Next Generation Solution for Geotechnical and Tunnel Engineering

midas GTS is all-in-one FE analysis software dedicated to geotechnical engineering. midas GTS provides a new paradigm for intuitive modeling, superb analysis capabilities and speed, visualization of modeling and results, and practical summarization of results. Such unprecedented analysis environment will surely satisfy the needs of the demanding users.

Product Overview

- **Static Analysis** (Linear, Nonlinear)
- **Construction Stage Analysis** (Drain, Undrained)
- **Seepage Analysis** (Steady, Transient, Saturated/Unsaturated)
- **Semi-Coupled Analysis**
- **Consolidation Analysis**
- **Slope Stability Analysis** (SRM, SAM)
- **Eigenvalue Analysis**
- **Equivalent Linear Analysis** (1D, 2D)
- **Response Spectrum Analysis**
- **Time History Analysis** (Linear, Nonlinear)

Foundation, Excavation, Tunnel, Slope Stability
Powerful pre/post-processors

User-friendly Interface

Reliable Solver

Generate Quality Reports

Increase Productivity

Development guided by user's feedback

Technical Support

Company Benefits

Time Efficient

New subway complex, United States

Shaft construction on the existing tunnel, United Kingdom

Odeon Tower, Monaco

Dubai Tower, Qatar

Sichuan Subway Station, China

Buhang Dam, Korea
1. What is midas GTS?

A midas GTS is Fully Integrated 2D/3D Finite Element Analysis Software.

midas GTS is a Fully Integrated 2D/3D Finite Element Analysis Software dedicated to geotechnical engineering applications including Tunneling, Mining, Foundations, Excavations, Soil-Structure Interaction, Settlement Analysis, Seepage (groundwater flow) Analysis, Consolidation Analysis and much more.

The pre/post-processors and solvers are Fully Integrated which means no need to acquire different modules for performing analyses such as Foundation, Tunneling, Excavation, Ground Water Flow Analysis and etc.

midas GTS technology balances power and simplicity to empower geotechnical engineers who are seeking a reliable platform while revolutionizing how people understand and incorporate actual projects into finite element software.

midas GTS is designed to become an integral part of your professional service which will ultimately add significant value to your engineering innovations and make a positive impact on your organization's performance.
2. Can complex 3D geometry be modeled?

A Yes, all the essential modeling tools are available.

midas GTS offers Intuitive GUI Environment which allows for creation of complex geometry in the least amount of steps based on CAD formats. Different element types (e.g., embedded truss, beam, plate, interface and solid elements) including structural elements can be composed in one model file.
3. Can different pile diameters and pile group behavior be modeled and analyzed?

Yes, midas GTS can consider it using beam elements.

Existence of super pile elements to model large scale piled raft foundation systems based on embedded element techniques and considering full soil structure interaction effects.

4. Can complex 3D Soil-Structure Interaction (SSI) be simulated?

Yes, various types of interface elements for SSI are provided.

Existence of various types of interface elements to simulate soil-structure interaction regardless of geometry complexity and interface position.

- Soil-pile friction captured by nonlinear interface behavior
- Pile group interaction captured by full 3D modeling
5. **Can unconventional Tunnel Intersections be modeled?**

**A** Yes, tunnels with unconventional connection galleries can be modeled with the essential tools provided.

All types of T-type/Y-type interconnections, curved tunnels, shaft-lateral-main tunnel connections, tunnel entrances, even subway stations can be easily modeled in detail.

6. **Can Shield TBM be modeled?**

**A** Yes, TBM modeling, considering excavation sequences, is available.

Automated and realistic construction stage definition for sequential activation and deactivation of excavation segments, structural parts, loads and boundary conditions.
7. Is Staged Excavation supported in midas GTS?

A Yes, midas GTS supports 3D excavation and dedicated tools.

Simulate 3D excavation in real time construction sequence including dewatering procedure. Structural support systems including anchors and diaphragm walls can be generated automatically.

8. Can Groundwater Flow be considered in midas GTS?

A Yes, various hydraulic boundary conditions are available to consider groundwater flow behavior.

Stress-seepage semi-coupled analysis & expanded application of Darcy’s law (saturated / unsaturated) are considered in midas GTS.

Furthermore, a detailed terrain geometry can be modeled based on built-in tool TGM (Terrain Geometry Maker) to incorporate digital maps into the model.
9. Can Dynamic Analysis be performed in midas GTS?

A Yes, 3D Dynamic Analysis is available with integrated seismic wave database.

Dynamic analysis can be performed for 1D, 2D and 3-dimensional models including built in 1D and 2D equivalent linear dynamic analysis features.

10. Does midas GTS support 64 bit O/S?

A Yes, midas GTS supports 64-bit OS & multi-core parallel system.

GTS offers robust and advanced kernel - supporting 64-bit OS & multi-core parallel system in nonlinear, construction-stage and seepage analysis.

- Displacement plot time: 0.5 sec
- Stress plot time: 0.7 sec
11. Are there any training programs or technical documents regarding midas GTS?

A Yes, MIDAS provides FREE online seminars & training programs in addition to an extensive tutorial database. Both MIDAS and partner companies provide local events such as user conferences & seminars, and on-site training programs.

MIDAS User Support System

- MIDAS Online Training
- Free Trial Version available
- Tutorials (Basic, Advanced)
- News & Events (new release and etc.)
- Q&A board
- and more...

MIDAS events world-wide (conferences & seminars)

- Italy
- United Kingdom
- The Netherlands
- Spain
- Japan
- China
- India
- Indonesia
- Korea

Our MIDAS Webinar Service is provided to all participants at no cost!

- Interactive
  It allows full participation between the audience and the presenter, providing Q&A sessions.

- Customized
  By submitting your areas of interest prior to the session.
12. How does MIDAS provide technical support?

A There are over 4 branch offices and 24 partners world-wide, including MIDAS Support & Development, who are qualified and ready to provide dedicated technical support via e-mail, phone and remote assistance.

- **Q&A Service**
  The GTS Q&A service provides prompt reply within 24 hours of a customer’s inquiry related to the technical matters from the program’s use. Also, for the security of a customer’s project, personalization service is provided.

- **Remote Technical Support Service**
  The GTS remote technical support service actively responds to the customer’s inquiry by sharing a customer’s PC screen in real-time with the technical support representative to resolve the inquired problems.
midas GTS

Analysis Capabilities

- Static Analysis (Linear, Nonlinear)
- Eigenvalue Analysis
- Equivalent Linear Analysis (ELA)
- Time History Analysis (Linear, Nonlinear)
- Response Spectrum Analysis
- Construction Stage Analysis (Drain, Undrained)
- Semi-Coupled Analysis
- Seepage Analysis (Steady state/Transient, Saturated/Unsaturated)
- Slope Stability Analysis (SRA, SSA)
- Consolidation Analysis

Application Areas

Unconventional Tunnel Intersections
- Complex subsurface strata and terrain modeling.
- Tunnel entrances, T-type/Y-type interconnections, Shaft-lateral-main tunnel connections, Subway stations...
- Tunnel modeling wizard for fast pre- and post-processing
- Dedicated lining analysis module

Deep Foundations
- Soil-pile friction captured by non-linear interface behavior
- Pile group interaction captured by full 3D modeling
- 3D model size optimized for piled raft foundations using dedicated embedded pile elements

Excavations, Embankments and Slope Stability...
- Non-linear static analysis based on construction stages
- Water level definition in drained or undrained conditions
- Factor of Safety and failure analysis using c-Φ reduction method

Groundwater Flow and Coupled Analyses
- Steady state and transient seepage for tunnels, dams, slopes...
- Expanded application of Darcy’s law from saturated to unsaturated range (van Genuchten and Gardner equations or user-defined curves)
- Stress-seepage semi-coupled analysis for the analysis of water-front systems, dewatering...
- Fully coupled consolidation analysis

Vibration Analysis for Earthquake, Blasting...
- Eigenvalue, response spectrum and time history analysis
- Earthquake history database and seismic wave autogeneration
The framework of GTS is a window based environment modified with an innovative pre/post processor empowering numerical modelers with the freedom to maneuver in 2D/3D environments and effectively organize/manage large scale projects in easy to use folders.

**Undo/Redo**
Undo/Redo history

**Tool Bars**
Main tool bars consisting of icons based on various operations

**Works-Tree**
Tree Structure including 3 different tabs for easy navigation

**Context Menu**
Provides more GUI control options

**Property Window**
Verify/modify the parameters pertaining to the selected item from works tree

**Table Window**
Table input and output compatible with MS-Excel

**Output Window**
Interactive window to monitor modeling and analysis process

**Unit System**
Real time unit conversion

**Task Pane**
Customizable window including workflow from modeling to analysis

**Window based environment**
Integrated Work Station

**midas GTS**
Framework

The framework of GTS is a window based environment modified with an innovative pre/post processor empowering numerical modelers with the freedom to maneuver in 2D/3D environments and effectively organize/manage large scale projects in easy to use folders.
GTS modeler is equipped with basic and advanced tools that are essential to accurate and quality modeling.

- **Primitive Feature**
  - Box, Cylinder, Sphere, Torus, Cone, Wedge
- **Generator Feature**
  - Extrude, Revolve, Loft, Sweep
- **Modifier Feature**
  - Fillet, Chamfer, Offset, Draft, Shell, Local Prism
- **Trim, Divide by surface**
- **Boolean Operation**
  - Fuse, Cut, Common
  - Imprint curve, point
  - Modeling various non-manifold shape
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Geometry Modeling

TGM (Terrain Geometry Maker) converts topographic maps into editable surfaces in order to model the most realistic site conditions by capturing the geographical features of the terrain.

DXF Data

3D Topographic map

Extracting surface from 3D topographic map

Applying the surface to geometry of the model

“Compatible with Auto CAD
Practical Geometry Modeling”

http://en.midasuser.com
Mesh Generation

Most essential mesh generation tools for all levels of experience.

- Surface Auto-Mesher
  - Loop, Grid, Delaunay
- Solid Auto-Mesher
  - Delaunay (more than 200,000 elements per minute)
- Map-Mesher
  - Transfinite Interpolation, Sweeping
- Protrude Mesh (2D → 3D)
  - Extrude, Revolve, Sweep, Project, Offset, Fill, Remesh
  - Edge / Face
- Advanced options
  - Include interior point and edge
  - Refinement factor
  - Adaptive seeding according to the geometry
  - Size control

Fast and Easy Mesh Generation Functions

- Surface Auto-Mesher
- Solid Auto-Mesher
- Map-Mesher
- Protrude Mesh (2D → 3D)
- Advanced options

Linear grading of mesh size
(Minimize quantity and maximize quality by size control)

Combination of 1D, 2D and 3D elements with section properties
The intuitive mesh generator covers all geometric shapes and includes Qa/Qc functions for mesh quality verification and optimization process.

- Check mesh
  - Free Edge, Free Face, Non-manifold Edge
- Check quality
  - Aspect Ratio, Skew Angle, Taper, Warpage, Twist, Collapse, Jacobian Ratio
- Check and arrange element coordinate system
- Organize mesh set
  - Merge, New mesh set, Include/Exclude Items
- Arrange node ID

Check mesh (Free Face)
The element library includes various elements for structural and ground modeling. These elements are classified into the following categories:

- **Geotechnical Element(s)**
  - Solid Element
  - Plane Strain Element
  - Axisymmetric Element

- **Structural Element(s)**
  - Truss Element
  - Embedded Truss Element
  - Beam Element
  - Plate Element
  - Plane Stress Element

- **Applied Element(s)**
  - Interface Element 1D/2D
  - Plate Interface Element
  - 3D Pile Element
  - Pile Tip Bearing Element
  - Geogrid Element
  - Elastic Link
  - Rigid Link
  - Point Spring
  - Matrix Spring

In addition to simulating isotropic and anistropic linear elastic material behavior, a comprehensive set of nonlinear constitutive models are included to represent the most realistic soil & rock behavior.

- **Linear Elastic**
- **Transversely Isotropic**
- **Tresca**
- **von Mises**
- **Drucker-Prager**
- **Mohr-Coulomb**
- **Modified Mohr-Coulomb**
- **Hoek-Brown**
- **Hyperbolic(Duncan-Chang)**
- **Strain Softening**
- **Modified Cam-Clay**
- **Jointed Rock Mass**
- **Jardine Model**
- **D-Min (Japan)**
- **User supplied material (Fortran)**
Load and Boundary Conditions

Application of practical load cases and boundary conditions includes robust graphical user interface for easy input navigation.

- **Load Conditions**
  - Self Weight
  - Force, Moment
  - Prescribed Displacement
  - Pressure Load
  - Line/Element Beam Load
  - Nodal/Element Temperature, Temperature Gradient
  - Prestress
  - Result From Other Case
  - Nodal Mass
  - Response Spectrum Analysis Data (Design Spectrum Data)
  - Time Forcing Function (54 Earthquake Acceleration DB included)
  - Ground Acceleration
  - Time Varying Static Load
  - Dynamic Nodal/Surface Load
  - Time History Result Function

- **Boundary Conditions**
  - Support, Ground Support
  - Nodal Head
  - Nodal/Surface Flux
  - Seepage Face
  - Seepage Boundary Function
  - Unsaturated Property Function : Permeability, Water Content
  - Non-Consolidation Condition
  - Draining Condition
  - Circular/Polygonal Slip Surface
  - Change Material
  - Change Boundary Set

System Equation Solver Benchmark

DIANA solver is driven by three direct solvers and one iterative solver, which are compatible with 32/64-bit architecture and multi-threading technology. The multi-frontal solver is one of the fastest solver for solving large solid models.

<table>
<thead>
<tr>
<th>Element type</th>
<th>Solid Element (Hexa Mesh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis case (Static)</td>
<td>Stress analysis in situ condition</td>
</tr>
<tr>
<td>Number of Element</td>
<td>27,000 Elements, 64,000 Elements</td>
</tr>
<tr>
<td>Boundary Condition</td>
<td>Displacement Constraints</td>
</tr>
<tr>
<td>Load</td>
<td>Self weight</td>
</tr>
</tbody>
</table>

**Multi-Frontal Sparse Gaussian Solver Benchmark Test**

System - Windows 2000 Server, CPU - Intel XeonTM 2.80GHz Dual, RAM - 4GB
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Construction Stage Analysis

- Practical interface to define large scale projects using construction stages for the following analysis types: seepage analysis, consolidation analysis, semi-coupled analysis, stress analysis
- Easily obtain in-situ ground conditions for various soil stratigraphy, Activate/Deactivate boundary conditions, loads, elements with Drag & Drop gestures or Construction Stage Wizard (automatic stage definition)
- Control time steps/load steps with user defined functions.
- Simulate and capture real construction stage sequence.
- Load distribution factor function (LDF) for excavation

Slope Stability Analysis

- Slope stability analysis evaluates the factor of safety using two types of methods. Strength Reduction Method (SRM) or Stress Analysis Method (SAM)
  - Strength Reduction Method(SRM) 2D/3D
    - Reduction algorithm seeks failure by reducing the (c,\(\phi\)) material parameters simultaneously
    - Control maximum number of steps/iterations
    - Consider initial water level using static value or user-defined function
    - Robust contour features displaying actual deformation
  - Stress Analysis Method using Limit Equilibrium Theory (SAM)
    - Perform stress analysis using finite element method
    - Extract min./max. factor of safety factor and critical surface among the results of stress analysis obtained at the virtual sliding surfaces
Solving groundwater flow problems: Steady-State Analysis / Transient Analysis

- Apply total / pressure head conditions and nodal flux using static conditions or user-defined functions
- Apply seepage face conditions to porous materials using total head values or user-defined functions

Steady State Analysis

- Internal and external boundaries change over time
- The volumetric water content is required
- Water content in unsaturated soil and porosity are required to estimate the flow rates

Transient State Analysis

- Seepage force resulted from the groundwater flow generates displacements and stresses in the ground
- Calculate seepage forces using the pore water pressure obtained from seepage analysis
- Seepage force is centralized around the outflow boundaries where the total head decreases drastically
- Relatively low confined pressure near the outflow causes a decrease of shear and tensile strengths of the soil
- This effect can be considered in conjunction with stress analysis in construction stage analysis

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Seepage Analysis

- Initial condition
- Seepage analysis (Consider Phreatic level Full water level)

Semi-Coupled Analysis

- Embankment
- Stress analysis (Full water level)
Consolidation Analysis

- Display dissipation of any excess pore water pressure behavior due to overburden load and display effective stresses of soils increase with dissipating the excess pore water pressure with time
- Assign non-consolidating/consolidating boundary conditions.
- Considering bi-directional drainage boundary conditions for 2D/3D models

1D Equivalent Linear Analysis

- Evaluate ground response against seismic waves prior to construction. Evaluating ground motion and damping effect based on seismic records for intact ground condition
- Determine critical seismic loads causing structural failure and liquefaction
- Predict ground vibration to obtain the design response spectra
- Analyze mechanism of quake-center, propagation of the seismic wave and the effect of geological strata based on ground behavior

Schematic of Ground Response Analysis

Function of Dynamic Properties

Geological Map

Ground Acceleration

2D Consolidation Analysis

3D Consolidation Analysis
Dynamic Analysis (Response Spectrum Analysis)

- Response of a multi-degree-of-freedom (MDOF) system is assumed to a combination of single-degree-of-freedom (SDOF) system
- Peak value of response such as displacements, velocities and accelerations, corresponding to the natural frequency is used for response spectrum analysis
- Spectral data can be generated from the seismic parameters such as dynamic coefficient, foundation factor, zoning factor, importance factor and seismic response factor

Dynamic Analysis (Time History Analysis)

- Calculate structural responses such as displacements and member forces within a given period of time using the dynamic characteristics of the structure under the dynamic loads
- Modal Superposition Method
  - Estimate displacement of structures from a linear superposition of modal displacements, orthogonal to each other
  - Damping matrix is assumed as a linear combination of the mass and stiffness matrices
- Direct Integration Method
  - Integrating the dynamic equilibrium equation over given time steps without changing itself

Design Spectrum  Abutment Structure

Horizontal Displacement  Vertical Displacement

Seismic Loads  Vibration Loads  Dynamic Analysis (Foundation)

Seismic Analysis (Tunnel)
Post-processing

The post-processing engine is a powerful visualization tool capable of manipulating complex models into simple cross-sections, clipping planes, and contour line representations.

Benefits
- Verify results using visual representations
- Adjust range of the results and contour colors

Various contour and edge type

Contour on ISO-surface

Capped Plot (Upper Part)

Capped Plot (Lower Part)

Contour on slice planes

Hybrid plot
(Combination of vector and contour plot on clipping plane)

Virtual transformation of mesh sets
(Async the results of embedded mesh sets)
Reports can be created in a short time by extracting results into three formats:
- Table: Import into spreadsheet
- Diagram/Graph: Real-time result update per stage
- Contour plot

- Extract Result:
  - User-selected data into a table or graph
- Probe Result:
  - Values at specific nodes/elements with probe tag or location of max/min value
- On-Curve Diagram:
  - Results along user-defined curve with diagram

Contour on Clipping Plane  
Flow Path  
Probe Results for selected nodes  
Settlement Diagram  
Output table and graph compatible with MS-Excel

“Contour, Table and Graph
Extracting and Visualizing Results”
GTS is a proven numerical modeling software used by many international geotechnical firms. Selected applications which have been modeled in GTS are shown on the right.

GTS includes two wizards for tunnels and anchors. The Tunnel Wizard can model tunnels having regular pattern and define excavation method such as full face cut, bench cut and direction (one, both) as well. For each case, load relaxation can be considered by applying load distribution factor (LDF).

- **Road Tunnel**
  - Portal, Cross passage, Emergence area (Emergency zones), Ventilation shaft, Electrical rooms, Fault fractured zone, Adjacent structures
  - Blasting load analysis
- **Railway Tunnel**
  - Fitting (Y-Type), Shield TBM, Machine Room, TRcM/CAM, Station, etc.
  - Steel Pipe Roof (pipe umbrella reinforcement method), Forepoling, Steel Strut
  - Full face/Bench cut, Ring cut, CD cut, Open cut, 2 Arch, 3 Arch

**Applications (Tunnel)**

- **Portal with fault fractured Zone**
- **Ventilation Shaft (vertical/horizontal)**
- **Shield TBM**
- **Steel Pipe Reinforced Step Grouting**
- **Adjacent Structures**
- **TRcM/CAM (Subway tunnel)**
- **2-Arch Tunnel (NATM method)**
Slope Stability in GTS can be analyzed with Strength Reduction Method, which is based on reduction algorithm for soil parameters (c, \( \Phi \)) simultaneously until failure occurs. Failure is governed using the force norm convergence criteria. The critical factor is the minimum factor of safety at which failure occurs.
Applications (Foundation Systems)

Analyze driven or bored piles behavior either in isolation or grouped arrangements subjected to any combination of vertical, lateral load, and eccentric loads. Estimate the bearing capacity of various types of foundations and differential settlements due to active load sets.

- Shallow foundation: Direct foundation, Foundation vibration
- Deep foundation (Pier/Abutment): Pile (Steel Pipe, PHC, Drilled Shaft RCD, Driven), Well foundation, Caisson, Raft foundation

Applications (Excavation/Temporary Structures)

Simulate excavation sequences considering temporary structures to support deep excavation considering existing nearby facilities such as subway complex, buried conduit and box. Changes in earth pressure and ground water level are also can be taken into account.

- Retaining wall: H-Pile + slurry wall, Sheet Pile, CIP, SCW, D-Wall
- Strut: Steel Strut, Earth Anchor, Rock Bolt, Soil Nail, Tie Rod, Raker
- Stability analysis for adjacent structures

Total Solution 2D/3D FEA Software for Geotechnical Applications

Next Generation Solution for Geotechnical and Tunnel Engineering
Applications (Soft Soil/Embankment)

Calculate the dissipation of generated excessive pore water pressure in the model due to surcharge loading process. Extract results to graph time-settlement behavior of various types of surface profiles. Acceleration of soil consolidation using vertical drains in 2D/3D (spacing & geometrical configurations considered)

- Soft soil: SCP-reinforced, Dewatering method (PBD, PSD, SD)
- Embankment: Revetment, quay wall, dock, breakwater

Applications (Hydraulic & Underground Structures)

Two types of seepage analyses for both steady state and transient flow based on Darcy’s law.

- Steady state and transient seepage for tunnels, dams, slopes...
- Stress-seepage semi-coupled analysis for the analysis of water-front systems, dewatering...

- Hydraulic structures: Earth Dam, CFRD, levee, water way tunnel (pipe & culvert)
- Underground Structures: Box, underground driveway
**Excavation & Foundation**

**Dubai Tower**  
Piled-raft Foundation Design

**Palazzo Versace and D1 Tower**  
80-storey Building, Foundation Behavior Analysis using 3D FEM

**Abu Dhabi Tower**  
Foundation Behavior Analysis using 3D FEM

**Yongduk Bridge**  
Abutment’s Foundation Analysis
Project Applications

Excavation & Foundation

Urban Express Railway
Excavation and Temporary Structure Analysis

Guangzhou TV Tower
Second tallest metal tower, Foundation Behavior Analysis

Sichuan Subway Station
Behavior Analysis of Underground Structure using 3D FEM

Hujeong Tunnel
Evaluation of Excavation Stability
Segmental & Sprayed Concrete Shaft Construction
Construction Analysis for Stability of Concrete Lining

Soil-pile-tunnel Interaction
Pile Construction and Loading Effects on Existing Shield Tunnels

Inje Tunnel
Tunnel Junction Analysis

Nahu Tunnel
Tunnel Exit Analysis
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Project Applications

Stress-seepage semi-coupled analysis

Yeosu Highway Construction
Slope Stability Analysis at Cutting Surface

Buhang Dam
Impervious Zone Stress Analysis for Gravity Dam

Navy Station’s Breakwater
Stability Check due to Wave and Earthquake

East Circulation Road
Culvert Analysis using 3D FEM
MIDAS IT is dedicated in becoming the world’s best engineering solutions and services provider on grounds based on vision, trust, and respect between our employees and our clients. We believe that true happiness can be achieved between our employees and our clients through our world-class solutions, and we will put our endless efforts to make this into reality. MIDAS IT is taking flight with endless passion and devotion to provide the technological solutions worldwide for the purpose of bringing true happiness all over the world.
All MIDAS IT programs are being used by engineers worldwide in the related fields of mechanical/building/civil/geotechnical engineering.

In the near future, to further grow as a leading global engineering solutions developer and provider, MIDAS IT plans to expand its CAE software solutions and technology to other engineering and business fields such as ship building, aerospace, electronics, environment, and medical industry.

**MIDAS Family Programs**

**Nastran FX**
Total Solution for True Analysis-Driven Design

**midas FX+**
General Pre & Post Processor for Finite Element Analysis

**Midas Civil**
Integrated Solution System for Bridge and Civil Structures

**Midas FEA**
Advanced Nonlinear and Detail Analysis System

**Midas Abutment**
Abutment Automatic Design System

**midas Pier**
Pier Automatic Design System

**midas Deck**
Pier Automatic Design System

**Midas GTS**
Geotechnical and Tunnel analysis System

**Midas GeoX**
Temporary shoring & Settlement analysis System for Excavation

**Soil+**
(CTC in Japan)

**Midas Gen**
Integrated Design System for Building and General Structures

**Midas Building**
A revolutionary building specific design system with auto-drafting modules

**Midas ADS**
Shear wall-type Building Design System

**Midas SDS**
Slab & basement Design System

**Midas Set**
Structural engineer’s tools

**MIDAS Program Applications**

**Burj Khalifa (UAE)**
- World’s tallest building to date
- Height: 800 m, 160 floors

**Beijing Olympic Stadium (CHINA)**
- Area: 78,000 sq. m.
- Allowed Capacity: 91,000 people

**Sutong Bridge (CHINA)**
- World’s longest cable stayed bridge to date
- Total span: 8,206 m

“MIDAS Family Programs are advanced CAE (Computer Aided Engineering) solutions that were developed using the latest technology”