2 from SIGMA Ingenieurgesellschaft mbH .



TRICAD MS® Licensing Model

Each software package installed at your company needs a licence. Use the various options offered by the TRICAD MS® modular licensing model:

- Local licence (single terminal solution)
- Floating licence (flexible server solution)
- Floating licence with check-out
(all the benefits of a server licence without foregoing the flexibility of a single terminal)

If you check your software status and have to order missing licences again, we will be happy to help.

MicroStation System Software

MicroStation V8 XM is the CAD basic platform for using the TRICAD MS® product range. This platform-spanning high-end CAD solution is operated world-wide in various market segments and forms the basis for all your constructions and models, plot management and the graphic display of your work. You can attach data in DGN, DWG and DXF format using reference technology. A hybrid treatment is likewise possible. A floating licence is installed in the form of a service on a Windows server.

System requirements

Hardware	Current standard PCs or notebooks
Operating system	Windows XP Professional or higher
CAD core system	MicroStation V8 XM Edition/ PowerDraft 2004 Edition or higher
Display screen	Single or double screen solution possible
Graphic cards	All graphic cards that are permitted for MicroStation, at least 256 MB or higher
RAM, memory	At least 2 GB, fixed disc >100 GB



VenturisIT and TRICAD MS®

Together with TRIPLAN Engineering, VenturisIT has in the last 20 years invested in employees, software and technology in order to develop a general range for customers in edificial engineering, plant design and digital factory planning.

With the introduction of the TRICAD MS® product range for PC-based 3D construction, VenturisIT has set a milestone in the engineering market. Worldwide, considerably more than 3,000 installations and more than 450 employees in the group of companies have made us one of the leading suppliers and developers of IT complete solutions. The resounding success of TRICAD MS® confirms us in the aim of continuing to offer solutions and process-oriented IT products and concepts appropriate for them, guaranteeing our customer the maximum use of cutting edge technologies.

TRICAD MS® has also contributed decisively to the success of the global integral planning of German car manufacturers in digital factories. This strategic goal has led to all highly complex factory plants revamps and rebuilding being visualised three-dimensionally before implementation.

All essential professional trades are considered for various planning concepts in a virtual space and checked for constructability. Today VenturisIT is an international software company which creates synergies with its customers. Together we are pursuing the goal and vision with which our company was founded: Innovation as the means to an end and not an end in itself.

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- Eisenman
- Fraport
- Henkel
- Imtech
- Kuka
- Miele
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- Volkswagen

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