

BEDAS™

MechaTools Technologies



SOFTWARE FOR DYNAMIC ANALYSES OF BRIDGES AND STRUCTURES UNDER FIXED AND MOVING LOADS

The Advanced software, which uses the technology of the exact dynamic finite elements
The tool where dynamics is not any more an obstacle

BEDAS (Beams Exact Dynamic Analysis Software) is a powerful and easy to use in Bridge dynamic analysis and dynamics of structures under moving and/or fixed loads. BEDAS is based on the new preferment exact dynamic stiffness method under the framework of exact finite elements.

BEDAS is a professional level bridge dynamic analysis under moving loads program, with capabilities to handle most typical 2d mechanics, aeronautics and civil/structural analysis problems. It performs static, mode shapes and dynamic response analysis. It gives exact high frequencies and mode shapes with only one element per beam (span). Dynamic finite elements lead to higher precision of internal forces in any location of structure excited by fixed, moving and/or seismic loads.

BEDAS is the leading 2D finite element program for the true dynamic bridge analysis under high speed moving loads. The user focuses on the geometrical conditions and needs not spend time on matters regarding how to generate the finite element model.

• Moving Loads

In **BEDAS**, user can add a custom moving or fixed load, with the possibility of specifying if this loading is concentrated or distributed. **BEDAS** has also a library of standards vehicles and high-speed trains. Specifying the path of moving loads is very convivial in Bedas. For fixed loads, user must only set the load's speed to zero.

• Free Vibrations

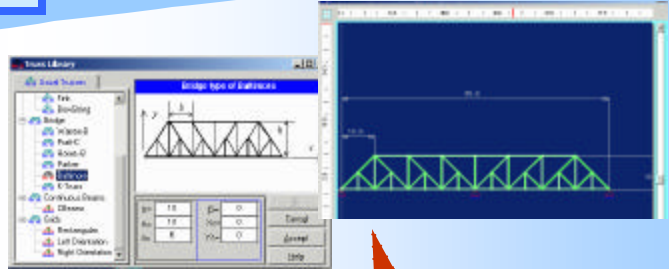
For the calculation of the eigen-frequencies, the user has two choices, that is to set to choose the number of desired mode or more precisely the maximum frequency in Hz (compute all frequencies equal or lower)

• Dynamic Analyses

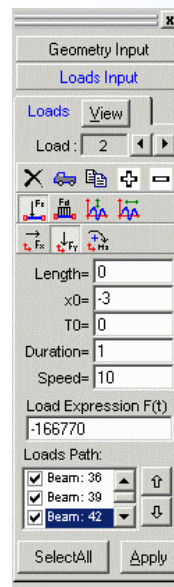
By preoccupation with user -friendliness, **BEDAS** offers few parameters to set in the dynamic analyses, the user must return the time step, the total time of the analysis, for damping one must return the two critical damping ratios and the two corresponding modes. For the time step, if it's not in conformity, BEDAS suggests a more conform time step to the user.

• Seismic Analyses

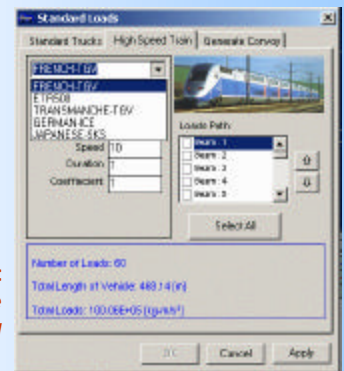
In BEDAS, user can perform seismic analyses due to a specific accelerometer (e.g. El-Central etc.) or under the effects of an acceleration of the ground motion in the form of mathematical expression $a(t)$. The seismic excitation can be vertical or/and horizontal.



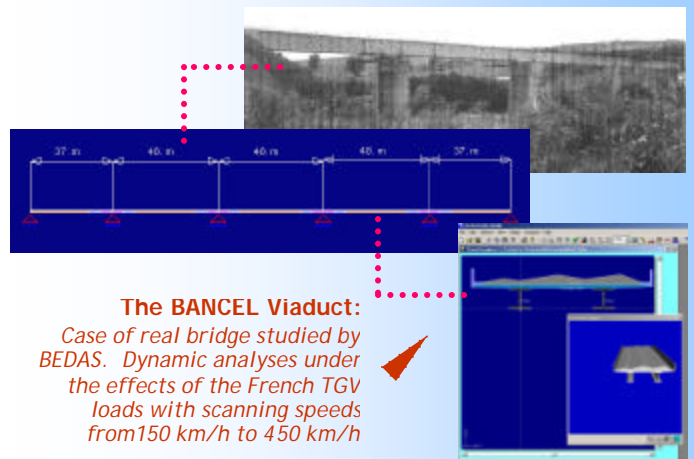
Bridge finite dynamic model: Model carried out in less than one minute. Its dynamic analysis under the effects of moving high-speed train with a speed of 350 km/h, took only a few seconds, including the calculation of the first thirty frequencies



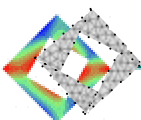
Loads data input: Convivial and easy to use graphical interface. It allows users to add or remove loads and modify existing loads.



Standards loads interface: Component, which makes it possible to quickly add a predefined standard and custom dynamic loads.



The BANCEL Viaduct: Case of real bridge studied by BEDAS. Dynamic analyses under the effects of the French TGV loads with scanning speeds from 150 km/h to 450 km/h



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Numerical Simulation & Finite element in Engineering

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BEDAS™

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*Fast and powerful software
It is an essential tool for the dynamics of the
structures engineers*

Key Program Features

- Selection of base materials
- Mode shapes animation
- Identification of the mode shape vibration for each beam in structure
- Fixed and/or moving concentrated loads analysis
- Fixed and/or moving distributed loads analysis
- Seismic excitations
- Loads may be applied in any location of the structure
- Load intensity may be gives by mathematical expression $F(t)$
- The static response is given in addition to dynamic response
- Visualize the solutions in displacements, velocities and accelerations (u , v and rotations), moments, shear-forces and axial-forces for the whole structure at time t between 0 and total time
- Visualize the solution for the gage placed in any location
- Dynamic solution animation
- Animated mode shapes, deflections and efforts diagrams
- **Bedas** include components to get beam properties for general and standards sections.
- Advanced Integrated CAD for sketching and drawing 2D frames
- Pan, rotate and zoom using the mouse or keyboard
- Library of complex commonly used 2D Frames can be quickly generated and assembled to form complex geometries
- Results given in professional report
- High Quality graphical results
- Integrated units converter.
- Dimensions view (quotations)
- Dynamic moving loads analysis. Use to analyze moving loads acting on Bridges or structures supporting mobile equipments with speeds.
- **BEDAS** is the result of several international scientific papers and industrial experience of Dr. Kamel Henchi and the Research & development department.

◀ **Bridge LA LYS:**
Dynamic acceleration response at the center of the mid-span

◀ **Bridge LA LYS:**
Dynamic deflection response at the central of mid-span under the effects of the high-speed train

▲ **Dynamic deflection:**
zoom on the dynamic deflection at time t under the effects of moving loads

▲ **Second vibration mode shape:** *Baltimore bridge type, generated automatically by BEDAS.*

◀ **Dynamic Moment:**
zoom on the dynamic moment at time t under the effects of moving high-speed train

▶ **Results window,**
In addition to the graphical output and the saved results in ASCII format

System Requirements

- 100 MHz Pentium® class or higher processor
- Microsoft® Windows® 9x/NT®/2000/XP
- 32 MB (64 MB recommended)
- 20 Mo of available hard disc space
- CD-ROM drive and mouse

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