Finite Elemente
Frameworks
Prestressing
Dynamics
BIM

InfoCAD 19
Update Information
InfoCAD Update August 2019 - Version 19

Dear customers,

the annual update for version 19 is completed and is available to all maintenance customers for
download on our website.

For this purpose, please log in under your license number on the service page


Please download the file 'InfoCAD_19.exe' and start the installation.

Customers with a network license have to update their installation of the license manager 'Info-
NetKey_19.exe' first.

All updates are briefly outlined in the attachment. More detailed explanations can be found in
the help system and on the download page


We wish you the best of success with the new program functionalities.

Sincerely yours,

InfoGraph

Ingenieurgesellschaft für graphisch
unterstützte Datenverarbeitung mbH

Picture credits: InfoGraph GmbH
News in InfoCAD 19

The following chapters provide you with the latest information on the InfoCAD program system and the most important changes with respect to the previous version 18.

**General Information**

- The new form-sensitive mesh generator (Lp Norm) exploits the speed advantages of parallelization and has been optimized for structures with a large number of sub-areas.
- Model faces can now be ‘divided’.
- The properties of line supports can now be stored in a database as a template.
- The ‘List’ function has been extended by the options ‘De-select’ and ‘Delete’. This is helpful when editing superimposed objects.
- The ‘Uniform load on model faces’ can now be automatically decomposed into load cases in grid form.
- With ‘Import load data’, the support forces from other systems can now be combined into line or trapezoidal loads.
- The load type ‘Area load onto beams’ can now also be used for cable elements.
- In the color representation of the node deformations, the deformation figure can now be switched on at the same time.
- The result representation ‘colored’ has been supplemented for beam elements.
- The results representation ‘colored’ is now also available in the cross-section view.
- For the sectional representation of results, spatially curved curves (NURBS) can now be defined in addition to the line-shaped sections. All sections can be interactively edited by dragging the control points.
- The geometry of design objects can now also be defined via NURBS. For example in the case of curved surface and volume structures, the entry of cross sections for checks is considerably simplified.
- The internal forces of design objects can now alternatively be related to the centroid of the cross sections. The selection is made in the dialog of the design objects.
- The graphical representation of system structures has been significantly accelerated.
- For frameworks and the supplementary module ‘Second order theory’ the third order theory was activated.
- A function has been added to the help menu to allow automatic checking for program updates.
**Print List**

- For selected entries in the print list, it is now possible to select which settings are to be refreshed. For multiple entries, the viewport or the visible layers can be refreshed at the same time.

**Prestressing**

- The statically determined bending moments $M_0$ from prestressing can be determined optionally with the lever arm, which results from taking the total or the effective plate width (see DAfStb, Book 600, Chapter 5.3.2.1, Book 525, Chapter 7.3.1 (1) or DIN 1075, Chapter 5.1.3.1).

**Nonlinear Structural Analysis**

Two additional calculation methods were implemented:

- The 'Newton time steps' method allows the applied loads to automatically follow user-defined load-time functions. Among other things load-displacement curves can be calculated (e.g., for the pushover method).
- The 'Arc length method' automatically calculates load-displacement curves of the structure. The behavior of structures in the supercritical region (after failure, snap through problem) can be analyzed.
- The deformations, internal forces and support reactions of all load levels are available for evaluation and animation.

**Reinforced Concrete Checks acc. to EN 1992-1-1**

- For the decompression check, the relevant action combination can now optionally be selected independently from the exposure class.
- For slabs, the minimum degree of reinforcement for the transverse direction in relation to the main direction can now be selected in the cross-section dialog according to Chapter 9.3.1.1 (2).
- In the punching shear check the reinforcement suggestions are now calculated with the upper limit $k_{\text{max}} \cdot v_{\text{Rdc}}$ from Eq. (6.52).
- The safety factor $\gamma_0$ can now be freely selected for the earthquake combination (NA Great Britain, Austria and Sweden).
Reinforced and Prestressed Concrete Checks acc. to British Standard BS EN 1992-1-1

For the British Standard BS EN 1992-1-1 / NA: 2015-07 the following checks was implemented:

- **Ultimate limit state**
  - Minimum reinforcement to ensure robustness
  - Bending with or without normal force and normal force alone
  - Lateral force taking into account the minimum degree of reinforcement
  - Pure torsion and torsion with lateral force
  - Punching shear check

- **Checks against fatigue**
  - Longitudinal reinforcement and prestressing steel
  - Lateral force and torsion reinforcement
  - Concrete under longitudinal compressive stress
  - Concrete struts under lateral force and torsion

- **Serviceability limit state**
  - Limitation the concrete compressive stresses
  - Limitation of reinforcing and prestressing steel stresses
  - Minimum reinforcement for crack width limitation
  - Limitation of crack width by direct calculation
  - Decompression check
  - Limitation of deformations

Reinforced and Prestressed Concrete Checks acc. to SIA 262

The checks have been adapted to corrigenda C1: 2017-02 on the 2013-01 edition. In detail, the following changes result:

- The crack width check is now performed for all requirement classes under the quasi-continuous combination as shown in Table 17.

- The permissible steel stress according to Figure 31 is no longer defined by the maximum bar spacing, but as a function of bar diameter according to Eq. (100a) and is modified depending on the average concrete tensile strength.

- The minimum degree of reinforcement for the transverse direction in relation to the main direction can be selected in the cross-section dialog according to Section 5.5.3.2.

- Existing projects can be converted to the new rules in the analysis settings.
**Steel Checks acc. to EN 1993-1-1**

- For the system checks the British Standard BS EN 1993-1-1: 2005 / NA: 2008-12 was implemented.
- In the calculation settings, an option has been added to check the plastic cross-section capacity for classes 1 and 2, even if the reference stress does not exceed the permissible limit.
- The safety factor $\gamma_M$ can now be freely defined for the individual design situations.
- The check of plastic cross-section bearing capacity was accelerated.
- The checks were adapted to the new versions of the Austrian National Annex of November 2011 as well as the German National Annex of December 2018. Changes are limited to editorial adjustments.

**Timber Checks acc. to EN 1995-1-1**

- For system checks at normal temperature and in fire scenario, British Standards BS EN 1995-1-1 / NA: 2009-10 and 1995-1-2 / NA: 2006-10 were implemented.
- According to DIN EN 1995-1-1, NDP to 6.1.7 (2), an increase of the coefficient $k_r$ by 30% can now be selected in the cross-section properties.
Bridge Checks acc. to EN 1992-2 and National Annexes

- In the definition of the design situations it can now be selected whether the variable actions are combined as a group (QK) or individually.
- When entering the UDL load in load model 1, the relevant lane can now be preset.
- The utilization for bending and robustness are now also determined in the design modes 'symmetrical' and 'compression member'.
- For bridge slabs, the minimum degree of reinforcement for the transverse direction in relation to the main direction can now be selected in the cross-section dialog according to Chapter 9.3.1.1 (2).
- The action combination for the decompression check can now be freely selected in the cross-section dialog.
- Within the dialog for selecting the type of structure, 'Road + Railway' can now be chosen for mixed-use bridge constructions (NA Germany).
- For the structure type 'Road + Railway', combinations according to Tables 7.101DE and 7.102DE can be selected simultaneously (NA Germany).
- For the time-dependent material behavior, the safety factor $\gamma_{lt}$ for the long-term extrapolation of the delayed strains has been supplemented according to EN 1992-2, Chapter B.105.

The checks have been adapted to the new version of the National Annex for Austria B 1992-2: 2019-05. In detail, the following changes result:

- The strength coefficient $\alpha_{cc}$ is now assumed to be $\alpha_{cc} = 1$ for all concrete classes.
- In the shear design, the interaction for lateral force and torsion is determined by Equation (9AT) for full cross-sections.
- The check against fatigue for reinforcing steel and prestressing steel may be omitted in accordance with Chapter 6.8.1 (102) if the decompression check for the frequent combination is satisfied. This option can be selected in the cross-section dialog.
- For road bridges, the check according to NDP to Chapter 6.8.7 (102) need not be carried out if the compressive stresses under the characteristic action combination are limited to $0.6 \cdot f_{\alpha}$. 
Recalculation of Road Bridges

- When entering the UDL load in load model 1, the relevant lane can now be preset.
- The utilization for bending and robustness are now also determined in the design modes ‘symmetrical’ and ‘compression member’.
- The decompression check can now also be carried out for requirement class D for DIN FB 102.
- Additionally, in the shear check the utilization of the combined load of lateral force and torsion can now be graphically displayed.
- When calculating the utilization for the lateral force reinforcement, the corresponding instead of the maximal torsional moment is used to determine the chargeable reserve in the torsional stirrup reinforcement.
- For bridge slabs, the minimum degree of reinforcement for the transverse direction in relation to the main direction can now be selected in the cross-section dialog.

Recalculation of Road Bridges in Level 4

A new add-on module allows level 4 verification in accordance with the Canadian Standard CSA A23.3-14: 2015 based on the Modified Compression Field Theory (MCFT) for both prestressed and not prestressed components. In detail, the following checks are carried out:

- Determining the shear coefficient $\beta$ and the compressive stress angle $\theta$ using the longitudinal strain parameter $\varepsilon_x$ according to the general calculation method (Chapter 11.3.6.4)
- Determination of the minimum shear reinforcement $A_v$ according to Chapter 11.2.8
- Consideration of the lateral force resistance $V_c$ for unreinforced concrete according to Chapter 11.3.4
- Design of lateral force reinforcement according to Chapter 11.3.3 considering the maximum shear force capacity $V_{c,max}$
- Checking the minimum torsional resistance $T_{cr}$ according to Chapter 11.2.9
- Design of torsional stirrup reinforcement according to Chapter 11.3.10.3
- Design of torsional longitudinal reinforcement according to Chapter 11.3.10.6
- Check of the ultimate load capacity for combined loads from lateral force and torsion according to Chapter 11.3.10.4

Further information can be found in the corresponding manual section.
## Separate Programs for Lateral Torsional Buckling and Crack Width Check

- For the check of the minimum reinforcement and the crack width the British Standard BS EN 1992-1-1: 2014 / NA: 2014 was implemented.
- For the lateral torsional buckling check the British Standard BS EN 1993-1-1: 2005 / NA: 2008-12 was implemented.

## BCF – BIM Collaboration Editor

- A new editor allows the data exchange in the BIM Collaboration Format (BCF), an open standard format recommended by buildingSMART e.V. It is used by numerous BIM applications to augment IFC models with comments, images, and 3D views. The BCF editor is activated in the InfoCAD menu 'View / Toolbars and docking windows'.

## BIM / IFC / Homepage / Educational Licenses

- The IFC interface has been extended to IFC version 4.0. Analytical structural models from Nemetschek Allplan® can now be imported if the Allplan2IFC® plug-in from Allbau GmbH is installed there.
- On the new page https://www.infograph.eu/en/bim-technologies, the InfoCAD interfaces for the exchange of digital building models (BIM) are explained in tabular form.
- The entire website has been optimized for presentation on mobile devices.
- Students are offered a free, non-limited educational license to complete the exam thesis.
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