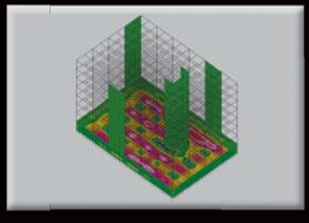
NISA™ CIVIL

version 16

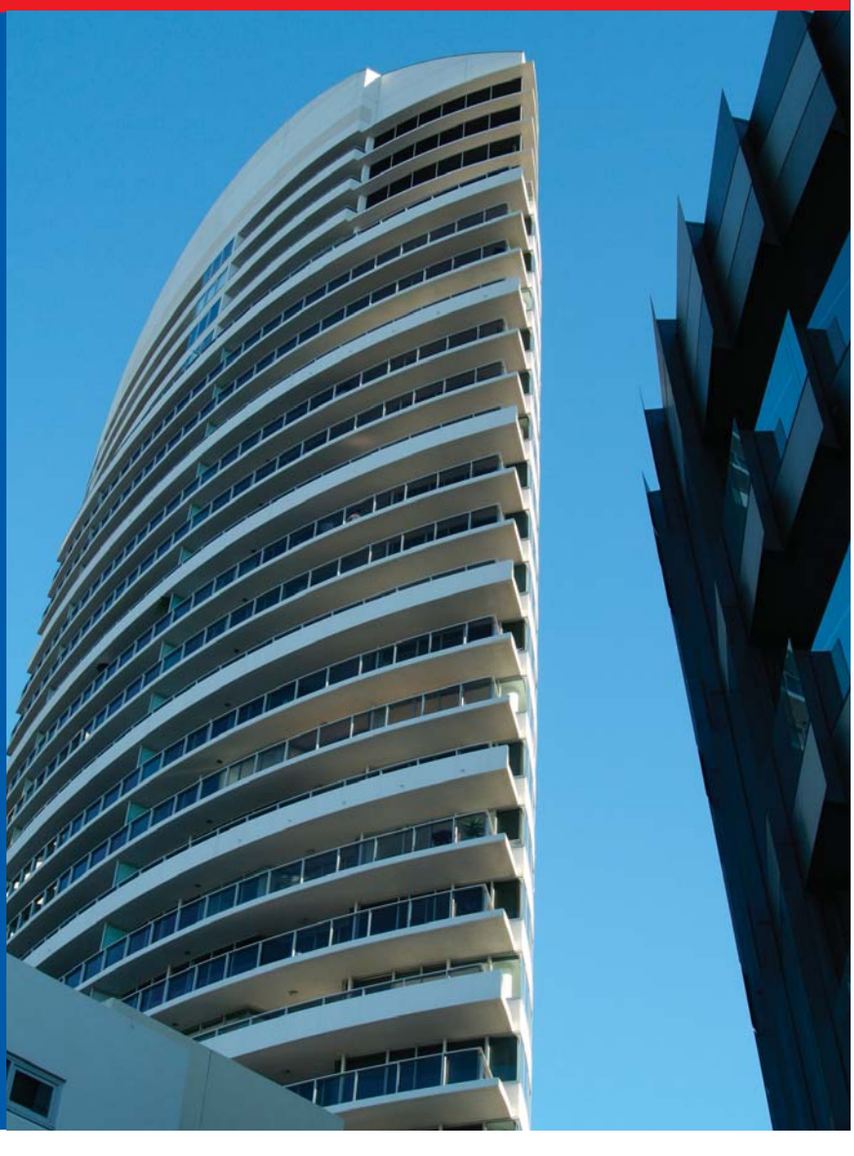
CHOICE OF STRUCTURAL ENGINEERS WORLDWIDE



Cranes Software International Ltd.

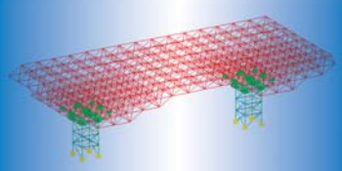
NISA/CIVIL

NISA/CIVIL is a truly integrated & versatile structural engineering software which offers Structural Engineers a powerful CAD based tool for the Analysis, Design & Detailing of RCC & Steel structures like Buildings, Bridges, Shells, Towers, Irrigation Structures & Water Retaining Structures. The software has excellent reporting and graphing features and automatically generates detailed AutoCAD® drawings.



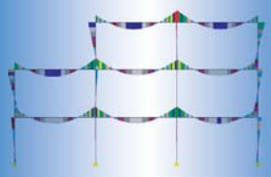
3D FRAMES

SPACE FRAMES



SHELL STRUCTURES

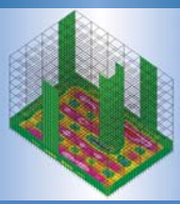
BMD



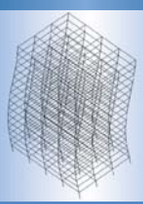
STRUCTURES LIBRARY
2D & 3D Frames & Trusses

CIVIL ENGINEER FRIENDLY IN-BUILT GRAPHICS EDITOR & DISPLAY

CONTOURS



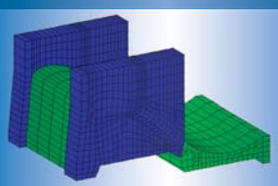
MODE SHAPES



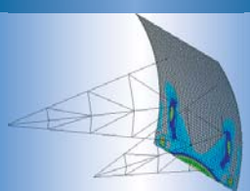
NISA II
Linear & Non Linear Static & Dynamic Finite Element Analysis

NISA™ CIVIL

SPILL WAYS ANALYSIS



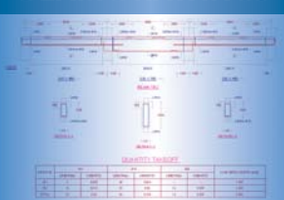
RADIAL GATES ANALYSIS



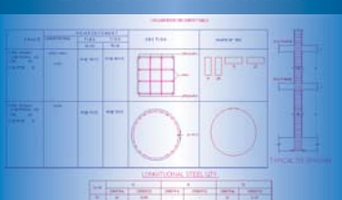
POST PROCESSING
BMD, Contours & Mode shapes

COMPOSITES
Layered Shell, Sandwich Shell & Layered Solid

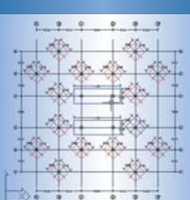
BEAM DRAWINGS



COLUMN DRAWINGS

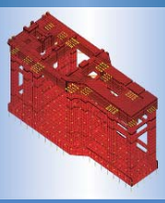


FOOTING LAYOUTS



BRIDGES

MACHINE FOUNDATIONS

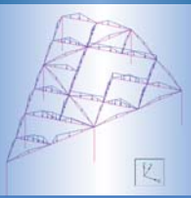


TRANSMISSION TOWERS

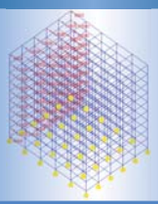
AUTO LOADING DUE TO
Floor, Wind,
Seismic, Dynamic, Moving,
Temperature, Prestress,
Construction Sequence,
P-Δ & Snow

STEEL DESIGN
as per IS, BS & AISC
codes of practice

FLOOR LOADS



WIND LOADS



NISA/CIVIL
Truly Integrated &
Civil Engineer Friendly
Software

RCC DESIGN
as per IS, BS & ACI
codes of practice

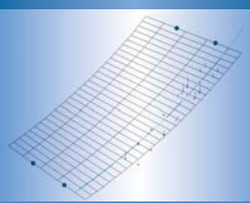
SEISMIC LOADS

DYNAMIC LOADS

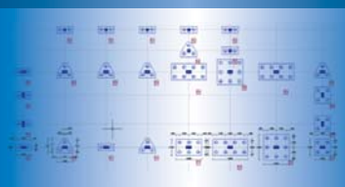
CAD
Structural Drawings
in AutoCAD® with quanity of
Steel & Concrete takeoff

REPORTS
Detailed & Summary
- Text
- MS Word
- MS Excel

MOVING LOADS

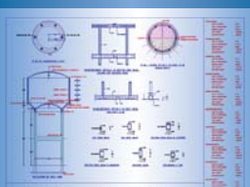


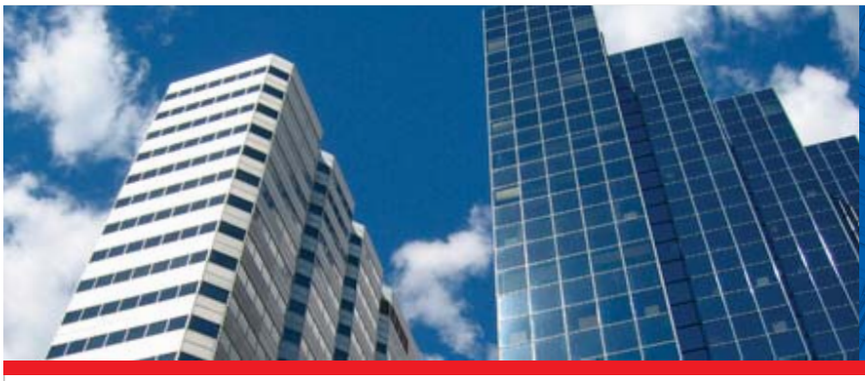
PILE DRAWINGS



STAIRCASES

WATER TANKS





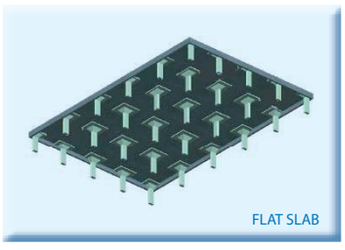
NISA™ CIVIL

Codes of Practice

	Loading	RCC	Steel
Indian	IS 1893:2002 (Part I) IS 875:1987 (Part 2, 3 & 4)	IS 456:2000 (LSD) IS 456:2000 (WSD) IRC 1966 (Rev 2000) IS 3370:1967 IS 13920 IS 2911:1979 AERB/SS/CSE-1	IS 800:1984 AERB/SS/CSE-2
British	BS:6399 – 1997 (Part 2) BS:6399 – 1998 (Part 3) BS EN 1998:1 – 2004	BS:8110 – 1997 BS:5950 - 2000	BS:449 – 1969
American	ANSI/ASCE 7-05	ACI-318R-2005 ASME1-NF3000 AISC-LRFD-2002 AISC-ASD-2005 AISC-LRFD-2005	AISC-ASD

Finite Element Modeling

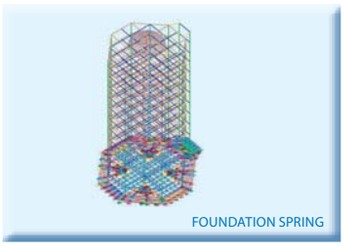
- Civil Engineer friendly built-in graphics editor for creating FE model of skeletal structures, shell structures and spring elements
- Structures primitives for 2D and 3D rigid frames and trusses
- Library of industrial structures and structures gallery for model generation of commonly used structures
- Structural shape library to generate Domes, Cones (frustums), Cylindrical shell (single, multiple) and folded plates with provision for generating a reticule model (model with beam elements)


FLAT SLAB

- Easy-to-use feature of combining two different structural models with and without coordinate offsets
- Interface to NISA/DISPLAY - Pre-Post FEA Environment
- Import geometry data in DXF format from AutoCAD®
- Automatic FE model generation of Bridge deck as Beam/Grillage/Shell model
- Model Verification: Powerful model verification tool to check & rectify the presence of unconnected nodes, duplicate members and coincident nodes
- Specify and view Rigid Links
- Define geometry, finite element data and boundary conditions using the powerful feature of Macros
- Grouping of nodes and elements

New in V16

- Improved user interface by merging Options menu, and structure definition & analysis menu. New open dialog and opening existing project dialog with project details are introduced
- Graphics editor always displayed on screen
- Automatic shell model generation for flat slabs
- Automatic generation of shell elements from floor panel definition only for rectangular panels


FOUNDATION SPRING

- Automatic orientation of Model for selected gravity direction (Z and Y)
- Automatic computation of modulus of elasticity for selected grade of concrete as per IS code
- Tool Bar for Node/Element Editing features
- Hot buttons for plotting elements, nodes and their numbers with element lengths are introduced
- Listing of material and property IDs along with description for selection during Modify property operation

Translator

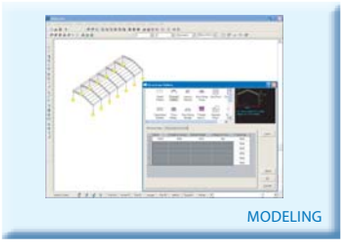
- Seamless interface to STAAD.Pro® (Geometry, Properties, Static Load Cases & Boundary Conditions)

Unit Specification

SI, MKS, FPS and User Defined units supported. User Defined option has dual units for length and force. Desired unit system can be specified at the beginning or as and when necessary.

New in V16

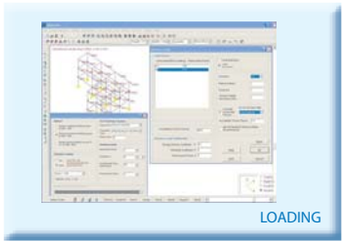
- Default units for selected country codes


MODELING

Loading

Frame Loads

- Transfer of floor loads such as DL, LL and Snow loads from panels to supporting members based on Two-way or One-way distribution



- Automatic generation of floor loads on supporting members for non-rectangular shaped slab panels and sloped panels
- Joint loads due to Wind and Seismic effects (seismic coefficient or response spectrum method with accidental torsion) as per code provision or user specified values
- Automatic generation of panels and loads assignment for preliminary designs

Truss Loads

- Joint loads due to DL and LL on trusses Joint loads due to Wind and Seismic effects (seismic coefficient or response spectrum method with accidental torsion) as per code provision or user specified values
- Loads on structure are automatically generated based on the following codes of practice:
- ANSI/ASCE 7-05, IS: 1893 – 1984
- IS: 875 – 1987 (Part 2, 3 and 4), BS: 6399 Part2 1997, BS: 6399-1998 (Part3)
- IS: 1893 – 2002 (Part 1)

Prestressing Loads

- Loads due to prestressing: stressed before or after placing
- Parabolic or Linear cable profile
- Specify cable profile along a set of elements which are on the same line

Dynamic Loads

- Mass elements for Eigen analysis and load combinations to account for reversal of forces from subsequent response spectrum analysis for seismic design

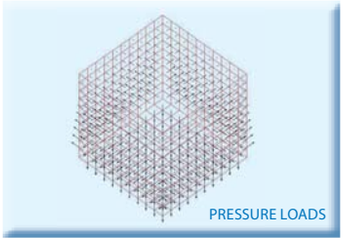
- Missing mass correction specification including cut-off frequency
- Pre-stored spectra as per IS 1893 2002

Temperature Loads

Nodal temperature or temperature difference specification at joints to compute axial expansion/contraction and bending in local XY and XZ planes.

Pressure Loads

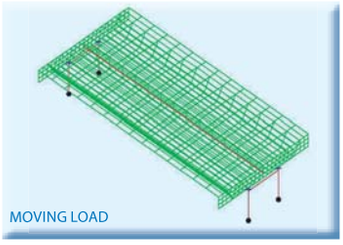
Provision to assign different pressure loads on each node of shell element.



▶ Loading contd...

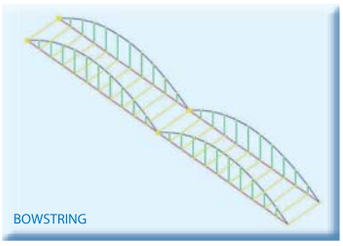
Moving Loads

Powerful moving load generation algorithm to automatically generate the magnitude of loads transferred to members due to movement of either single or group of vehicles along different vehicle paths on a bridge structure



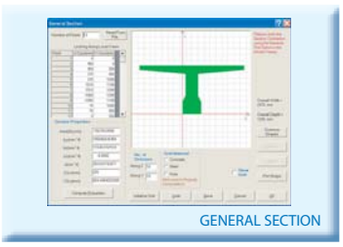
Following vehicles are included in vehicle database.

- IRC Tracked & Wheeled Vehicles (Class AA, 70R, A & B)
- Indian Railway Standards MBC-1987, MMG-1988
- BS: 5400, Nominal HB Loading, RU & RL Railway Bridge Live Load
- AASHTO Nominal Hs20-44 loading for different vehicle lengths (8.5344 13.4112M)
- American Railway Engineering Association Cooper E-80, American Axle Loads for Two Units of Heavier Diesel Locomotives



New in V16

- Auto Load generation for dead loads, live loads, seismic loads, wind loads and their corresponding load combinations
- Reduction of uniformly distributed imposed floor loads in multi-storeyed buildings for design of columns and footings as per user specified reduction factors
- Introduction of 10% (TSM), Grouping (GRP) and double sum (DSM) methods for modal combination in dynamic analysis
- Automatic wind and seismic loads generation conforming to ASCE 7 -05
- Automatic seismic load generation as per British standards BS EN 1998:1-2004
- Load Combination:
  a. Detailing as per IS: 13920 for beams and columns
  b. Sway Load Combination as per ACI & AERB concrete codes
  c. Option to ignore slenderness for column design against P-Δ load
- Automatic computation of seismic forces as per number of floors above the specified base
- Computation of static accidental torsion as per codes of practice with/without negative shears
- All or selected loads specified at any floor level can be copied to other floors
- Listing of load sets in a selected load case with option to select load sets to view them in graphic display
- Extract predefined load combinations from a file

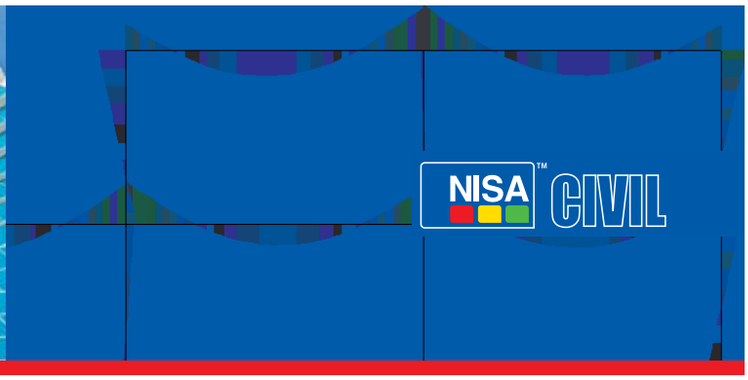


Load case dependent Member End Release

Different end release conditions for an element can be specified in conjunction with loads, as analysis with different load cases can be performed in one session.

Load case dependent Inactive Member Specification

Useful for construction sequence analysis for a particular loading condition. Members specified as 'Inactive' will not be included while formulating stiffness matrix and load vector.



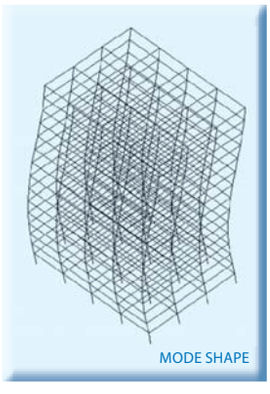
Finite Element Analysis

NISA/CIVIL comes bundled with DISPLAY & NISA II SOLVER.

DISPLAY: State-of-the-art Pre & Post processing environment which can be used for tasks such as complex 3D Solid Element modeling and analysis.

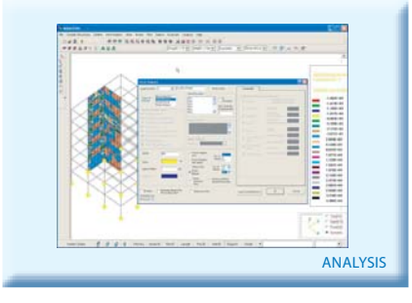
NISA II SOLVER: Offers an impressive list of linear & nonlinear - static & dynamic analysis features complemented with an extensive finite element library. It has efficient solvers like direct (frontal and sparse) and iterative solvers.

- Static Analysis (Linear, Non-linear & Contact)
- Eigenvalue Analysis
- Modal Dynamic Analysis (Transient, Frequency Response, Random Vibration, Shock Spectrum & Direct Transient)
- Heat Transfer Analysis (Optional)
- Non-linear Analysis (Material, Geometric or both)
- Composite Analysis (Static, Dynamic & Heat Transfer)
- Fluid Analysis (Seepage Analysis & Shadow effect of buildings) (Optional)
- P - Δ Analysis


MODE SHAPE

Post Processing

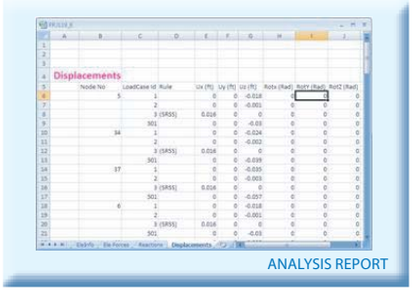
- Display of loading diagram for different load cases
- Display of bending moment, shear force and deflection diagrams along with listing at twenty different sections
- BMD/SFD can be viewed with color band contours
- Animation of deflected shape, eigen modes & stress contours


ANALYSIS

- Design results viewer for individual or failed elements
- Force factors such as Pu/fckBD and Mu/fckBD^2 used in concrete design can be plotted as done for BMD/SFD etc.
- Bending Moments, Force Factors etc can be output as a table in a report file
- Displacements and Reactions can be displayed at the nodal locations for documentation
- Viewing of Mass, Pipe and 3D Solid elements are supported including realistic plot

New in V16

- Hot buttons for plotting BMD features
- Additional BMD features:
  a. Color Band numbers
  b. Contours without element boundary
- Dynamic rotation in Graphic viewer
- Mouse wheel support for graphic features such as zoom & pan
- Exporting to Excel: FE model data such as Node IDs and their co-ordinates, Element IDs and their nodal connectivity along with sectional sizes, results of analysis such as reactions & member forces



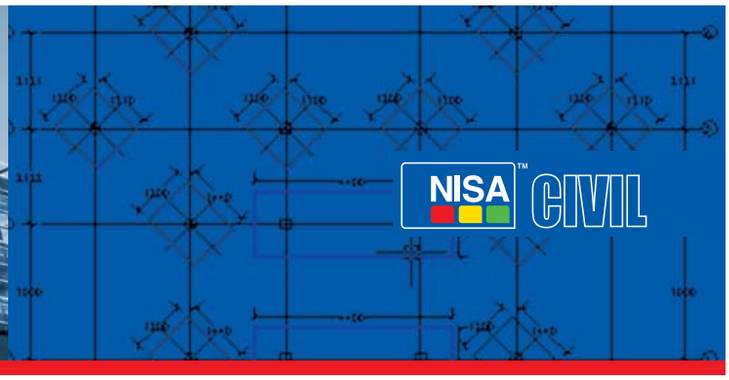
ANALYSIS REPORT

Design Modes

Structural designs can be performed as per three modes of design:

- Integrated Online
- Integrated Offline
- Interactive

Integrated offline mode is a special and Civil Engineer friendly option to carry out alternative designs without repetitive analysis.



Structural Design

RC Slab Structural design of RC slab panels with different support conditions. Short and long term deflection in slab panels. Interactive design of sector, circular, triangular, skew, waffle slabs and spherical domes based on theory of plates and shells

RC Beams Structural design of RC beams subjected to Flexure, Shear and Torsion

RC Columns Structural design of RC columns subjected to Axial loads with Uniaxial and Biaxial bending based on Interaction or Equilibrium approach

RC Footings Structural design of isolated footings of constant and varying thickness with or without pedestals, combined footings, solid slab, beam and slab


FOOTING

Raft Design of raft as per Rigid Beam Theory conforming to Indian standards

RC Plate/Shell Structural design of plate/shell elements at nodal and centroidal points due to axial, flexural and shear stresses

Shear Wall Design of Shear wall as per Indian standards

Flat Slab Flat Slabs can be modeled, analyzed by Equivalent Frame Method and Shell Element Method and designed as per Indian, British & American standards

RC Staircase Straight, Dog-legged, Open newel with waist slab/Tread & Riser, Helicoidal and scissor type staircase as per Indian, British & American standards

RC Retaining Wall T or L shaped with or without keys and batter towards heel or toe

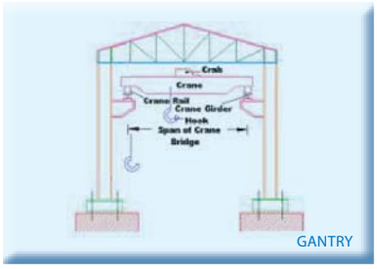
Pile Foundation Design of Bored Cast-in-situ, Friction, End Bearing, Under Reamed and Precast Driven Pile Foundation (Piles and pile caps) as per IS – 2911

RC Corbel Design of RC Corbel as per American, British and Indian codes of practice

Pipe Design of Straight and Elbow type pipes as per ASME-NB, NC & ND codes of practice

Liquid Retaining Structures Design of 'Overhead and ground level water tanks' as per IS: 3370, parts I, II & IV

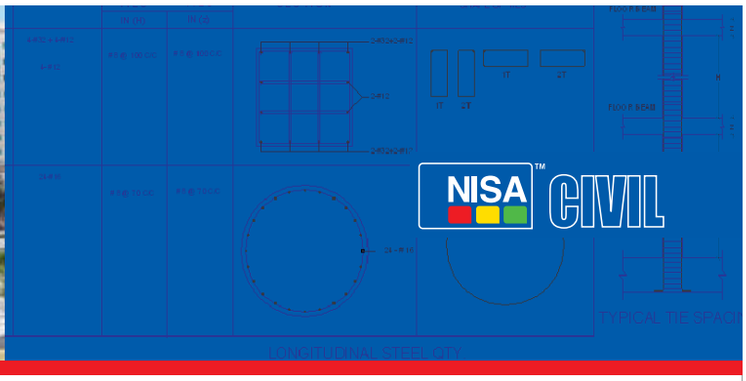
Structural Steel Elements Code checking of Standard (Channel, I, Angle, T, Pipes and RHS/SHS) or user defined sections subjected to axial, bending and torsional effects along with recommendations in case of inadequacies. Design of different types of built-up sections and Plate girders



GANTRY

New in V16

- Implementation of concrete designs conforming to AERB/SS/CSE-1: Atomic Energy Regulatory Board of India
- Implementation of steel designs conforming to AERB/SS/CSE-2: Atomic Energy Regulatory Board of India
- Automatic Selection of sectional sizes for beams & columns based on user specified % of steel and from a list of preferred sectional sizes
- Automatic selection of isolated footing sizes from the user specified list. Additional features for isolated footing such as support height specification, overburden pressure and design of eccentric isolated footings
- IS: 13920 Seismic ductile detailing design provisions for the design of beams and columns
- Steel Design as per AISC-2005



CAD Drawings

In NISA/CIVIL post-processing is not limited to analysis results only. At the click of a button, design results are processed to produce design drawings of good quality in an AutoCAD® environment. Separate drawings are made for different structural elements even though all of them are designed in the same session. Drawing entities are present in different layers and colors for easy identification and editing. They can be customized as per requirements.

RC Slab Sectional top view indicating top and bottom reinforcement at different floor levels. Typical cross section showing curtailment or bending of bars near the edge and intermediate beams

RC Beams Longitudinal section and cross sections at support and span regions indicating rebar arrangement and stirrup details along with framing plan

RC Columns Cross section along with reinforcement details in tabular form. Columns having similar reinforcement arrangement are grouped together

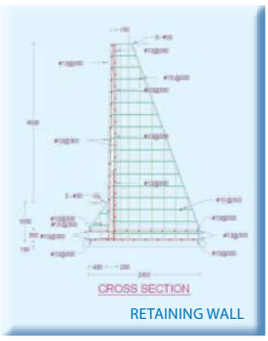
RC Footings Sectional top and front views indicating reinforcement details for isolated and combined footing of solid slab type and cross sections in beam and slab footing

Shells Reinforcement requirement is displayed in the form of color contours

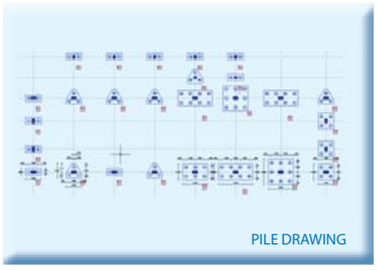
Flat Slabs Drawing generation of Flat Slabs

RC Stairs Plan, Flight sectional view, Cross sections showing reinforcement details, Bar bending schedule and Steel quantity table

RC Retaining Walls Longitudinal and cross sectional views indicating reinforcement details in stem, base and keys if any



Piles and Pile Caps Typical sections at top and front views indicating reinforcement details along with complete pile layout



Overhead and Ground Level Water Tanks Plan, sectional elevation, cross-sections for beams and columns

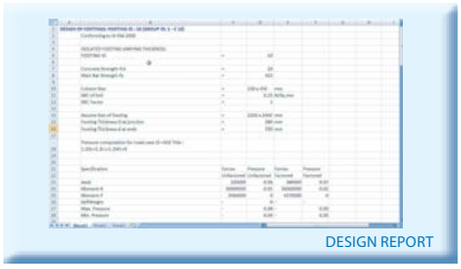
Steel Structural Elements Front view along with section designation, sectional details and profile of the section of individual elements in a tabular form

New in V16

- Rebar Rationalization for beams & columns
- Drawing Layout editor to specify member offsets.
- Automatic drawing generation for beams of unequal depths
- Reinforcement & Layout drawing generation for different types of common shapes such as T,L,I,H & hollow & solid rectangular, circular, hexagon and octagon
- Drawing generation for Counter Fort retaining wall
- Drawing generation for Corbels
- Feature to add Notes in Detailer & Drawings for Steel and Retaining wall
- Slab drawing is incorporated in interactive design mode also

Reports

Design results are reported as summary and detailed outputs. Design reports can also be generated in Text, MS Word and MS Excel format.



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