Advance Design Improvements

3.1

- CAD / ANALYSIS Integration
- Customizable calculation reports
- Connections library
# Advance Design 3.1 Improvements

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CAD / ANALYSIS Integration

Development of GTC format

- The "GTC" manages the different imports/exports and synchronizes the databases of the different application in the Advance Suite (Advance Concrete, Advance Steel, Advance Design, Arche, Effel).

- This component was updated for better interoperability:
  - Common section library between Advance Design and Advance Steel (see description further down).
  - New link between Advance Design and Advance Concrete via the customizable reinforcement.
  - Plug-in development for Revit® Structure for import/export along with synchronization of models

- The new version of the GTC component has two new exchange formats that are available in all the applications of the GRAITEC Suite. **IFC2x3, CIS2, PSS, VRML...**
Common section library for Advance Design \ Advance Steel

- To ensure a better integration between Advance Design and Advance Steel, the Advance Steel shapes database was implemented in Advance Design, which represents 100 new section families:

- The new section library is accessible by selecting "Graitec Profiles" from the available libraries.
With the GTC technology, the user benefits from the integration between Advance Steel (8.1 version) and Advance Design by applying the model synchronization which enables work in parallel between draftsman and engineer:

When the Advance Design user modifies a shape in the model, the Advance Steel user can be automatically notified and can accept, refuse or delay the modification.
Advance Concrete 8.1 incorporates a new concept: **dynamic reinforcement**. With this technology, the Advance Concrete user can define customizable 3D reinforcement cages that can be saved in a library and reused for accelerating the reinforcement of a project. An automatic detection can be performed, function of the model geometry, to apply the custom reinforcement.

- Creation of a reinforcement solution in Advance Concrete -
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- Advance Design 3.1 can reuse the "dynamic reinforcements" by letting the user assign them to elements (based on reinforced concrete results), to adjust the defined parameters in Advance Concrete, and to export them to Advance Concrete via the GTC file. The reinforcement drawing is automatically obtained in Advance Concrete, under AutoCAD®.

- In Advance Design, the dynamic reinforcement function is available on the "Analysis - Reinforced Concrete Results" toolbar:
Revit® Structure plug-in


* Check the GRAITEC website for the availability and downloading conditions of the GRAITEC plug-in for Revit® Structure 2008.
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USER INTERFACE

Language configuration

- Advance Design is available in three languages: French, English, and Romanian.
- The choice of interface language is made from the "File \ Configuration" menu which is only available if a project is not open:
MODELING

Elements library

- Export part of or the entire structure to the library:
  - Definition of an insertion point
  - Dynamic preview of the structure to export.
  - Definition of an insertion point while saving the library.

- Importing of a structure in a library, in a new project, or in an existing project.
Mesh preview

- The mesh can be previewed on part of the model or on the entire model. This function is accessible from the "Modify \ CAD \ Preview mesh" menu or on the "CAD Modifications" toolbar.
**Loads management**

- A load can be copied from one case to another using the context menu (Copy \ Paste) in the pilot.
Systems management in the pilot

- A new function, accessible from the pilot context menu, sorts the systems in ascending order of identifiers.
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New management for saved views

- The management of the model (descriptive or analysis) and post-processing views was improved:

  - A new icon is used to replace an existing view in the pilot. This icon is available on the Modeling, Analysis, and Result post-processing toolbars.

  - An existing view can be locked or unlocked from the pilot context menu:
Addition of a vertex on a planar element

- A new function for adding a vertex to a planar element is available. Perform the following steps:
  - For example, start with a planar element with four vertices, and create a geometric point in the desired location to add a vertex:
✓ Next, select the planar element and the geometric point and use the "Subdivide" function.

✓ An element with 5 vertices is obtained that can be stretched:
Improvement of linear supports display

- The symbol density (fixed or hinged supports) was increased for improved viewing of supports.

Improvement of dimension line creation

- There are two new dimension line types: the "horizontal" dimension lines and "vertical" dimension lines. These two new types are available in the properties window:

  ![Dimension line creation properties window](image)

- The dimension lines can be created by "freehand" on a 3D view without using snap modes.
New timber types / NFP21-400 Standard

- The material library has new timber types according to the NFP21-400 Standard:
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Importing Effel Structure files

- Correction of an error in the seismic load case names when importing an Effel file in Advance Design.

Climatic generator

- The climatic generator integrates a geographical map for snow and wind zones:
ANALYSIS

Initial constraints on linear elements

- Initial constraints can be defined on linear elements:

  - The user can set a normal stress or shear stress (in each linear element drawing).
  - The defined stresses are expressed in the local coordinate system of each element.
  - The initial constraints do not belong to a load case, they are associated to an element. They are always taken into account, regardless of load case or calculated combination.
  - If the user wants to consider the initial constraint for certain load cases and not others, a calculation by phase is required.
Eccentricity on planar elements

- An eccentricity can be defined on planar elements from the properties window:
Steel structures dimensioning

- A new option creates shape sheets by element (geometric element before meshing) or by mesh. This option is available in the connection properties window:
Elastic links between nodes

- In the analysis model, the user can manage the elastic links between nodes.
  
  ✓ A new creation icon is available on the "Analysis – Hypotheses" toolbar. It is also available in the "Generate \ Elastic links" menu.

  ✓ As an object, the created elastic link has a properties window and a graphic representation:
Integration of the new Cross Sections module

- The new GRAITEC "Cross Sections" module is integrated in Advance Design and new data can be added to the section library from the calculated mechanical properties in the module.
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Link with Effel Timber Design module

- A new icon enables a "flash" link with the Effel "Timber Design" module:

- If the two application are not installed on the same system, the "File \ Export \ Effel Experts" menu can be selected:
RESULTS POST-PROCESSING

Result rules

- Advance Design 3.1 integrates a new tool for results post-processing: Result rules. The result rules provide a table for viewing all elements that exceed a user set limit value.

- The configuration of the result rules is done using the "Hypotheses \ Result rule definition".
The user defines a filter (name, system, role, etc.) and Advance Design automatically selects the elements to apply the result rule.

After the analysis, the results associated to the result rules are listed in a table in the report generator:
New option for table display

- A new option available in the properties window displays tables with two columns:
New envelope tables

- Envelope tables by load cases \ combinations were added to the list of global envelope tables. The previous version of Advance Design only contains global envelope tables by element.
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Customizable calculation reports

- Advance Design 3.1 integrates new customizable calculation reports:
  - Creation of new tables
  - Modification of existing tables
  - Advanced sorting and data grouping functions
  - Reuse of "user" tables in other projects.
Bill of quantities tables

- The bill of quantities tables of linear elements integrates the perimeters and surfaces to paint:

<table>
<thead>
<tr>
<th>Material</th>
<th>Weight Density (t/m³)</th>
<th>Volume (m³)</th>
<th>Weight (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B12</td>
<td>2.90</td>
<td>9.14</td>
<td>22.84</td>
</tr>
<tr>
<td>Concrete - Cast In Situ</td>
<td>2.25</td>
<td>31.35</td>
<td>70.23</td>
</tr>
<tr>
<td>Concrete - Cast In Place Concrete</td>
<td>0.35</td>
<td>109.01</td>
<td>29.66</td>
</tr>
<tr>
<td>Concrete, 25</td>
<td>2.55</td>
<td>117.08</td>
<td>302.36</td>
</tr>
<tr>
<td>B100</td>
<td>2.35</td>
<td>8.24</td>
<td>19.92</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>563.06</td>
<td>492.82</td>
</tr>
</tbody>
</table>

---

New version of the viewer

- On the Advance Design 3.1 CD, a new version of Wordview is available with the following features:
  - Automatic creation of a summary without using a "doc" document format.
  - Line color management which improves the readability of tables.

- WARNING, this version of the viewer is not included in the Advance Design installation process. The user must manually install the viewer and configure it as the default viewer for the reports.
Calculation reports in PDF format

- From the calculation report general options, a document can be created as a pdf:
Verifying the oblique bending of columns

- In the verification window of column oblique bending, an option returns to the calculation values:
Graphical results post-processing

- Modification of the results post-processing in the form of values on linear elements: only the maximum values (by mesh) are displayed for better readability.
The dimensioning and verification of the following connections was implemented in Advance Design 3.1:

- Hinged or fixed base plate
- Splice
- Beam-beam fixed connection by welded bolted plate
- Beam-column fixed connection by welded bolted plate
- Welded tube connections (1 or several secondary bars).
- Beam-Beam hinge with angles
- Beam-Column hinge with angles
- Tube connections with gusset plate (1 or several secondary bars).

This represents a total of 15 different connections.
Creation of connections in Advance Design

- The creation of a connection can be performed from the dedicated toolbar, the "Generate Connections" menu or the CAD context menu:
Each connection has its own properties window (based on its type):

- Connection name
- Standard file to use for exporting to Melody Attaches.
- Connected elements
- Type, quality and diameter of anchor bar.
- Type, quality and diameter of bolts.
- Bolt distribution
- Plate dimensions and thickness
- Flange thickness
- Work ratio (after linking to Melody)
- Number of errors on the connection
- …

It is important to note that connections can be created in the descriptive model or in the analysis mode.
**Automatic creation of connections**

- Instead of manually creating connections one by one, the automatic generator can be used. Simply select the entire or part of the structure and select "Connections \ Selection" from the context menu. The program automatically detects all cases that correspond to the connection type to create:
Export to Melody

- There are two ways to export to Melody Attaches:
  - Using the flash link on a selected connection:
Selecting several connections and clicking the icon or from the context menu:

![Image of context menu with option to export to MELODY Attaches]

In this case, the corresponding Melody Attaches files are created on the hard disk so that the user can open and analyze them elsewhere.
During the export to Melody Attache, Advance Design automatically determines the torsors for the connection:

![Diagram of torsors and forces](image)

Returning from Melody Attaches, Advance Design automatically obtains the work ratio that is listed in the properties window for the connection.
The user can modify the Melody Attaches parameters (e.g., software version, standard files, installation folder, combinations to export, etc.) in Advance Design using the "Options \ Applications" menu:
Connections calculation reports

- Three new tables were implemented for connection dimensioning and design:
  
  - A table that lists the created connections in the model.
  - A table groups data about the connections (e.g., number of identical connections, work ratio, bolts, etc.)
  - A table lists the envelope torsors that were exported to Melody Attaches.
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Always greater performance and integration

+ 100 IMPROVEMENTS