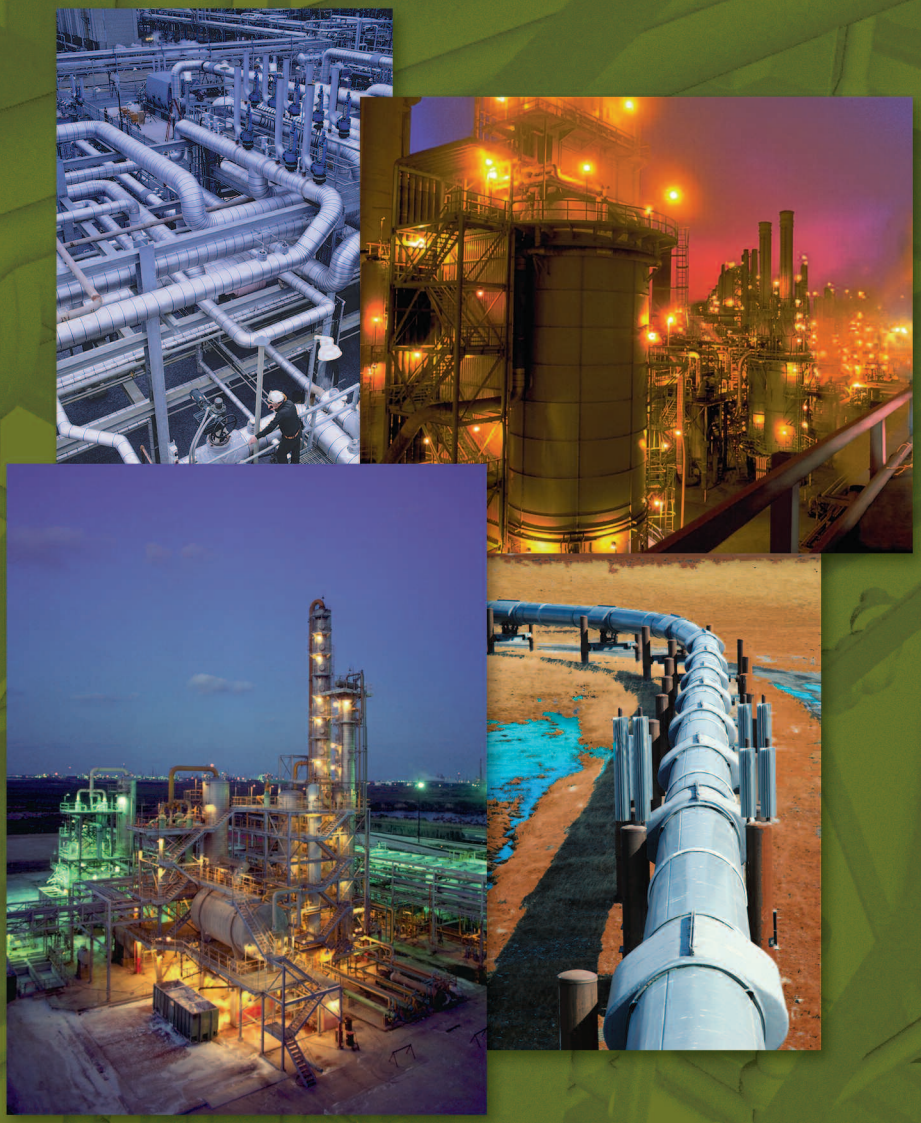
COADE®
ENGINEERING SOFTWARE

COADE CAESAR II®

Pipe Stress Analysis



CAESAR II: The World Standard for Pipe Stress Analysis

Since its introduction in 1984, CAESAR II has become the world's most widely used pipe flexibility and stress analysis software and is thus considered the industry's de facto standard.

CAESAR II is a complete solution that allows quick and accurate analysis of piping systems subjected to a wide variety of loads that take into account weight, pressure, thermal, seismic and other static and dynamic conditions. It can analyze piping systems of virtually any size or complexity.

Whether you are designing a new system or trouble-shooting an existing one, the program produces results that completely describe the system behavior based on user-defined variables and accepted industry guidelines. With CAESAR II, you can do more in less time and do it more accurately.

COMPLETE

CAESAR II includes most major material and piping codes. It leads the field in technical capabilities and analysis options to provide best-in-class piping system design capabilities.

FLEXIBLE

Tailor the program to fit your exact needs by setting your own desired parameters and system conditions.

EASY TO USE

CAESAR II makes analysis model building easy and intuitive with its smart graphics. Interactive error checking and instant context-sensitive help ensure the quality of input and the integrity of the model.

PROVEN

For over two decades CAESAR II has proven itself to be a stable and reliable tool providing dependable results for a broad range of piping applications and environments.

UNIVERSAL ACCEPTANCE

The world's major engineering and energy firms standardize and rely on CAESAR II to provide the analysis that ensures the reliability and safety of their designs for billions of dollars of capital projects and installations worldwide.

KNOWLEDGEABLE SUPPORT

Experienced pipe stress analysts, program developers and engineers answer customers' technical questions. Customers continue to give high marks to CAESAR II's reliable and timely technical support.

TRAINING

Top-notch training courses cover not just the use of CAESAR II, but also COADE's approach to satisfying piping code requirements.

CAESAR II provides the following capabilities—right out of the box!

System Modeling
- Context Sensitive Input Screens
- Interactive Graphics
- Extensive Restraint Types
- Structural Steel Modeling
- Interactive Global Editing
- FRP (Fiberglass) Pipe Modeling
- Automatic Expansion Joint Modeling
- Buried Pipe Modeling

Static Analysis
- Comprehensive Load Case Options
- Interactive Error Checking
- Extensive Spring Hanger Options
- Wind Load Calculations
- Nozzle Flexibilities and Stresses
- Equipment Load Checks
- Flange Leakage and Stress Checks
- Fatigue and Cumulative Usage Analysis
- Wave and Current Load Analysis

Dynamic Analysis
- Mode Shape and Natural Frequency Calculations
- Harmonic Displacement and Force Analysis
- Shock Spectrum Analysis and Independent Support Motion
- Force Spectrum Analysis
- Modal Time History Analysis
- Animation of Dynamic Response
- Missing Mass/Force Corrections
- Static/Dynamic Load Combinations
- Relief Valve Load Synthesis
- Data Interfaces

Output
- Customizable Reports
- Graphic Review of Analytical Results
- Automatic Pipe Stress Isometrics
- ODBC Database Export

Bi-directional Links to Design
- CADWorx Plant

Third-party Import Links
- Third-party Import Interfaces
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Analysis Codes and Standards
- Piping
- Wind Loading
- Seismic
- Flange Evaluation
- Equipment Loading
- Nozzle Flexibilities and Stresses
- Extensive Material Databases

System Modeling

CAESAR II's ease of modeling piping and additional supporting steel systems revolutionizes the way pipe stress engineers approach flexibility analysis. The architecture, speed and responsiveness of its innovative modeling tools greatly reduce modeling time of typical jobs, from hours to just minutes.

Context Sensitive Input Screens
The program's intuitive modeling dialogs and menus place the most frequently used features up front while the less frequently used capabilities are just a click away. Plus, CAESAR II allows you to build your input screen your own way—using only the fields that you want to see. This ensures that you are not distracted by complex screens or confusing and redundant options. You see only what you want to see, when you need to see it.

Interactive Graphics
CAESAR II's interactive graphics allow the editing of one or more elements by selecting them directly from the model. Additionally, the model view allows you to walk around your fully rendered model. System representations can be adjusted to single-line, volume or wire-frame mode for better visualization.

Extensive Restraint Types
CAESAR II comes with a wide selection of restraint types that can be used individually or in combination to provide the most complete set of boundary conditions of any analysis tool on the market:

- Anchors
- Spring Hangers
- Imposed displacements
- Translational restraints
- Rotational restraints
- Snubbers
- Guides and limit stops

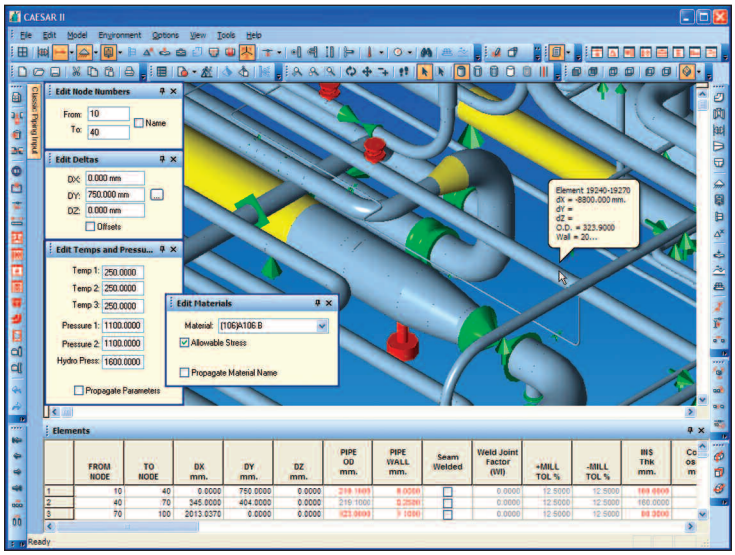
Restraints may be modeled with a full range of linear and non-linear characteristics such as user-defined stiffness, connecting nodes (for nodal interdependence), friction, gaps, single-directionality, bi-linear stiffness, large rotation angle constraints, etc.

Structural Steel Modeling
CAESAR II includes a full library of international structural steel shapes to make modeling structures easy. Steel structures can also be imported from COADE's CADWorx Steel to take advantage of the most current boundary conditions.

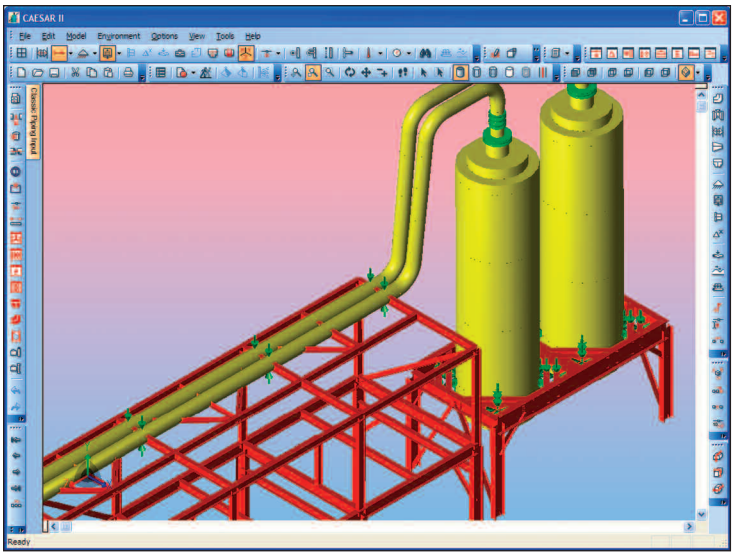
Interactive Global Editing
You can globally view, edit and manipulate elements and their data within an element spreadsheet, element listing, or graphic environment, or using all three at once. The editing functions include group block-edit features such as element Rotate, Duplicate, Mirror, Delete and Node Renumbering.

FRP (Fiberglass) Pipe Modeling
Choose from piping codes specifically for fiberglass reinforced plastic pipe plus vendors' data for modeling and analysis.

Automatic Expansion Joint Modeling
Create input for expansion joint assemblies with parameters extracted from vendor-supplied catalog databases.



Integrated Input Environment
Build your system using the spreadsheet, list or graphical environment for easy intuitive modeling.



Steel Analysis Modeling
A full range of steel shapes are included to make the development of a complete analysis model a breeze.

Buried Pipe Modeling
CAESAR II can automatically mesh a piping system and create restraints which simulate soil resistance on buried pipe based upon user-entered soil conditions.

Static Analysis

CAESAR II begins the static analysis by recommending load cases necessary to comply with piping code stress requirements. Built-in default load cases are suggested for most analyses but users may also create load cases from combinations of basic load types or of other load cases as required. Existing load cases can be modified or deleted as necessary.

The combining of piping and structural models also makes it possible to observe the effect of the non-linear pipe-structure interaction both graphically and numerically.

Comprehensive Load Case Options
Load cases may consist of any basic loadings present in the model (pressure, weight, thermal, displacements, wind, uniform loads, seismic, wave and current, cold spring, and hanger loads) or they may be combinations of other load cases. Numerous load case options are also available to control the analysis, such as stress type (hydrotest, operating, sustained, expansion, occasional, fatigue), combination method, modulus of elasticity specification, friction factor, spring hanger behavior, etc.

Interactive Error Checker
Once modeling is complete, the comprehensive error checker automatically reviews the input to ensure that the model makes sense from a "piping" perspective. Warnings and errors are synchronized with the element input screen so that mistakes can be immediately addressed and the workflow maintained.

Extensive Spring Hanger Options
Once you specify a hanger as a restraint, CAESAR II permits hanger selections based on multiple thermal cases, cold or hot load design, and standard or extended load ranges. The ideal hanger can be selected from numerous built-in manufacturer catalog databases based on a variety of proposed operating and installation positions.

Wind Load Calculations
Automatically apply and analyze multiple wind load sets according to industry specifications. In keeping with CAESAR II's flexibility, you can also specify your own pressure or velocity profiles.

Nozzle Flexibilities and Stresses
Perform nozzle load analysis based on built-in nozzle flexibility estimation methods from WRC, API and PD 5500.

Equipment Load Checks
Perform load evaluations for steam turbines, centrifugal pumps, centrifugal compressors, closed feedwater heaters and air cooled exchangers.

Flange Leakage and Stress Checks
Evaluate flange loads using simple leakage checks and ASME Section VIII Division 1 specifications.

Fatigue and Cumulative Usage Analysis
Calculate the remaining life based on material fatigue curve data and an assigned number of cycles. A cumulative usage report will provide a total usage factor for all fatigue cases selected at one time.

Wave and Current Load Analysis
Analyze piping elements that experience loading due to the effects of ocean waves and currents. Various wave theories and current profiles are incorporated.

Dynamic Analysis

CAESAR II guides you through the specification and the acquisition of data needed for dynamic analysis. Dynamic analysis begins with the specifications of the dynamic input data such as lumped masses, imposed vibration, snubbers and spectrum definitions. You can use built-in shock spectra or define your own. Accuracy can be balanced with efficiency through the choice of either the consistent mass or lumped mass analytic model.

Mode Shape and Natural Frequency Calculations
CAESAR II calculates the natural modes of vibration. In many cases, operating problems can be examined or avoided by reviewing the system's natural modes of vibration, thus saving valuable time and reducing piping system failures.

Harmonic Displacement and Force Analysis
Evaluate the vibration response of a damped system to a range of harmonic forces or displacements simulating mechanical and acoustic line vibrations.

Shock Spectrum Analysis and Independent Support Motion
Choose independent support motion and from a library of NRC and UBC earthquake spectra (including optional anchor movements), or have a 'wizard' help build your spectrum in accordance with common building codes. The program uses standard response spectrum methods, and you may choose from a variety of modal and spatial summation options.

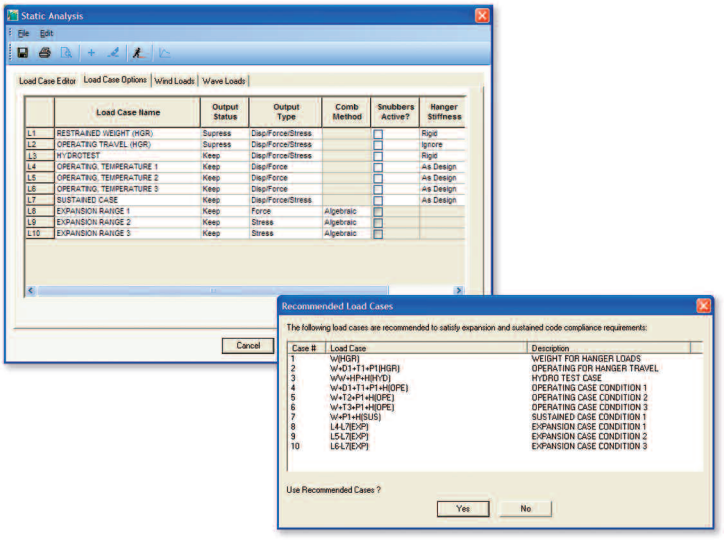
Force Spectrum Analysis
Analyze general impact loads such as water and steam hammer, slug flow and relief valve discharge. The program includes a routine to convert time history loads into the appropriate frequency response data.

Modal Time History Analysis
Conduct an accurate and complete evaluation of the system response through time when the timing of dynamic loads is well defined.

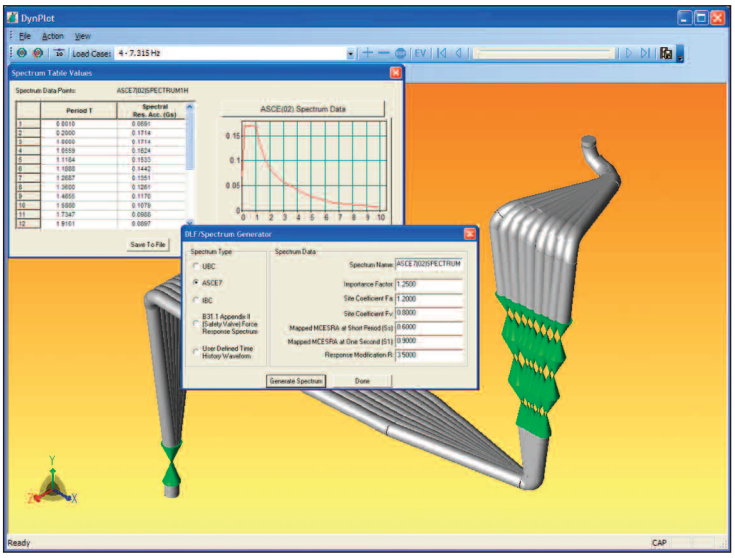
Animation of Dynamic Response
Verify system response using the Animation Module, one of CAESAR II's most valuable tools in diagnosing dynamic problems. The program animates the results from time history and harmonic analysis as well as mode shapes.

Missing Mass/Force Corrections
Improve dynamic solution accuracy by accounting for system high frequency modal response.

Static/Dynamic Load Combinations
Combine any number of dynamic and static loads to accurately address the occasional load requirements of the piping codes.



Load Case Selections Made Easy
CAESAR II recommends analysis load cases but still provides powerful options for complete load case customization.



Comprehensive Dynamic Capabilities
CAESAR II analyzes many different types of dynamic effects.

Relief Valve Load Synthesis
Calculate dynamic thrust loads and transient pressures from relief valves in open discharge systems.

Data Interfaces
Import results automatically from hydraulic analysis packages such as Stoner's LIQT and Sunrise Systems' PIPENET as response spectrum data for dynamic analysis in CAESAR II.

Output

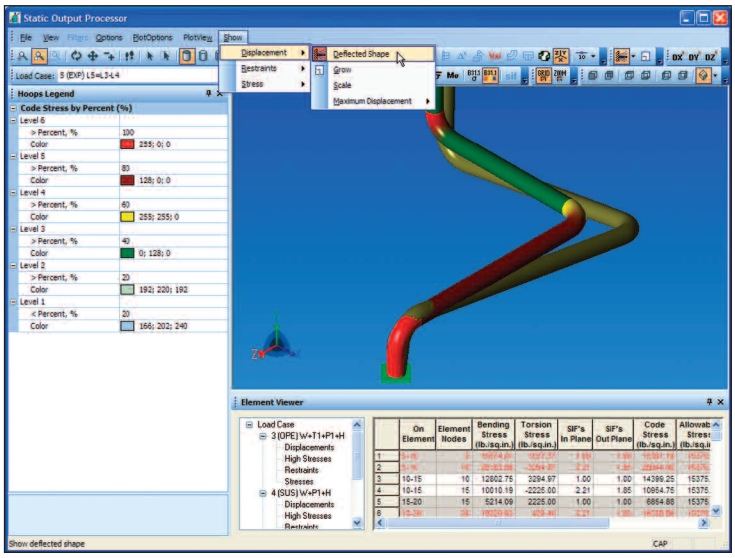
CAESAR II output reports include input echo; hanger selection and individual load case listings of restraint loads, displacements, local forces and moments; and code-defined stresses compared with their allowable limits. You can review all or part of this information on the screen before the reports are printed or sent to Microsoft Word. This output review speeds the design cycle by displaying results that are useful in diagnosing piping trouble areas.

Customizable Reports
If the standard set of CAESAR II output reports is inadequate, they may be supplemented with user-customized reports built upon easily constructed templates. All output data may be placed in the reports along with user-specified formatting and custom headers. Using the output report filters lets you save paper by eliminating non-critical results from the reports.

Graphic Review of Analytical Results
The output graphics display can be used to query the results, either by superimposing selected results on the model, viewing all associated element results in a spreadsheet form on the graphics screen, or plotting displaced shapes and animated motions. Color coding can be used to highlight highly stressed areas of the model.

Automatic Piping Stress Isometrics
Once a piping model is created for analysis in CAESAR II, you can produce automatic piping isometric drawings from within the program using Alias' ISOGEN. In addition to the basic geometry and materials data, the drawing can be automatically annotated with additional piping information such as piping materials and sizes, operating conditions and restraint functions. Analysis results, such as pipe stresses, restraint loads and thermal placements, can also be included in the drawing. Producing automatic isometric drawings from within CAESAR II saves time for both engineers and designers.

ODBC Database Export
Export piping model information and analysis results to any ODBC database for data review and manipulation outside CAESAR II. This is very useful in comparing results between several analyses or creating unique reports and plots.



Clear Concise Output Results
Analytical results may be reviewed either graphically or in report form.

Bi-directional Links to Design

CADWorx Plant
CAESAR II offers a seamless link to CADWorx Plant, COADE's AutoCAD-based plant design software, the only intelligent, fully functional, bi-directional link between CAD and pipe stress analysis. This powerful link improves accuracy by allowing engineers and designers to concurrently share piping models, therefore saving time and money.

In addition to the piping links between CAESAR II and CADWorx, CAESAR II can also import steel structures created in CADWorx Plant Professional or CADWorx Steel.

Third-party Import Links

Third-party Import Interfaces
CAESAR II provides data import interfaces to the following third-party packages, and, as a result, it eliminates time consuming data entry and enhances the value of your existing plant design data.

- PDS
- CADPIPE
- ComputerVision
- ISOMET
- PRO-ISO
- PCF
- And many more

Neutral File Import
COADE publishes the full specification of the CAESAR II neutral file standard. The CAESAR II neutral file format gives individuals the ability to develop means of data exchange from packages and systems that are not listed here.

New versions of CAESAR II work perfectly with analysis models produced using earlier versions of the software, thus ensuring the viability of your data from version to version.

Analysis Codes and Standards

CAESAR II comes with the codes, standards and databases required for many worldwide applications, so you can begin work right away.

Piping
- B31.1 and B31.1 (1967) - Power
- B31.3 - Process Piping
- B31.4 - Liquids Transportation
- B31.4 - Chapter IX - Offshore
- B31.5 - Refrigeration
- B31.8 - Gas Transportation
- B31.8 - Chapter VIII – Offshore
- GPTC/192 – Gas Pipelines
- ASME Sec. III, Class 2&3 - Nuclear Power
- British Standard 806
- US Navy Spec. 505
- Z662 - Canadian Gas Transportation
- Z662 Chapter 11
- RCC-M Section C & D - French Nuclear Power
- Stoomwezen - Dutch
- BS 7159 - British Fiberglass Reinforced Plastic Pipe
- CODETI - French
- TBK 5-6 - Norwegian
- FDBR - German
- UKOOA - UK Offshore
- IGE/TD/12 - UK Gas
- Det Norske Veritas
- EN-13480

Wind Loading
- ASCE 7
- User-definable pressure and velocity profiles

Seismic
- ASCE 7
- UBC
- IBC
- US NRC Regulatory Guide 1.60
- Static G-Load

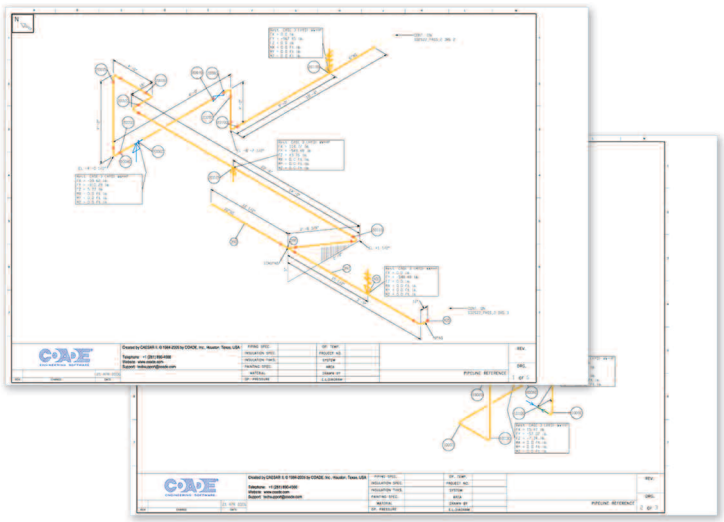
Flange Evaluation
- ANSI B16.5
- ASME Section VIII Division 1

Equipment Loading
- NEMA SM23 - Steam turbines
- API 610 - Centrifugal pumps
- API 617 - Centrifugal compressors
- HEI - Closed feedwater heaters
- API 661 - Air cooled exchangers

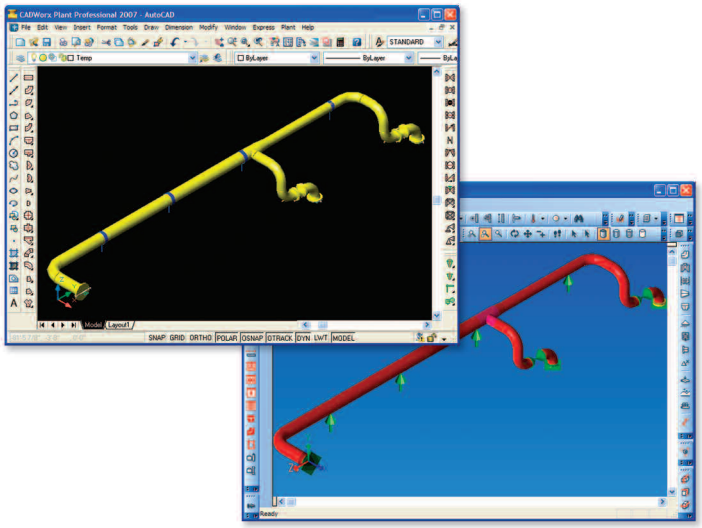
Nozzle Flexibilities and Stresses
- WRC 107
- WRC 297
- API 650
- PD 5500
- ASME Section VIII Division 2

Extensive Material Databases
CAESAR II includes a comprehensive set of databases, including:

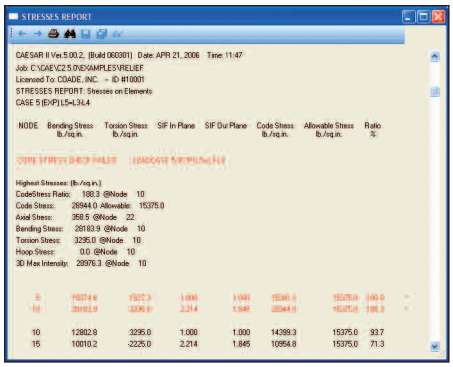
- Material database with temperature dependent allowable stresses, modifiable by the user
- Valve and flange databases with built-in length and weight information
- Expansion joint vendor databases
- Spring hanger vendor databases
- Structural Steel databases
- FRP pipe property databases



Automatic Stress Isometrics
CAESAR II creates ISOGEN-based annotated stress isometrics easily and quickly.



Bi-directional interface to CADWorx Plant
Seamless data sharing between CADWorx Plant and CAESAR II allows engineers and designers to work concurrently.



CAESAR II does what no other pipe stress solution does. It provides power and ease, all in a universally accepted package that continues to lead the field.

System Requirements:

- 2 GHz Intel Pentium processor (or equivalent) or better
- Microsoft Windows (2000, XP Pro or higher) Operating System
- Microsoft Internet Explorer (6.0 or later)
- 512 MB RAM (recommended)
- 1280 x 1024 graphics resolution or better
- 128+ MB of video RAM

CAESAR II Licenses:

All software licenses provide the following as standard:

- Complete CAESAR II program
- One complete set of program manuals (online)
- Online technical newsletter
- Phone, fax, web site and e-mail access for technical support

Full License provides:

- Perpetual single license with no limit on the amount or duration of use
- One full year of automatic upgrades from date of purchase
- Eligibility for annual extensions of automatic upgrades
- Eligibility for discounts on additional Full License purchases

Monthly Lease provides:

- Full License copy on a monthly rental basis
- Option to apply first month lease when converting to a Full License purchase

Limited Run provides:

- Complete program for limited number of executions (analysis)

Graphics powered by:
HOOPS (Tech Soft America)

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