

Bridges and Civil Nonlinearities Module

In addition to all the features of CivilFEM INTRO, this software has some further advanced capabilities for civil engineering needs included into specific modules that can be added to CivilFEM INTRO such as the Bridges and Civil Nonlinearities module.

The latter module, includes a set of tools that facilitates and improves the analysis of complex concrete bridges. This advanced module allows generating the geometric cross section from a library, the bridge layout in plan and elevation views using lines, circles, clothoids and parabolas as well as the automatic generation of the solid and finite element model of the structure using both BEAM and SOLID elements. Furthermore, this module allows defining automatically both line and surface moving loads through the structure as well as generating surface loads. The Bridge module allows the introduction of pretensioned cables in the analysis by defining their possible path throughout the bridge. In addition, it allows automatic simulation of construction processes following the most used bridge construction procedures.

This module also solves civil nonlinear problems, making ANSYS more efficient. This module considers stress-strain laws (nonlinear) of materials, by accounting for changes in the cross sections parameters during the successive calculation iterations. Besides solving beam nonlinear analysis, the Bridges and Civil Nonlinearities module includes a utility that permits performing construction sequence processes simulations of cross sections.

Bridges and Civil Nonlinearities Module Features

1. LIBRARY OF COMMON BRIDGE CROSS SECTIONS

- Definition of common bridge sections by dimensions
 - Slab cross sections (solid or hollow)
 - Box cross sections

2. BRIDGE LAYOUT DESIGN (PLAN AND ELEVATION VIEW)

- Utilities for generating the bridge model by introducing lines, circles and clothoids in plan view, parabolas and lines in frontal view

3. AUTOMATIC GENERATION OF THE FINITE ELEMENT MODEL

- Automatic generation of the finite elements model either using BEAM and SOLID elements
- Automatic generation of a 3D solid element model from a previous 3D beam element model

4. LINE AND SURFACE MOVING LOADS GENERATOR

- Loads are calculated automatically by the program, taking into account the vehicle type and path
- Definition of vehicle type: rigid or flexible (adaptable to trajectory)
- Definition of user defined "vehicle libraries"

5. SURFACE LOADS GENERATOR

- Wizard for automatic surface load generation

6. PRESTRESSED CONCRETE UTILITIES

- User input of pretensioned cables by points (coordinates and forces) along the structure
- The program calculates an equivalent system of forces at each node of the element crossed by the tendon

7. CONSTRUCTION SEQUENCE ANALYSIS

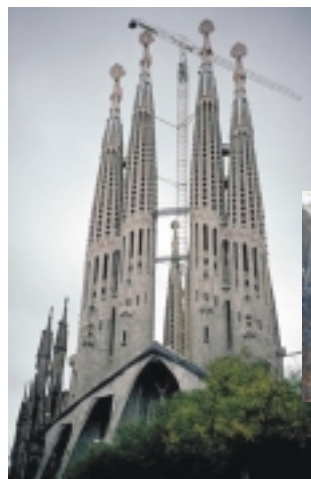
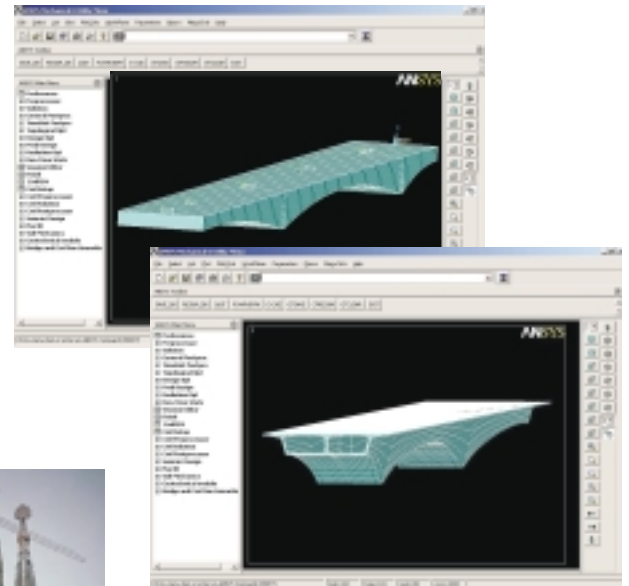
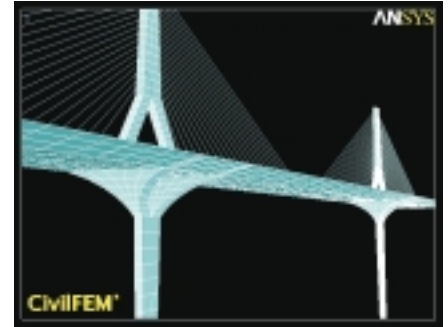
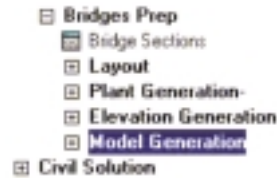
- Automatic simulation of bridge construction processes following the most important procedures

8. CIVIL NONLINEARITIES

- Changes in the cross section geometry and time-dependent properties due to construction processes
- Large Deflection Buckling of Concrete Beam elements, nonlinear redistribution analysis and Cracking and Yielding Phenomena
- Creep and Shrinkage*

9. MOMENT-CURVATURE DIAGRAMS

- CivilFEM allows the calculation of the real moment-curvature diagram for a given section
- User defined diagrams calculation



(*) Please for further information and available capabilities contact your local CivilFEM Support Distributor