

CASINGGCK – Casing Stress Check

is a powerful engineering tool designed for running casing verifications, i.e., to compare the resistance of a casing column design to the physical stresses that the column will experience.

CASINGGCK analyzes constraints and stresses depending on formation pressure profiles and shoe positions, and verifies each casing string against user-specified minimum design factors. Casing and tubing can be selected from an extensive database.

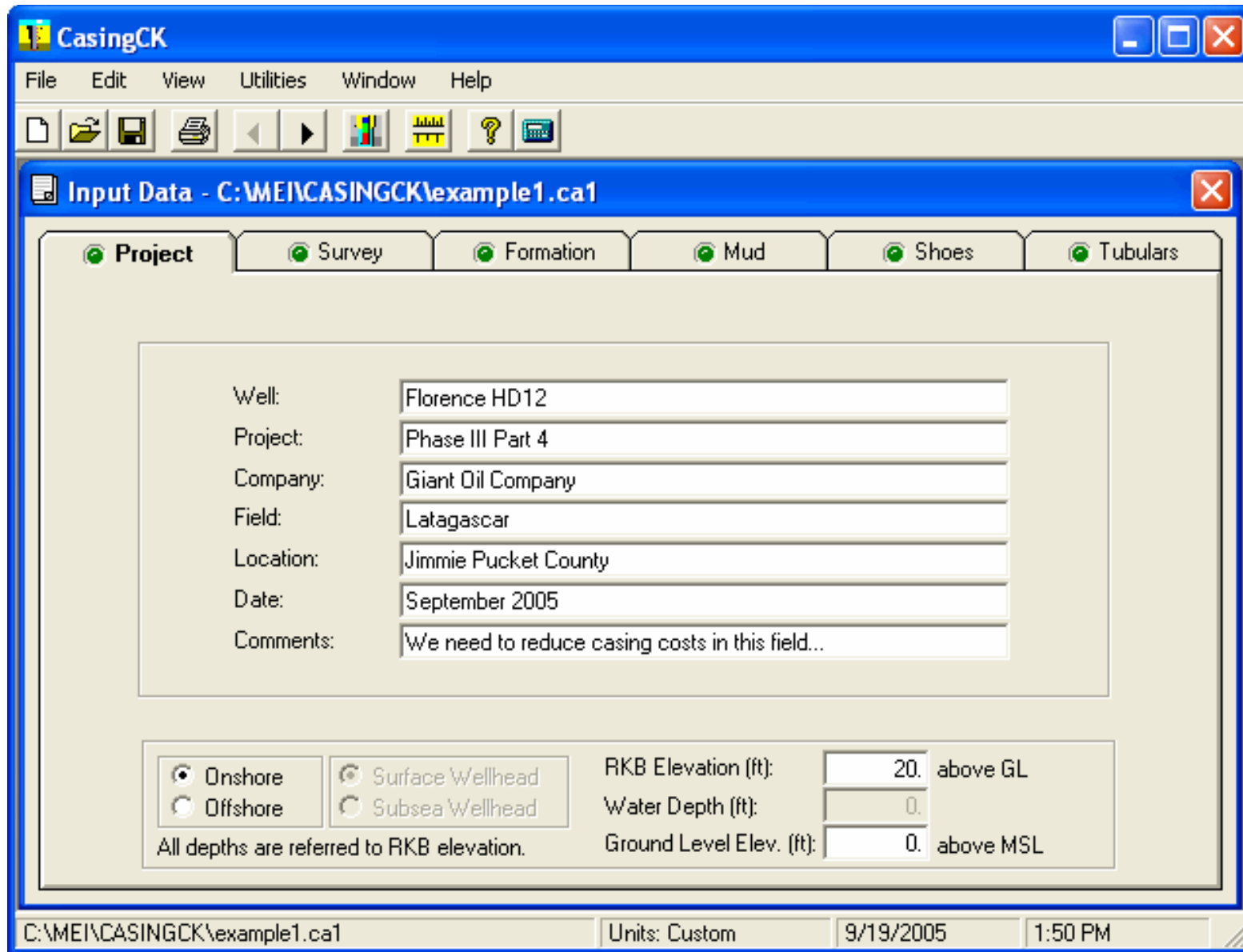
Rules used to calculate stresses can be saved in a customized profile, thus making it easier to meet your company's policies.

NOTE: Computer screens within this PDF document may appear slightly distorted. This is due to limitations in the Adobe Acrobat Viewer when displaying graphics. To clearly view details in the graphics, zoom in or print the document.



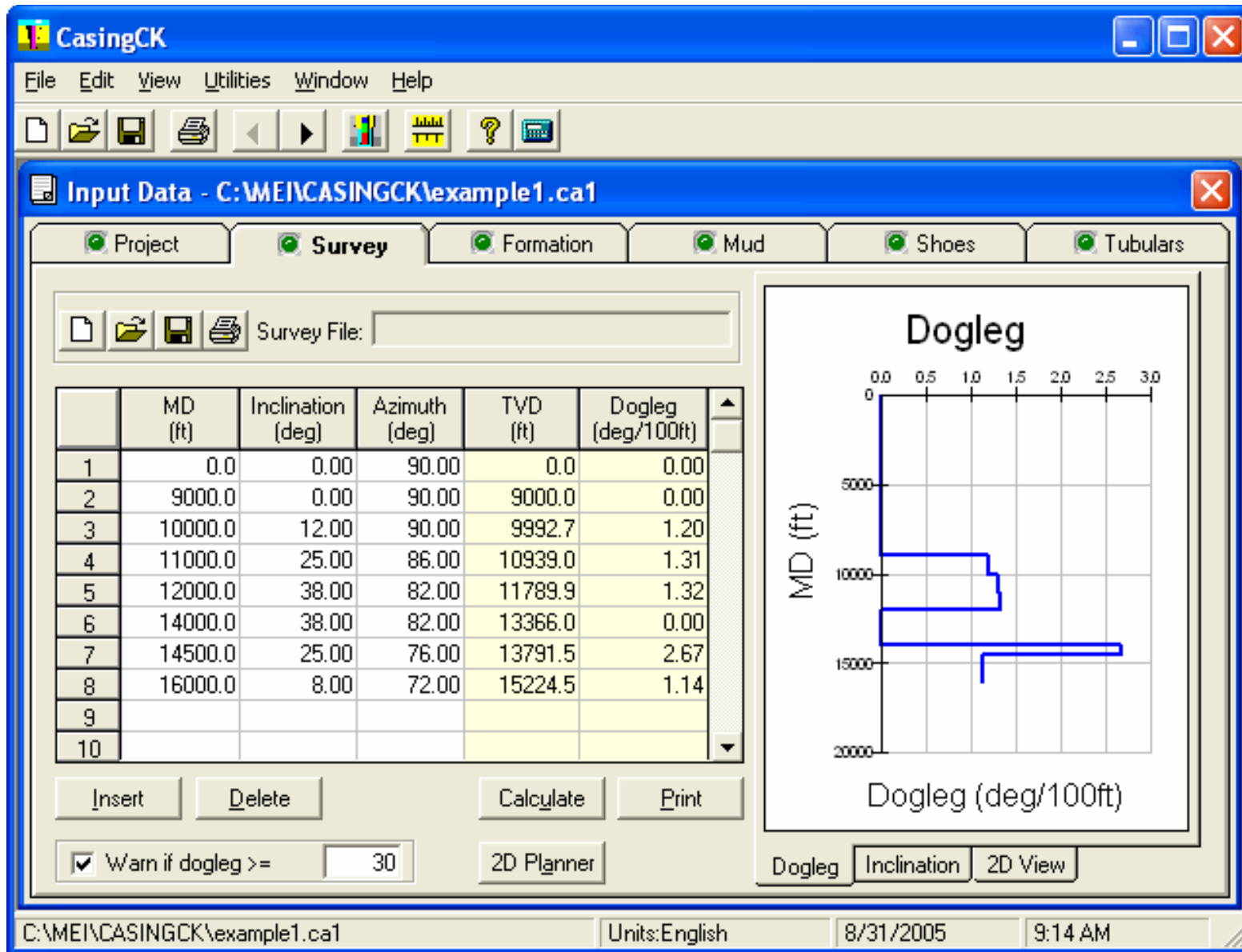
Advanced Engineering Features:

- ✓ Handles directional wells
- ✓ Handles surface and sub-sea well heads
- ✓ Avoids drill-string failures
- ✓ Analyzes Kick Tolerance, Choke Margin and Differential Pressure based on shoe positions
- ✓ Applies conservative criteria for stresses analysis as well as customized criteria
- ✓ Analyzes stresses according to surface, intermediate & production conditions
- ✓ Models burst & collapse including uni- and biaxial analysis
- ✓ Real gas law analysis for internal burst load modeling
- ✓ Analyzes axial load and bending effects in curved sections
- ✓ Accepts directional well plans and surveys
- ✓ Calculates formation frac gradients according to defined lithotypes
- ✓ Casing-shoe determination
- ✓ Helps select casing and tubular strings at lowest cost



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CASINGCK's first input page, the **Project** page, is used to document specific project descriptive data and to select the current mode of operation. Rules for casing verification can differ according to the well location (onshore or offshore).



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The **Survey** page can separately plot plan and section views of the wellpath, as well as wellbore inclination and dogleg. Data may be copied from a spreadsheet or entered manually. Don't have a survey? Create one quickly with the handy 2D Planner utility.

2D Well Planner

2D Plan

Build/Build
 Build/Drop
 Build/Hold

Target

TVD/NS/EW
 TVD/Horizontal Distance/Azi

TVD (ft):
 N/S (ft):
 E/W (ft):

Planning

	Unknowns (Select 2)	Value
Inc1 (deg)	<input type="checkbox"/>	5
L1 (KOP) (ft)	<input checked="" type="checkbox"/>	
BR1 (deg/100ft)	<input checked="" type="checkbox"/>	
Inc2 (deg)	<input type="checkbox"/>	60
L2 (ft)	<input type="checkbox"/>	650
BR2 (deg/100ft)	<input type="checkbox"/>	10
Inc3 (deg)	<input type="checkbox"/>	90
L3 (ft)	<input type="checkbox"/>	500

Survey Interval

Straight Section (ft):
 Curve Section (ft):

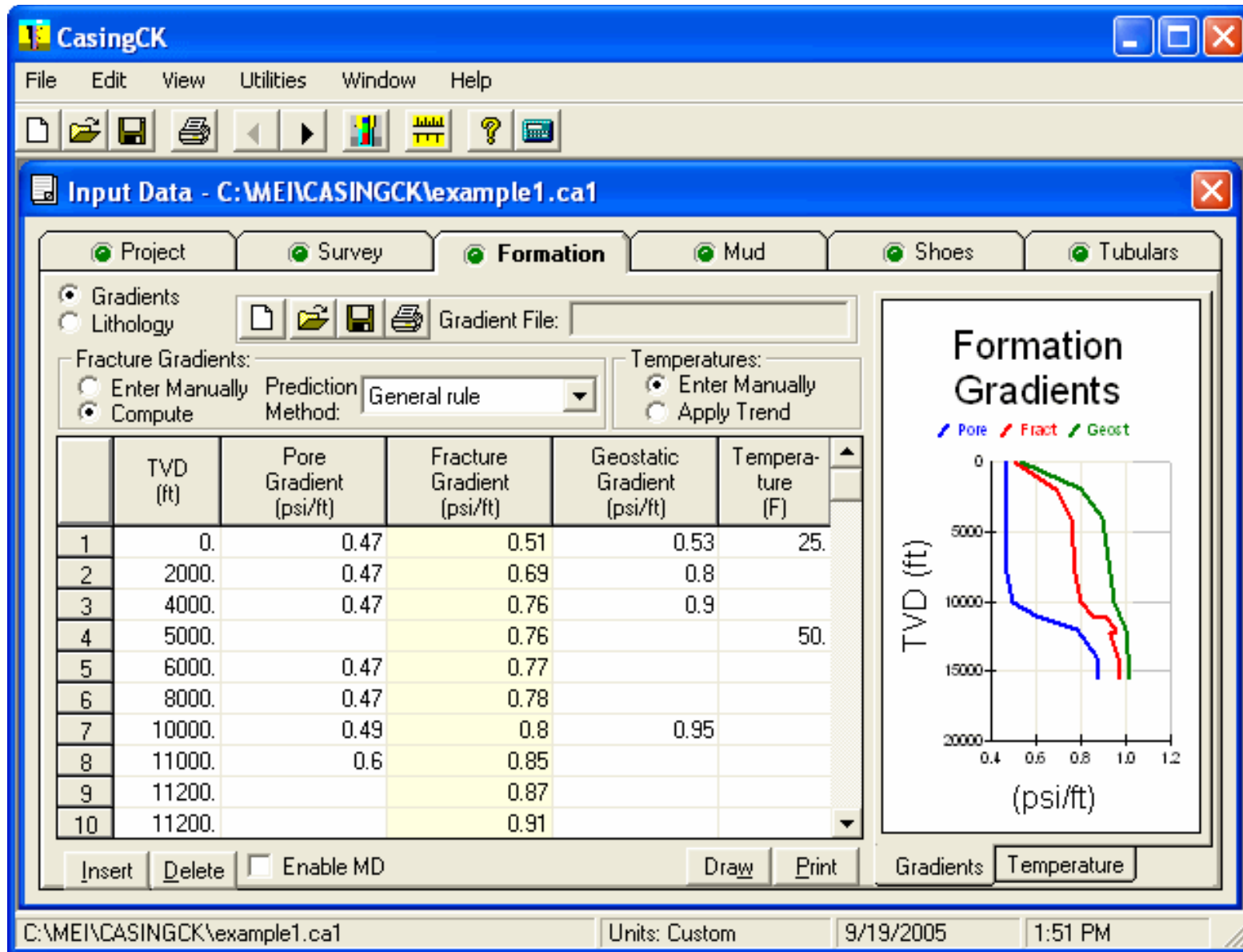
	MD (ft)	Inc (deg)	Azi (deg)	TVD (ft)	N/S (ft)	E/W (ft)	Build Rate (deg/100ft)	Section Length (ft)
1	0.00	5.00	4.29	0.0	0.0	0.0	n/a	n/a
2	893.9	5.00	4.29	890.5	77.7	5.8	0.00	893.9
3	2012.7	60.00	4.29	1798.2	654.4	49.1	4.92	1118.8
4	2662.7	60.00	4.29	2123.2	1215.7	91.2	0.00	650.0
5	2962.7	90.00	4.29	2200.0	2193.8	164.5	10.00	300.0
6	3462.7	90.00	4.29	2200.0	2000.0	150.0	0.00	500.0

Calculate

Accept

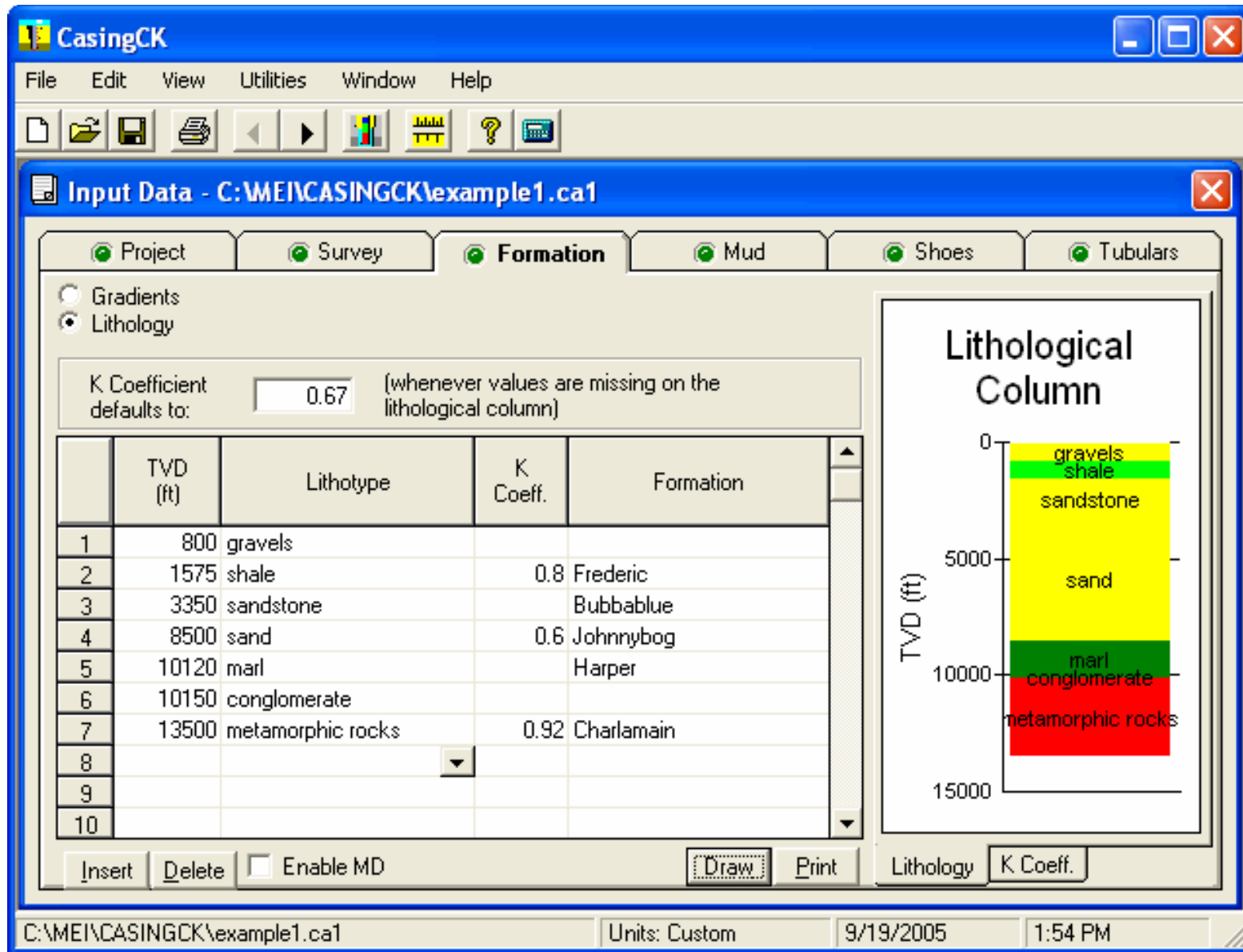
Cancel

The **2D Planner** allows you to quickly create simple or complicated well surveys. Choose the basic well shape and enter starting values for the primary geometric parameters. After creation, the new survey is automatically exported back to the Survey page.



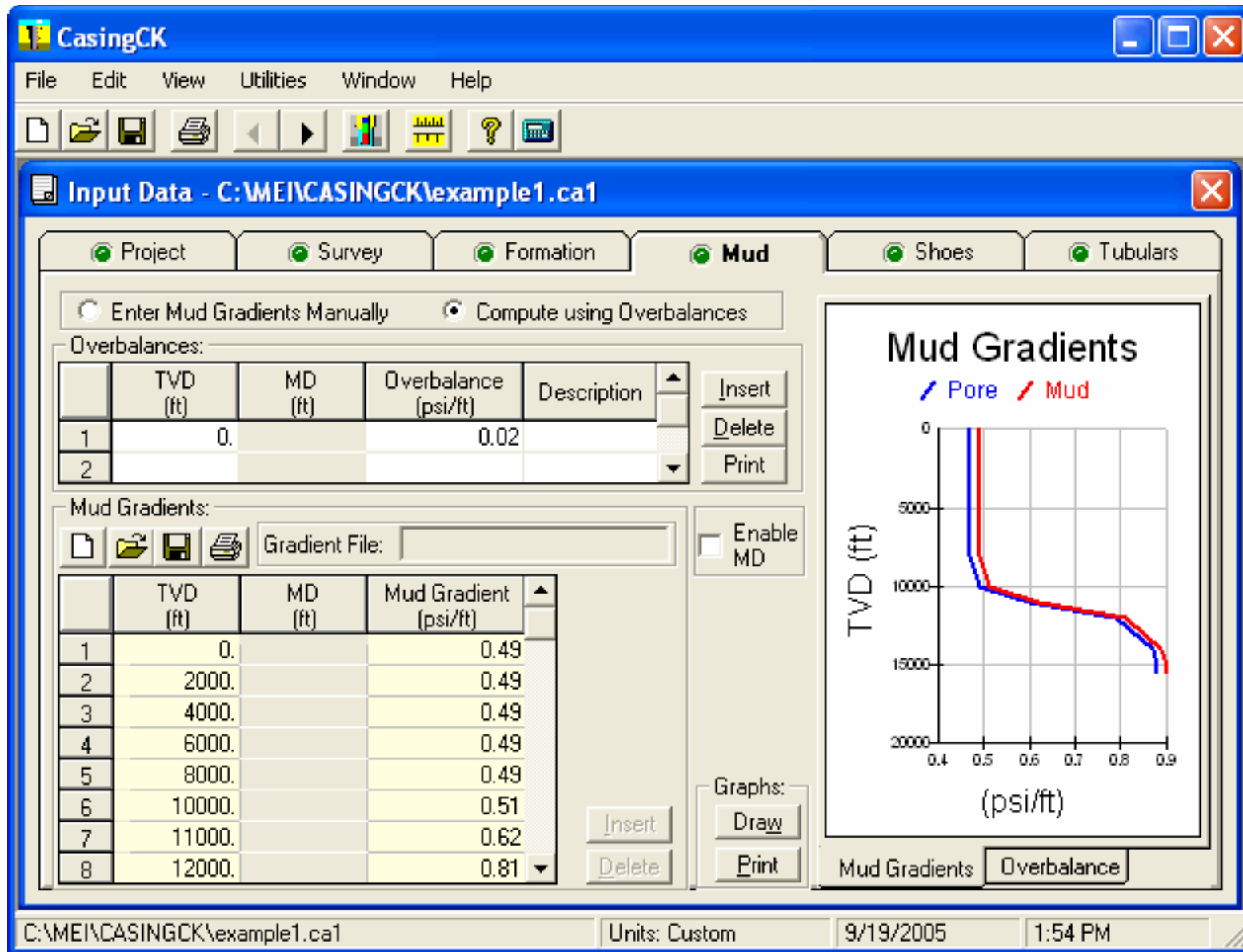
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On the **Formation** page, external stresses on the casing are specified. Fracture gradients can be imported, entered manually or calculated by the General Rule. Formation temperatures can also be estimated. All data are immediately shown in graphs for review.



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The second level of the **Formation** page displays lithological data along the wellpath. The “K coefficient” is related to Poisson’s ratio and characterizes formation deformation with loading. K is used to estimate fracture gradients based on pore and geostatic gradients.



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On the **Mud** page, mud weights can be entered manually or estimated based on overbalances. Depths can be entered in terms of TVD or MD, whichever you prefer. Gradient data can be easily imported from any type of text file.

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File Edit View Utilities Window Help

Input Data - C:\MEI\CASINGCK\example1.ca1

Project Survey Formation Mud Shoes Tubulars

Conductor Pipe TVD (ft): 0 MD (ft): 0

Shoe data:

	Description	Shoe TVD (ft)	Shoe MD (ft)
1	shoe 1	2000.	2000.
2	shoe 2	4000.	4000.
3	shoe 3	11500.	11643.
4		15000.	15773.
5			

Insert
Delete
Draw
Print:
Table
Graph

Trajectory Below Last Shoe as a New Drilling Phase

Shoe Advisor

Last Shoe Suggested Depth:

TVD (ft): 15000 MD (ft): 15773

Margins (psi/ft):

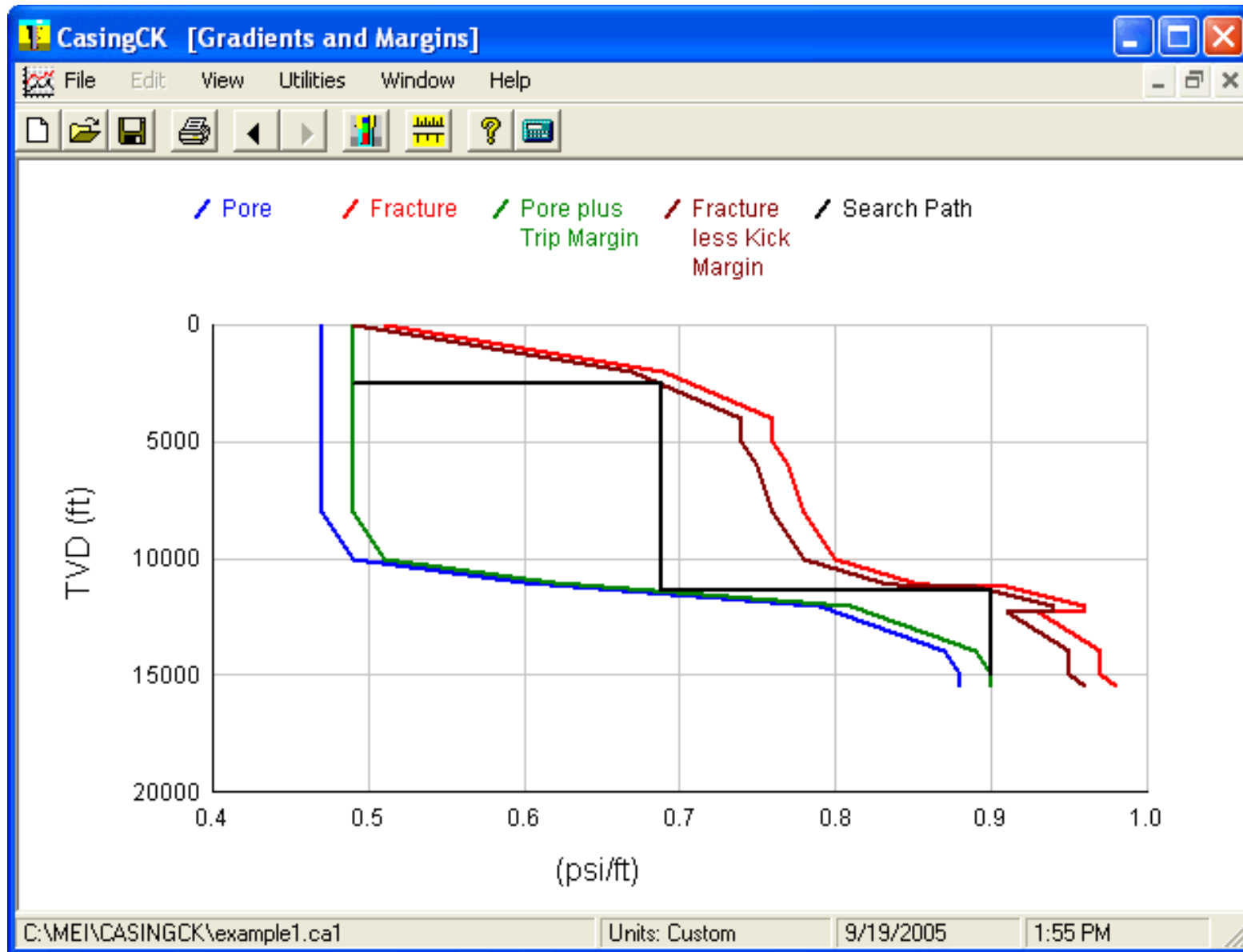
Trip Margin: 0.02 Kick Margin: 0.02

Run Advisor...

C:\MEI\CASINGCK\example1.ca1 Units: Custom 9/19/2005 1:55 PM

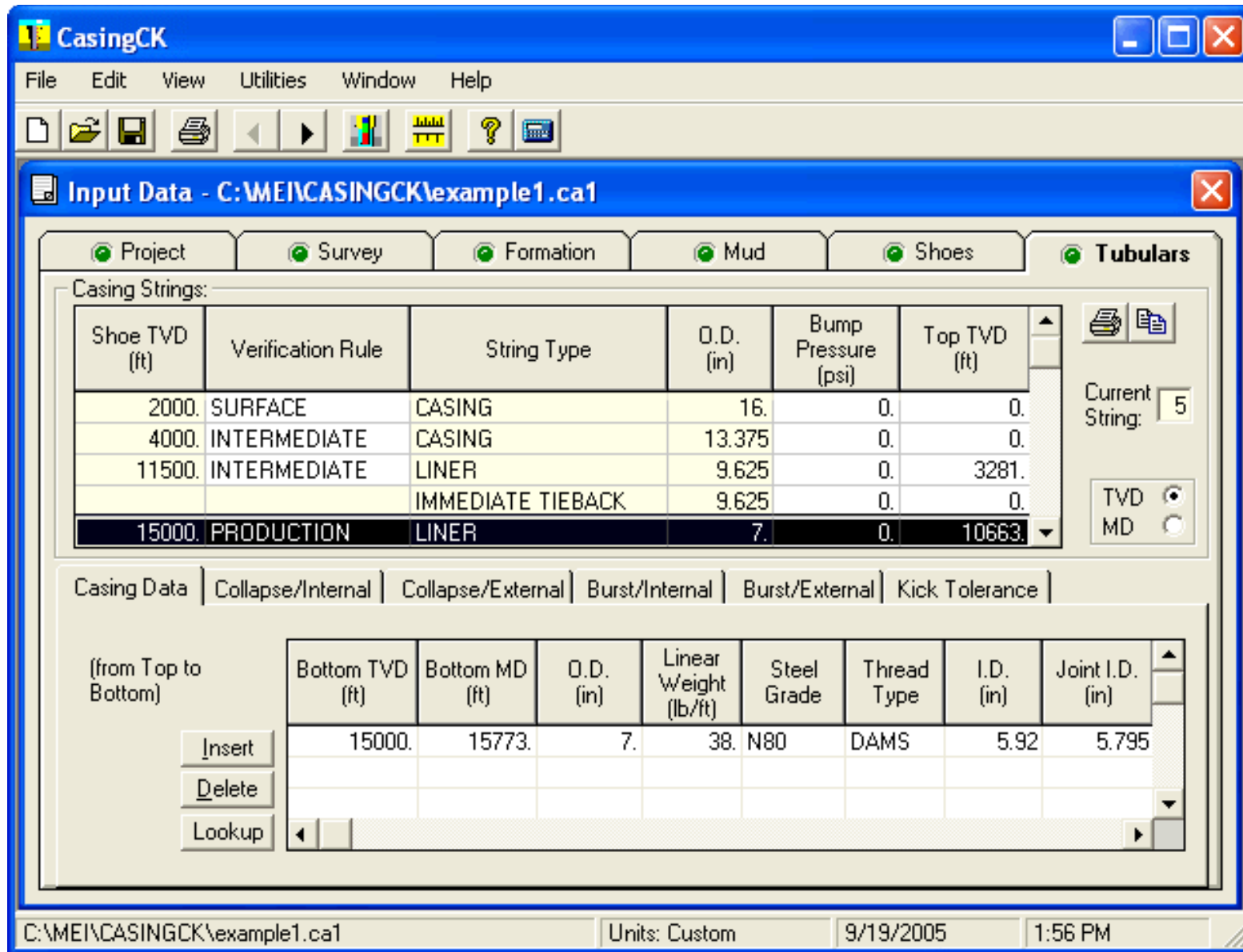
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Casing-shoe depths are specified on the **Shoes** page. Bottom depths of each section of the wellbore are inferred from casing-shoe depths. The Shoe Advisor helps you to quickly position the casing shoes.



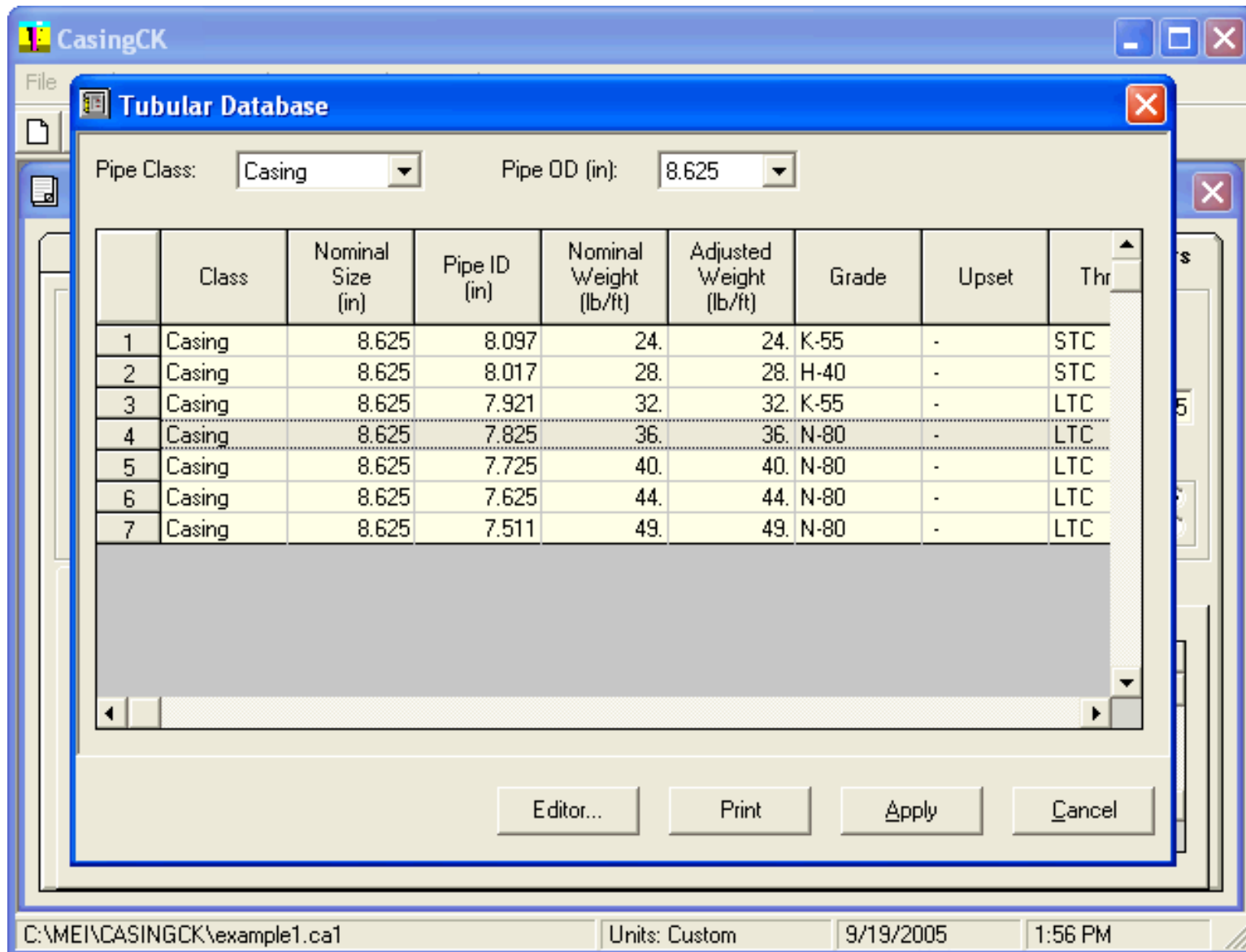
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The **Shoe Advisor** results define shoe position based on pore and fracture gradients, and kick and trip margins. These results are automatically exported to the Shoes page.



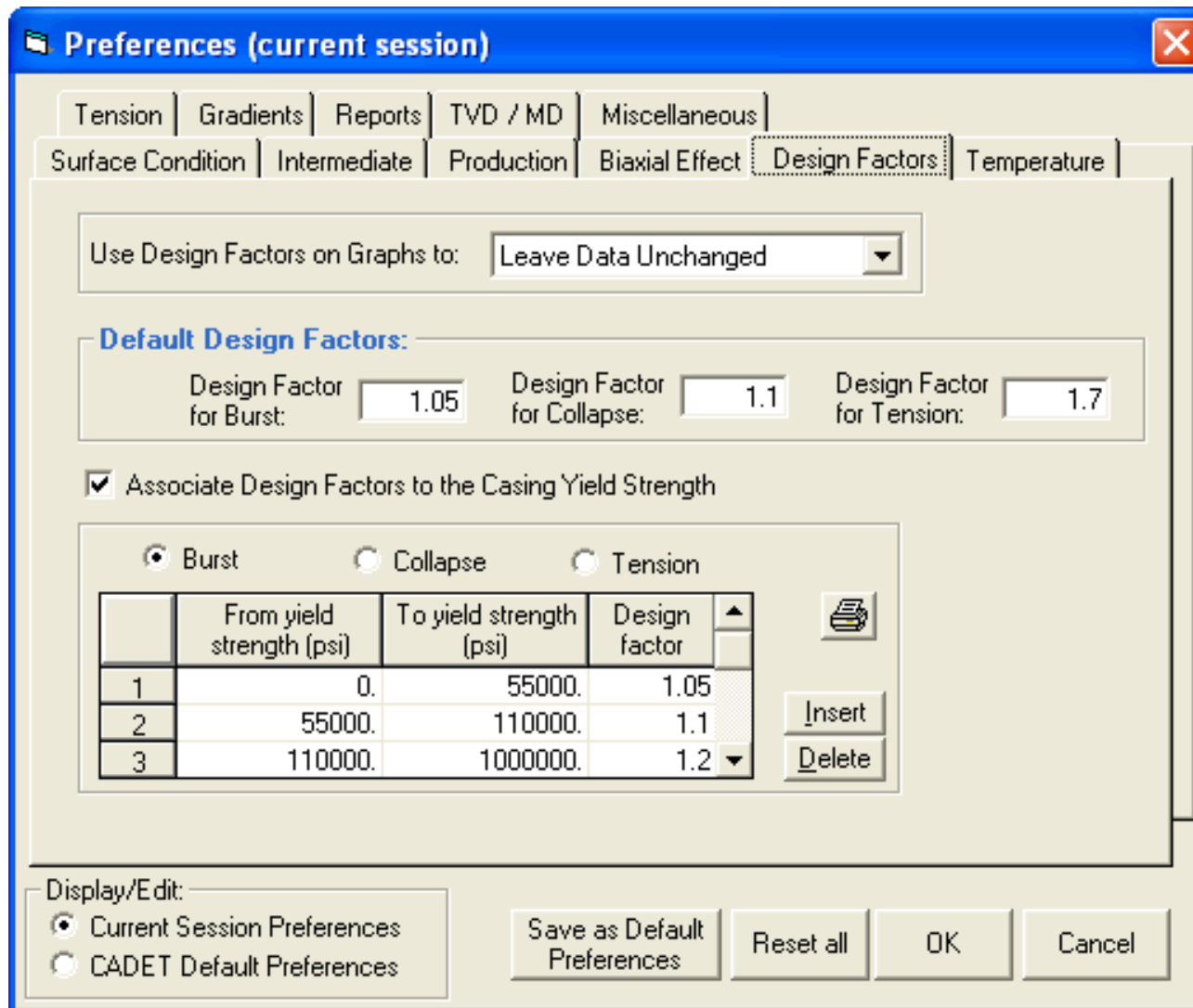
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On the **Tubulars** page, casing, liner and tie-back strings are specified in detail. You select the verification rule (surface, intermediate, or production) and enter a variety of data on casing properties, fluid conditions, stress factors, kick tolerances and other factors.

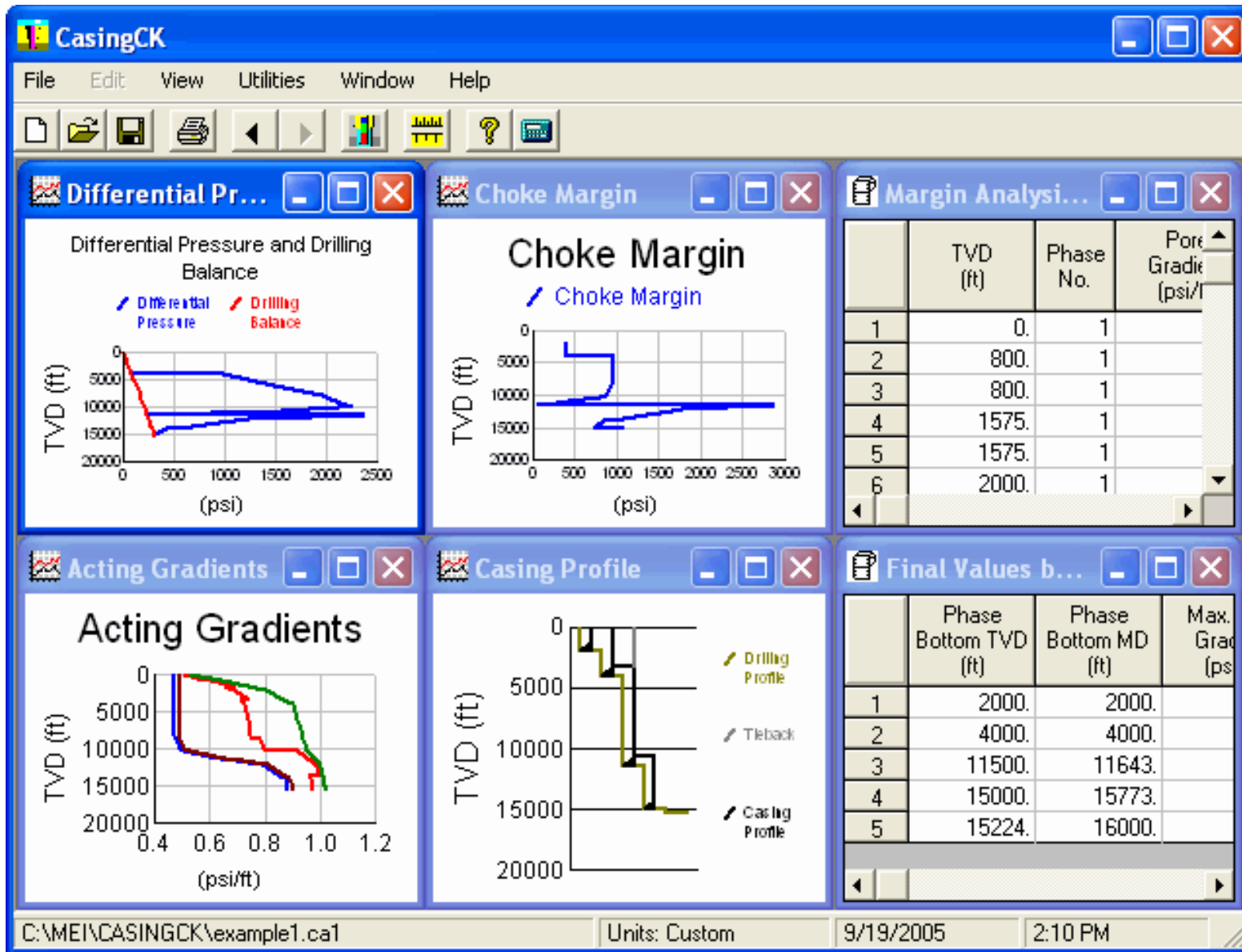


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All Maurer Software programs include an extensive **Tubular Database** that may be edited/customized. This feature avoids the need to look up the casing/tubing's size, weight, ID, etc. each time.

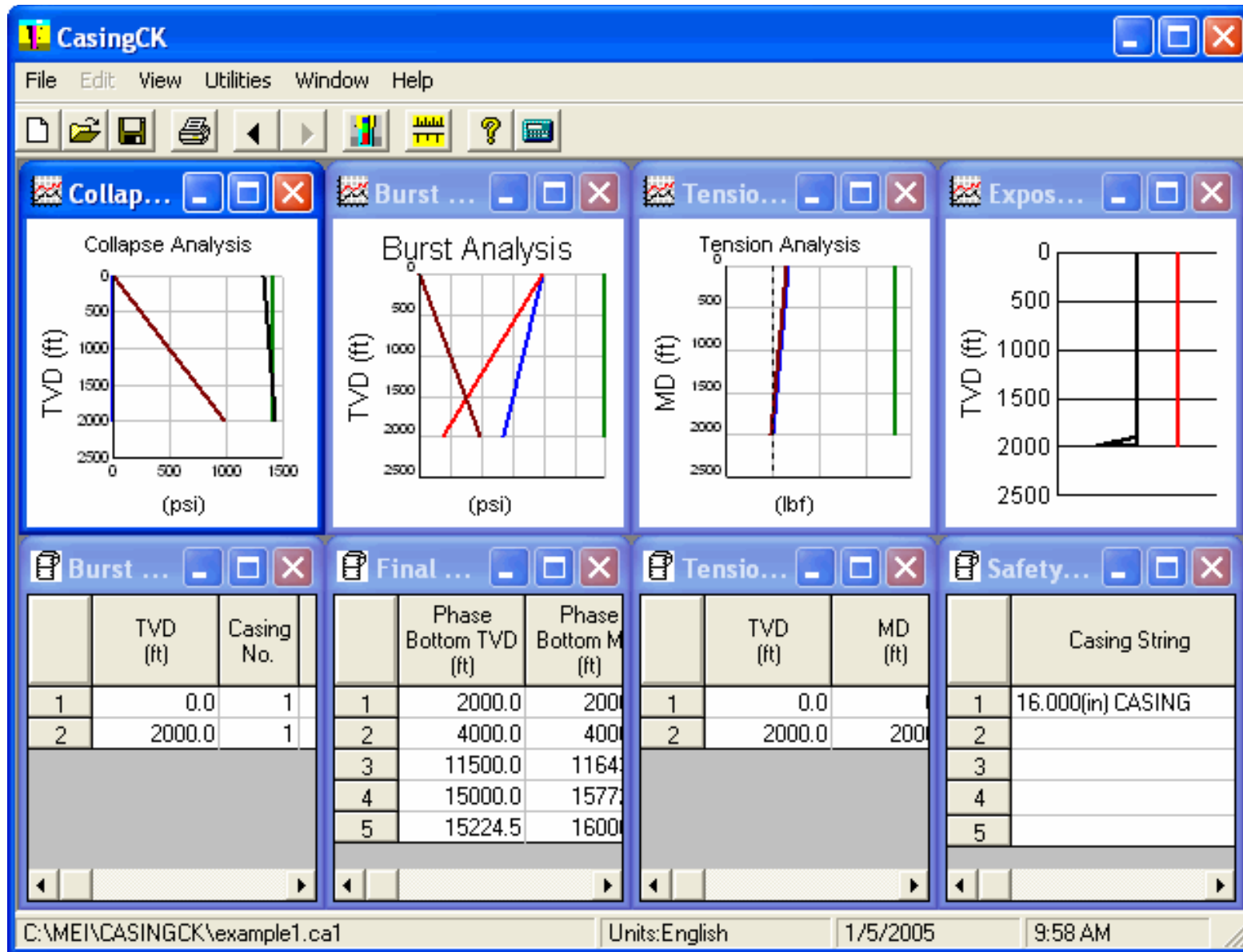


CASINGCK is designed as a highly flexible program. A wide range of **User Preferences** affect how CASINGCK performs casing verifications. The complete set of preferences can be saved as a template file, thereby providing a stable environment of rules that reflect your company's policies and procedures for casing design.



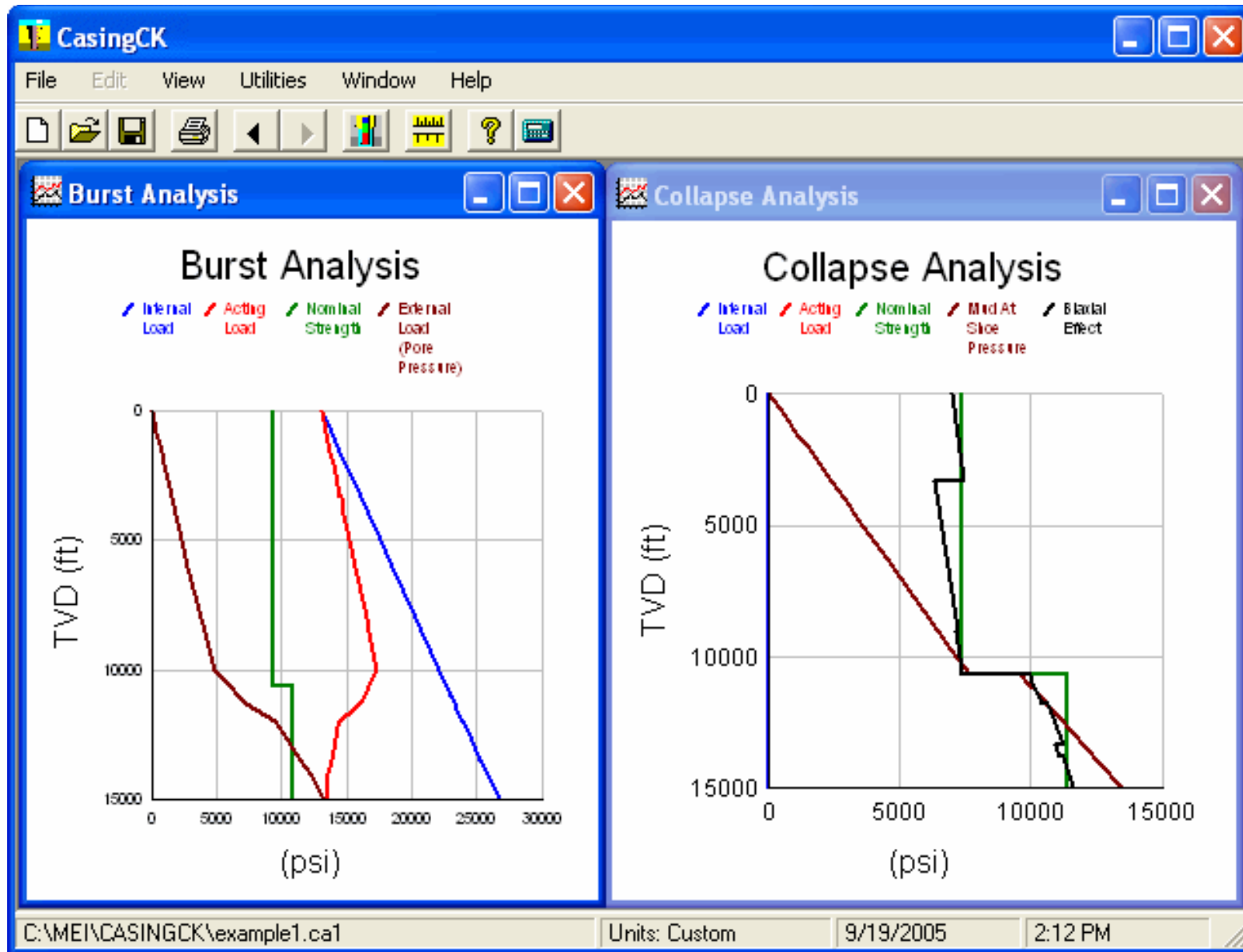
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Output is presented in two main windows: the **Margin Analysis** (above) and the Casing Verification (next slide). Margin analysis is an intermediate step toward casing verification. It is, in essence, a verification of the casing-shoe setting depths.



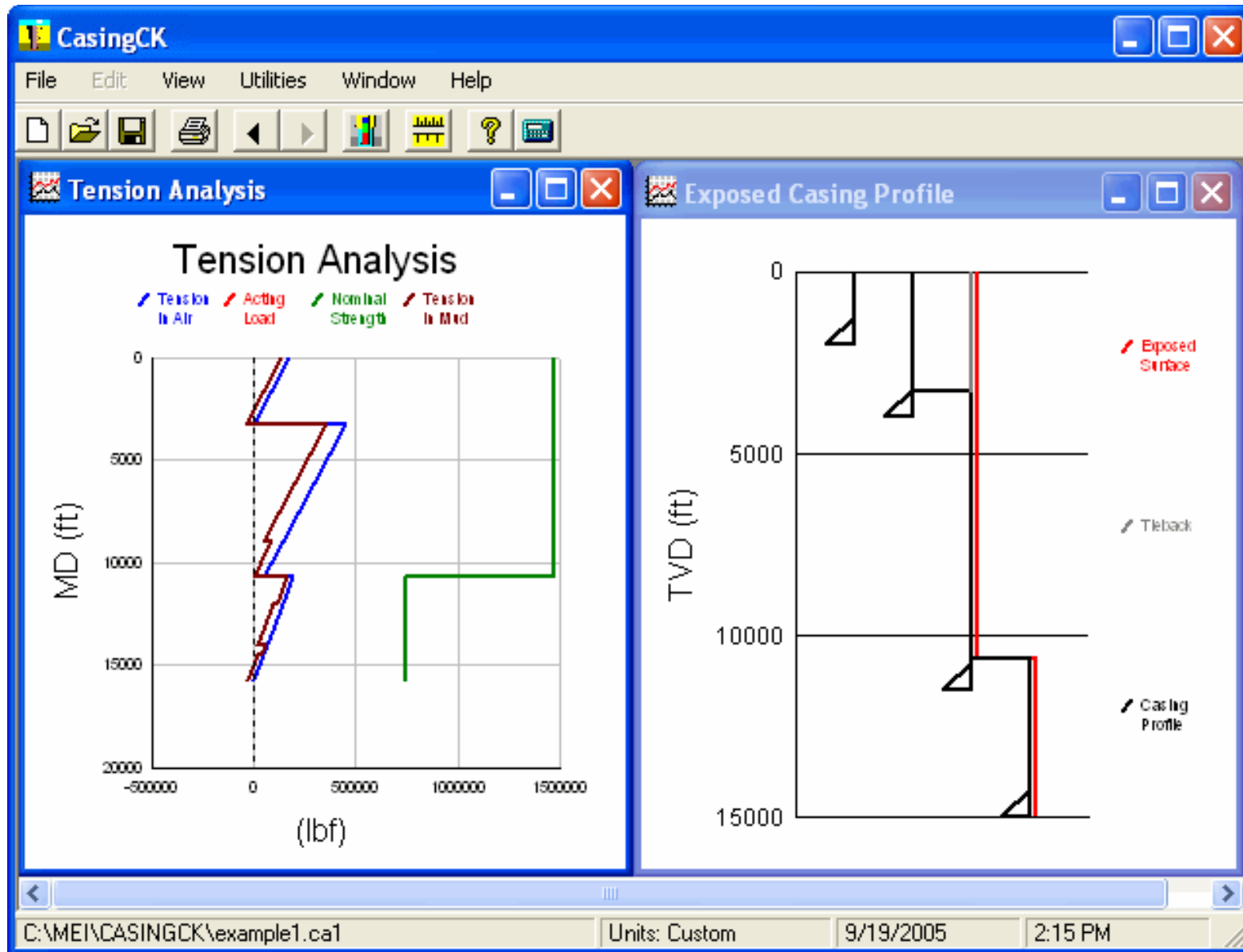
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The heart of CASINGCK is the **Casing Verification** window. Verification encompasses the three principal stresses to which a casing column is subjected: burst, collapse, and tension stress.



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For each casing and liner string, Collapse and Burst loading are derived and compared to that casing's nominal strength.



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The Tension analysis takes into account axial loading, buoyancy and bending effects.

CasingCK [Burst and Collapse Data]

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	TVD (ft)	Casing No.	Pore Grad. (psi/ft)	Collapse Int. Fluid Grad. (psi/ft)	Mud Grad. at Btm (psi/ft)	Burst Int. Load (psi)	Burst Ext. Load (psi)	Burst Acting Load (psi)	Burst Resistance (psi)
1	0.	4	0.47	0.	0.72	13070.	0.	13070.	9414
2	800.	4	0.47	0.	0.72	13795.	376.	13419.	9414
3	800.	4	0.47	0.	0.72	13795.	376.	13419.	9414
4	1575.	4	0.47	0.	0.72	14497.	740.	13757.	9414
5	1575.	4	0.47	0.	0.72	14497.	740.	13757.	9414
6	2000.	4	0.47	0.	0.72	14882.	940.	13942.	9414
7	2000.	4	0.47	0.	0.72	14882.	940.	13942.	9414
8	3281.	4	0.47	0.	0.72	16043.	1542.	14501.	9414
9	3281.	3	0.47	0.	0.72	16043.	1542.	14501.	9414
10	3350.	3	0.47	0.	0.72	16105.	1575.	14531.	9414
11	3350.	3	0.47	0.	0.72	16105.	1575.	14531.	9414
12	4000.	3	0.47	0.	0.72	16694.	1880.	14814.	9414
13	4000.	3	0.47	0.	0.72	16694.	1880.	14814.	9414
14	5000.	3	0.47	0.	0.72	17600.	2350.	15250.	9414
15	6000.	3	0.47	0.	0.72	18506.	2820.	15686.	9414
16	8000.	3	0.47	0.	0.72	20319.	3760.	16559.	9414
17	8500.	3	0.47	0.	0.72	20772.	4038.	16734.	9414
18	8500.	3	0.47	0.	0.72	20772.	4038.	16734.	9414
19	10000.	3	0.49	0.	0.72	22131.	4900.	17231.	9414
20	10150.	3	0.51	0.	0.72	22267.	5141.	17126.	9414

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All output data are also presented in tabular form for reviewing, printing, and/or storing to disk for use in other applications.

CASINGCK Casing Stress Check Tool

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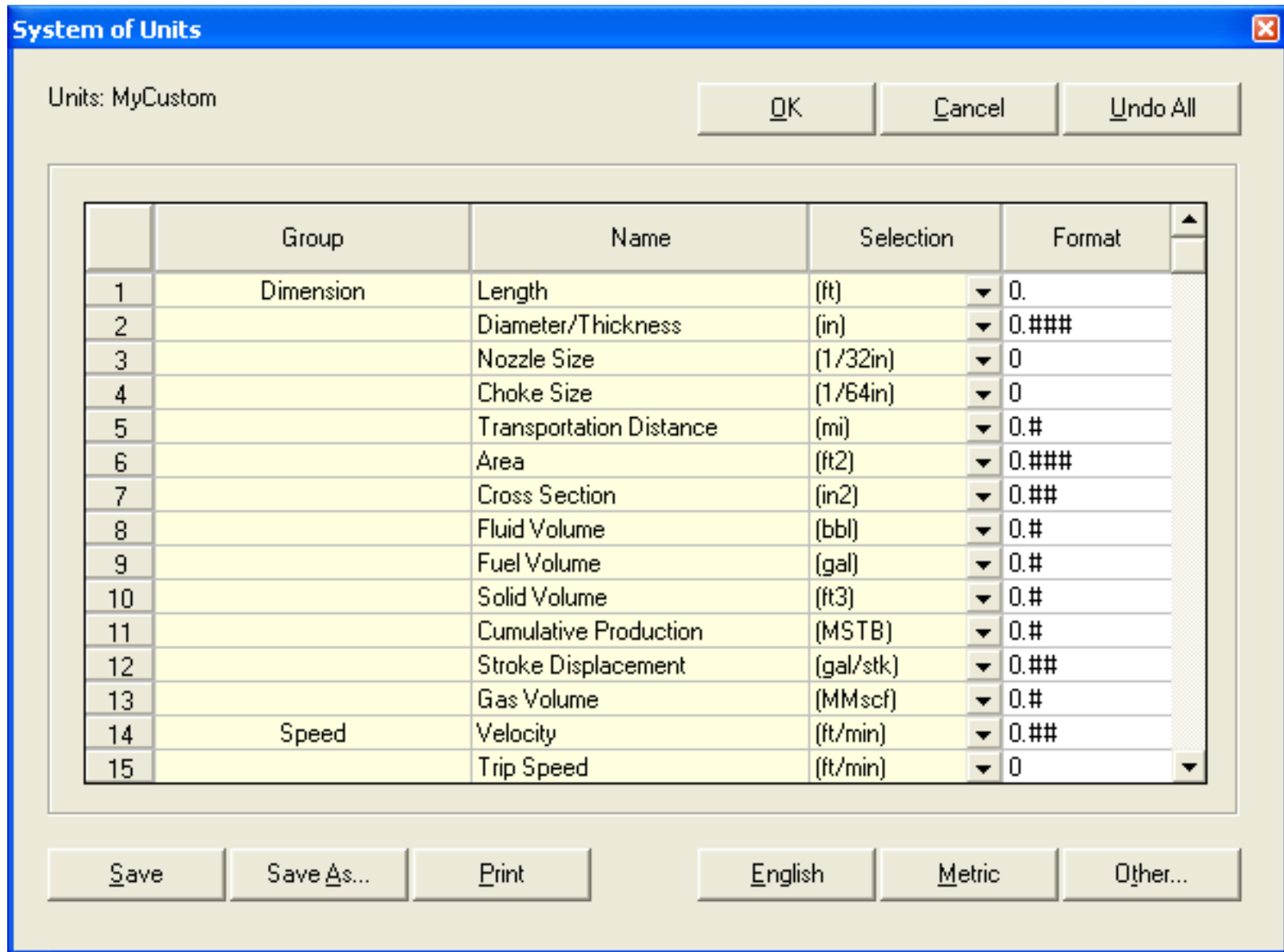
Background

CASINGCK, Maurer Technology's Casing Stress Check Tool, is a member of a comprehensive suite of programs designed for planning wells and evaluating field operations including drilling, completion, and workovers. The importance of casing design in the drilling engineering process does not need to be stressed. Many drilling engineers believe that casing design is the backbone of a well project.

CASINGCK is primarily designed to run casing verifications, i.e., to compare the resistance of a casing column design to the physical stresses that the column is likely to experience. A variety of potential stress factors can be taken into consideration. The rules used to calculate stresses can be saved in a customized profile, thus making it easier to meet your company's policies.

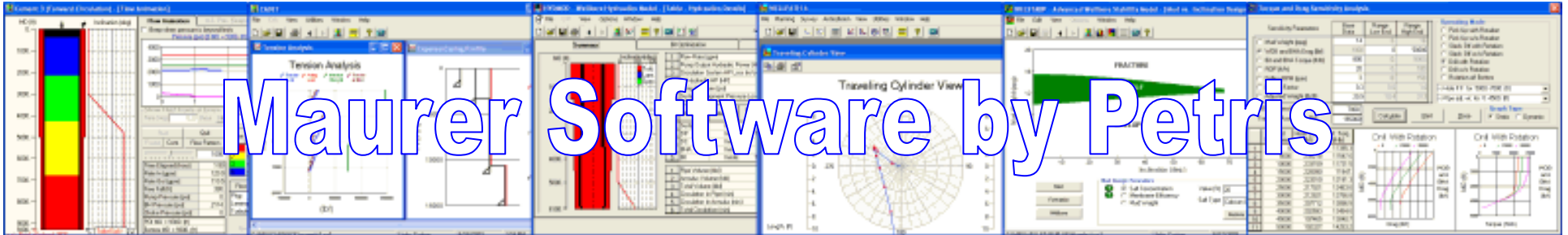
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A comprehensive **On-Line Help System** is also provided. Tips on program operation, program structure, and complete theoretical background are immediately available at the click of a button.



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Units for input and output displays are easy to select and customize. Choose between the default metric or English systems, or a custom combination of units (for example, depth in meters, hole size in inches). Custom systems are saved and automatically recalled in future sessions.



Thanks for your interest in **CASINGCK**

*For more information on Maurer Software by Petris,
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or visit us on the web at
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