

PERFORMANCE HIGHLIGHTS

ALLPLAN BRIDGE MODELER

Allplan Bridge Modeler is the powerful solution for four-dimensional parametric modeling of bridges. The software supports engineers in all planning phases, from the initial concept to the execution plan. The parametric description of the bridge model takes usability to a new level and allows engineers to work flexibly and quickly.

MODEL CREATION WITHOUT COMPROMISE

Allplan Bridge Modeler has been developed by recognized bridge experts – the Allplan Infrastructure team at Graz – and to the requirements of bridge engineers. The 3D parametric model description considers the road layout, bridge alignment and required cross-sections, making model configuration quick and efficient. Complex geometries including double curved alignment and variable cross-sections can be created easily with the help of alphanumeric entries and formulas. For example, the user only needs to define one typical cross-section and Allplan Bridge Modeler will accurately calculate all cross-section variants in accordance with the defined table(s) or /and formula(s). A complete 3D bridge model cannot be generated more easily or quickly.

CHANGES MADE IN NO TIME AT ALL

Allplan Bridge Modeler helps you to manage the inevitable changes that occur during the design process. The parametric model description is an ideal base for adapting design changes. The modifications are incorporated only at their origin and all other linked members are automatically updated. For example, if the road axis changes the complete bridge geometry will be adjusted. If only a certain structural member is modified only directly linked elements will be recalculated.

SAVE TIME WITH PARAMETRIC OBJECT PLACEMENT

Objects from the Allplan Engineering library can be referenced in Allplan Bridge Modeler to add further details such as lamp posts or anchor devices of tendons to the bridge model. To do this, reference points are defined in Allplan Bridge Modeler, using variables along the bridge. These points are linked to the object in the Allplan library using the respective name. When the parametric model is transferred to Allplan Engineering, the corresponding objects are positioned at these reference points. The position of these objects is automatically adjusted whenever the model is updated.

SMOOTH DATA EXCHANGE

Integrating road data used for road/bridge alignment is easily achieved via ALLPLAN's open BIM platform Allplan Bimplus. The bridge engineer must only take over the road data and can immediately start with the bridge design. To assist the engineer even further, the bridge model can easily be transferred to analysis software (such as RM Bridge by Bentley®) for structural calculations. Once the design is completed, the parametric model can be transferred in Allplan Engineering for completion of pre-stressing and reinforcement drawings.

CONVENIENT OPERATION

Compared to mechanical engineering CAD software or traditional 2D drafting, working with Allplan Bridge Modeler is very convenient and specifically tailored to the requirements of bridge engineering. This leads to an essential optimization of the working speed. Furthermore, you can use Allplan Bridge Modeler on multiple monitors at the same time. Allplan Bridge Modeler automatically adapts its user interface to the screen size and resolution and is ideal for the use in powerful high-resolution monitors (4D/UHD with 3840x2160 pixels and more).

INTELLIGENT DATABASE

Allplan Bridge Modeler benefits from a built-in database that is continuously logging modifications as the project progresses. This will benefit projects that have a long design period by ensuring project data is securely available for the duration of the project.

INTEGRATION OF THE FOURTH DIMENSION

In Allplan Bridge Modeler it's possible to map the construction process in a 4D model. The construction plan is first divided into several construction phases and then into individual tasks such as concrete hardening, tendon stressing or activating the self-weight. The corresponding components are interactively assigned to the tasks. In this way, the temporal dimension is linked to the structure. With this information, the construction process can be graphically visualized. Thus, complex construction processes can be made transparent for all parties involved. It's also possible to create several different construction plans for the same bridge for a variant comparison. The result is a reliable parametric 4D bridge model. Once the construction is completed in Allplan Bridge Modeler, the model is transferred to Allplan Engineering, where further steps such as detailing, reinforcement and plan creation are carried out.

TECHNICAL PRE- VIEW TO ANALYSIS: CALCULATION OF CROSS-SECTION VALUES

The calculation of cross-sectional values is an essential step in the generation of an analysis model. All cross-section values as well as the shear forces for the defined cross-sections are calculated automatically as soon as the corresponding calculation option is activated. This function is currently available as Technical Preview. All types and any geometries of cross-sections are supported. The stiffness matrix of the individual beam elements is automatically created considering the calculated cross-section values, beam geometry and material properties.

MODELING OF COMPOSITE AND STEEL BRIDGES

When defining the cross-section, standardized and repetitive profiles such as longitudinal stiffeners for steel and composite cross-sections can be easily positioned parametrically. The profile is first defined parametrically in a separate section or imported from the user library. The position and number of elements are then defined and automatically placed along a cross-section edge.

TECHNICAL SUPPORT FROM BRIDGE EXPERTS

ALLPLAN's bridge design experts have over 30 years' experience supporting engineers worldwide. ALLPLAN's clients can benefit from our technical experts providing comprehensive consultancy, training and support.

Current system requirements can be found at [allplan.com/info/sysinfo](https://www.allplan.com/info/sysinfo)



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ALLPLAN BRIDGE PRESTRESSING

Allplan Bridge Prestressing is the powerful solution for four-dimensional parametric modeling of bridges. The software supports engineers in all planning phases, from the initial concept to the execution plan. The parametric description of the bridge model with the prestressing cables takes usability to a new level and allows engineers to work flexibly and quickly.

PRESTRESSING MADE SIMPLE

Allplan Bridge Prestressing makes it easy to model a wide range of types of pre-stressing: with immediate or later bond, internal and external, longitudinal, transverse and vertical, as well as with non-standard geometry. Based on user-defined 3D points, the program automatically generates the geometry of a tendon along the bridge structure. Each 3D Tendon point is specified by the position along the axis, and the position in the cross-section in relation to a reference point. In addition, direction angle and curvature radius of the tendon can be specified in each point. Selective parameters can be defined as variable. When calculating the detailed tendon geometry, the program determines these values automatically, using an intelligent algorithm minimizing the friction losses in the stressing process. A special point grid is available in the cross-section to ease the specification of the tendon position in the cross-section plane. This point grid facilitates copying and mirroring of the tendon in longitudinal and transverse direction.

CHANGES MADE IN NO TIME AT ALL

Allplan Bridge Prestressing helps you to manage the inevitable changes that occur during the design process. The parametric model description is an ideal base for adapting design changes. The modifications are incorporated only at their origin and all other linked members are automatically updated. For example, if the road axis changes the prestressing tendon geometry will be adjusted. If only a certain structural member is modified only directly linked elements will be recalculated.

PLANNING STRESSING SEQUENCES IN ALLPLAN BRIDGE

A stressing sequence can be defined for each tendon specified in the model. Stressing, wedge slip, and releasing are available actions. These actions are carried out at the begin of the tendon, at the end, or at both sides simultaneously. To optimize the management of tendon stressing, the sequences of stressing actions are stored as named "stress groups". The tendons are assigned to the corresponding group via Drag&Drop, and automatically stressed in accordance with the group definition. In addition, the values can be adjusted individually for each tendon.

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ALLPLAN BRIDGE LINEAR ANALYSIS

Allplan Bridge Linear Analysis is the ideal complement to the Allplan Bridge Modeler. The parametric 4D model serves as the basis for the static calculation. The analytical model is automatically derived from the geometrical model. The automation accelerates the workflows enormously. Nevertheless, the engineer retains always full control. Furthermore, also loads are automatically assembled from the 4D model.

MATERIAL CATALOGUE (EURO NORM) IN ALLPLAN BIMPLUS

Allplan Bimplus is the open BIM platform for all disciplines to collaborate efficiently. In order to improve the collaboration a material catalogue is available. There are several different types of material at hand such as concrete, reinforcement steel, prestressing steel, etc. Each material contains the parameters required for structural analysis and several additional parameters. This allows the user to easily load the materials into the project, assign it to corresponding bridge part and perform the analysis.

SEMI-AUTOMATIC GENERATION OF ANALYSIS MODEL

Allplan Bridge automatically generates the analysis model from the geometrical model. This greatly reduces the amount of work and the susceptibility to errors. Hereby the engineer retains full control by specifying structural parts and those ones which contribute as load only. One additional analysis-relevant definition is the choice of generating a beam or a grillage model.

ASSEMBLING CONSTRUCTION SEQUENCE CALCULATION

Allplan Bridge analyses the defined construction schedule and sets up all necessary calculation definitions in an automated process, like load cases, element activations and calculation actions. This includes input data for calculating non-linear time effects, like creep, shrinkage and relaxation. Complete transparency is granted, the user keeps full control of the generated items and an overview of the results at any time of construction.

AUTOMATED TENDON LOAD APPLICATION

The Analysis model for placing the tendons in the beam elements is generated from their defined position in space. The product analyses the exact position of the tendon in relation to the girder and assigns it automatically the corresponding beam elements with the relevant eccentricity values. Once the user specifies the point in time when the tendon is stressed the product generates automatically the corresponding load cases and calculation action and applies the load on the structure.

NONLINEAR TIME DEPENDENT MATERIAL EFFECTS

Based on the assembled input parameters describing the creep and shrinkage behavior of the concrete and relaxation of the pre-stressing throughout the construction phases, respective creep load cases are calculated for every time interval between relevant changes of the active structural system and/or loading state. The calculation is based on the formulas specified in the selected standard. A final creep load case covers the long-term effects arising during life time.

SUPERIMPOSED DEAD LOADS DERIVED FROM GEOMETRICAL MODEL

The weight and the position of superimposed dead loads (like sidewalk, road pavement, etc.) are automatically retrieved from the geometrical model. The user needs to specify the point in time of the equipment installation, and consequently the load is applied. Additional loads, such as temperature change or wind loads, can be defined and applied easily as well.

NEXT GENERATION SUPERPOSITION

The superposition in Allplan Bridge works very user-friendly. The schematic definition of the superposition combines maximum flexibility with optimal overview. It is possible to select several stress components in user-defined stress points and perform a stress leading superposition. Furthermore, the superposition allows for storing corresponding results for selected elements.

STRUCTURAL ANALYSIS

A global static analysis based on the Bernoulli beam theory is performed for all automatically and manually generated calculation actions defined previously in the construction sequence definition. The analysis is enhanced to accurately consider the cross-section variation. Furthermore, the non-linear calculation of time-dependent effects is performed, considering design code formulas.

DEVELOPED VIEW OF TENDONS FOR DRAWING PRODUCTION

In addition to the standard transfer of data to Allplan Engineering, Allplan Bridge first calculates the developed tendon geometry and then transfers it to Allplan Engineering. Here the user can use the advanced drafting functionality to create 2D and 3D deliverables.

Current system requirements can be found at [allplan.com/info/sysinfo](https://www.allplan.com/info/sysinfo)

