Verification Examples

Introduction

MIDAS/Civil Verification Examples contain the verified results of various program functions.

Each example entails a general verification process witch confirms the validity of the structural analysis results. These results are compared with theoretical results and the results based on recognized technical reports. Each example is also compared with other similar programs results in this manual.

This manual consists of Title, Description, Model, Results and Comparison of Results of each example with brief explanations.

The references list publications at the end of each example and include lists of other analysis programs used to verify the examples.

Other programs used are as follows:

ADINA
ADINA R&D Inc.

ANSYS
ANSYS Inc.

ETABS
Computers and Structures, Inc.

MSC/NASTRAN
MSC. Software Co. Ltd.

NISA II
Engineering Mechanics Research Corporation

SAP2000
Computers and Structures, Inc.

STAAD/PRO
Research Engineers, Inc.

Relatively small magnitude of structural programs are illustrated in this manual in order to example specific capabilities of the program.

Verification Examples

Static Analysis

Static-1	Statically indeterminate structural analysis for reaction forces
Static-2	Continuous beam with fixed ends and an intermediate hinge support
Static-3	Overhanging beam analysis
Static-4	Circular ring structure
Static-5	Symmetric frame structure subjected to rotational forces
Static-6	Plane frame with beam span loads
Static-7	Beam with elastic supports and an internal hinge
Static-8	Cantilever beam with a rotational spring at the support
Static-9	Beam on elastic foundation
Static-10	Tapered cantilever beam subjected to a concentrated load at a free end
Static-11	2-D plane truss
Static-12	Cantilever beam with an in plane vertical load at a free end
Static-13	Cantilever plate subjected to a uniform pressure load
Static-14	Tapered cantilever beam subjected to a vertical load at a free end
Static-15	Closed section beam under a torsional moment
Static-16	Cantilever beam subjected to various static loads
Static-17	Curved cantilever beam subjected to forces at a free end
Static-18	Stress concentration around a hole in a square plate
Static-19	Simply supported square plate under a uniform pressure load
Static-20	Clamped square plate with a central concentrated load
Static-21	Twisting effect of a simply supported square plate
Static-22	Simply supported cylindrical shell
Static-23	Thin cylindrical shell under two point loads
Static-24	Hemispherical shell under concentrated loads
Static-25	Thick cylinder subjected to an internal pressure load
Static-26	2-D plane structure with an inclined support
Static-27	Plane truss subjected to various static loads
Static-28	Prestressed beam subjected to the uniformly distributed load
Static-29	Plane curved bar subjected to an out-of-plane load
Static-30	Solid cantilever beam subjected to shear force and bending moment
Static-31	Elliptic membrane under uniformly distributed load
Static-32	Tapered plate (beam) under static load
Static-33	Twisted beam under tip shear loads
Static-34	Pinched thin-walled cylinder
Static-35	Bending of a curved thick beam of a rectangular cross section
Static-36	Cantilever bar of z-cross section torsion
Static-37	Twisted solid cantilever beam subjected to in-plane and out-of-plane shear forces
Static-38	Curved solid beam loaded in its plane
Static-39	Long thick-walled cylinder subjected to internal pressure load
Static-40	A thin cylinder subjected to a uniform axial loading
Static-41	A circular slab subjected to a pressure load
Static-42	A bi-articulated slim arch

Thermal Stress Analysis

TS-1	Analysis of a structure due to temperature change
TS-2	Structure under a temperature gradient force

P-Delta Analysis

PDelta-1	P-Delta effect analysis of the beam
PDelta-2	P-Delta effect analysis for three planar columns
PDelta-3	P-Delta effect analysis of a portal frame

Moving Load Analysis

ML-1	Continuous 2-span bridge subjected to a moving load
ML-2	Rahmen(plate-frame) bridge subjected to a moving load

Load Factor Optimization Analysis

LFO-1	Tensile forces of cable members in a cable stayed **b**ridge
LFO -2	Long span beam with leveling forces

Eigenvalue Analysis

Eigen-1	Eigenvalue analysis of a two DOF system
Eigen-2	Simple beam with a lumped mass supported on two springs
Eigen-3	Eigenvalue analysis of a shaft with three disks
Eigen-4	Eigenvalue analysis of a simple supported shaft
Eigen-5	Eigenvalue analysis of a cantilever
Eigen-6	Eigenvalue analysis of a cantilever plate
Eigen-7	Behavior of a cantilever under concentrated loads at the free end
Eigen-8	3-D single story frame structure
Eigen-9	Eigenvalue and static analysis of a 5-level pyramid building under a lateral loads
Eigen-10	Eigenvalue analysis of a skewed cantilever plate
Eigen-11	Eigenvalue analysis of a thin simply supported rectangular plate
Eigen-12	Fundamental frequency of a simply supported beam
Eigen-13	Eigenvalue analysis of cantilever cylindrical vault
Eigen-14	Eigenvalue analysis of a simply supported solid square plate
Eigen-15	Eigenvalue analysis of simply supported thin annular plate
Eigen-16	Free vibration analysis of a cable net structure
Eigen-17	Eigenvalue analysis of a slim circular ring fixed by 2 points

Response Spectrum Analysis

RS-1	Dynamic response spectrum analysis of a 2-D, 3-story plane frame
RS-2	2-D 7-story frame building under static and dynamic loads
RS-3	3-D, 2-story unsymmetric structure
RS-4	3-D, 2-story frame structure

Time History Analysis

TH-1	Transient response to a step excitation
TH-2	Simply supported beam subjected to dynamic loads
TH-3	Simply supported beam subjected to a traveling dynamic load
TH-4	Dynamic modal response for 2-D rigid frame
TH-5	Tower structure under a harmonic exciting force

Buckling Analysis

Buckling-1	Buckling analysis of column

Geometrical Nonlinear Analysis

GNL-1	Geometric nonlinear analysis of a high arch structure
GNL-2	Stress analysis of a cable net structure
GNL-3	Buckling/postbuckling analysis of a truss structure (snap through)
GNL-4	Geometrical nonlinear analysis of a cantilever beam subjected to an end force
GNL-5	Snap-through
GNL-6	Snap-back
GNL-7	Static large displacement analysis of a tower cable
GNL-8	Static large displacement analysis of a cable supporting hanging loads
GNL-9	Static large displacement analysis of a curved cantilever beam under free end load

Boundary Nonlinear Analysis

BNL-1	Nonlinear analysis for a structure partially consisted of tension only elements
BNL-2	Analysis of a structure with nonlinear elements

Heat of Hydration Analysis

Hydration-1	Heat of hydration analysis of a quarter of a rectangular model

Time Dependent Material Analysis

TDM-1	Tendon prestressing loss by friction, slip and relaxation
TDM 2	Creep & shrinkage analysis of a beam