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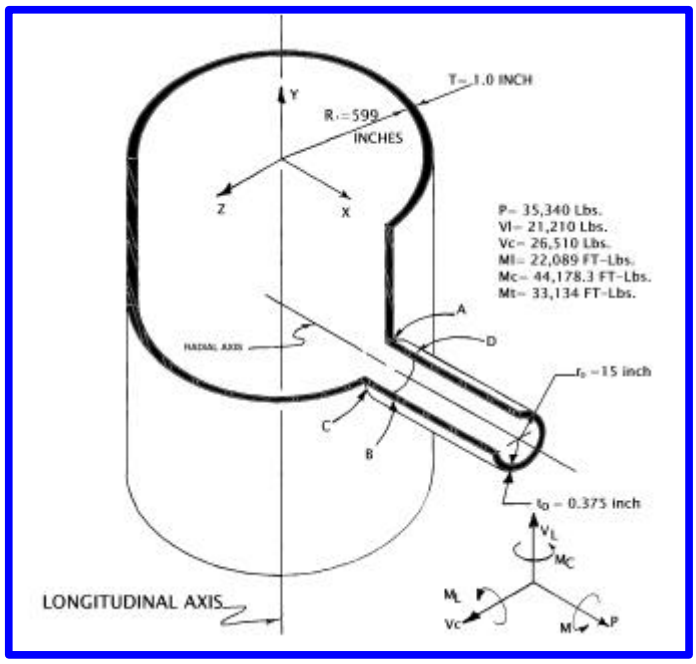
ANALYSIS OF STRESSES IN PRESSURE VESSEL AND TANK SHELLS AT NOZZLE AND CLIP CONNECTIONS RESULTING FROM EXTERNAL LOADS

WERCO 107/297 is a comprehensive software package for calculating stresses in shells in accordance with the guidelines set forth in the **W**elding **R**esearch **Co**uncil Bulletins 107 & 297. The program eliminates the need for hours of tedious hand calculations and manual cross-referencing and dramatically reduces the possibility of errors.



GENERAL FEATURES

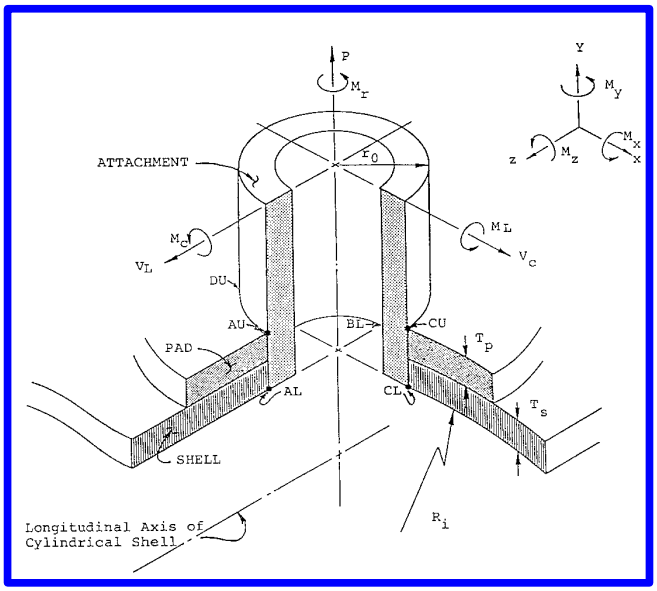
- Easy to use Data Entry Dialog screens
- Easy to understand HELP screens
- Extensive Data Checking
- Imperial and International units
- Support provided by experienced engineers.

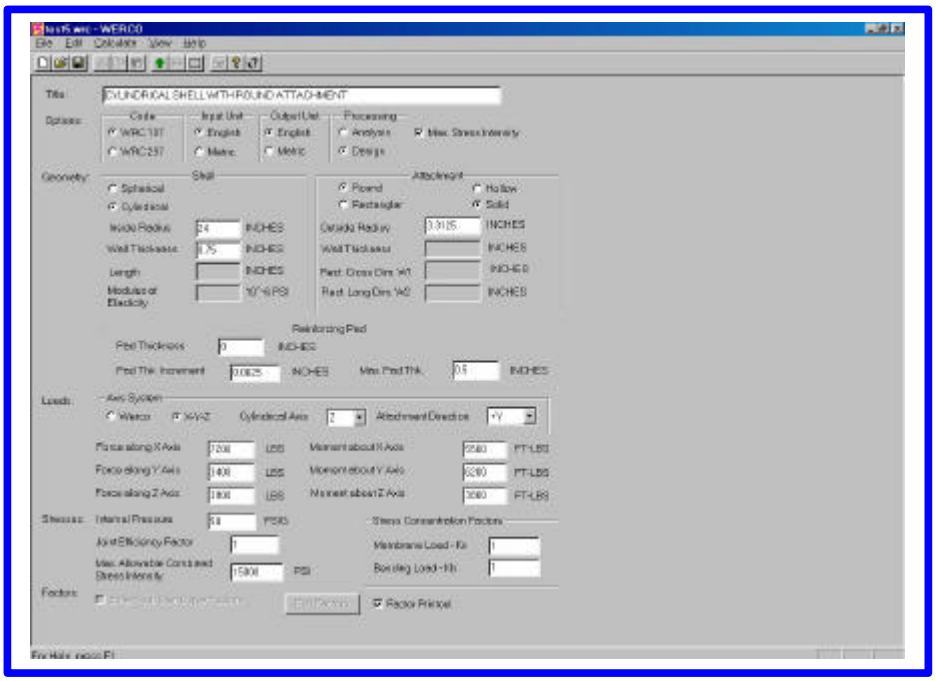
WERCO 107/297 CAPABILITIES

- Calculates stresses at eight points on the shell at the nozzle, clip or lug intersection
- Automatically compares calculated maximum combined stress intensity with the allowable stress value – automatically increases reinforcing pad thickness until the calculated stress value is found to be less than the allowed stress
- Determines worst combination of positive and negative loads and then designs a reinforcing pad so that the calculated stress is less than the allowed stress.

WERCO 107/297 APPLICATIONS

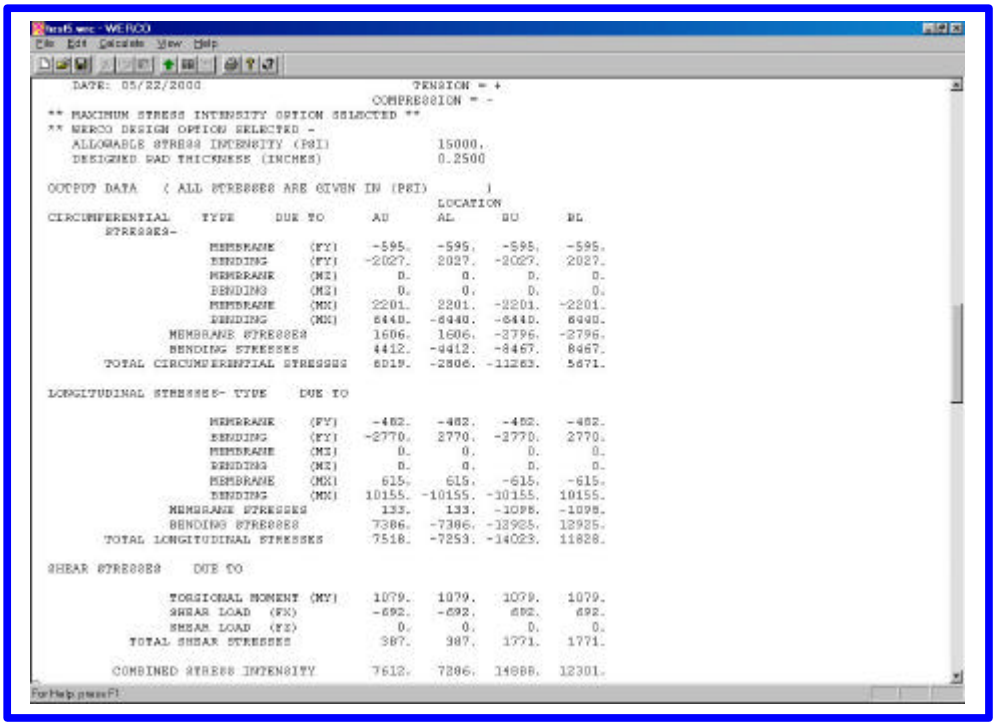
- Provides an effective tool for evaluating the ability of a nozzle to withstand the forces and moments applied by piping
- Provides an effective tool for evaluating the ability of a clip to withstand the force and moment loads applied by piping, structural members and equipment
- Provides an effective tool for evaluating the ability of a lifting lug to withstand the forces and moments applied to it at lift
- Provides technical compliance and documentation for regulatory authorities
- Enables an engineer/designer to determine the reinforcement required in spherical and cylindrical shell at the intersection of a nozzle, a clip or a lifting lug.





WERCO 107/297 INPUT

- Shell Geometry Shape (cylindrical or spherical)
- Attachment Geometry shape (round, square or rectangular – solid or hollow)
- Attachment Orientation to shell
- Loads (forces and moments) X, Y & Z
- Internal Pressure acting on shell
- Joint efficiency, if applicable
- Maximum Allowable Stress Intensity
- Maximum Reinforcing Pad Thickness.



DATE: 05/22/2000 TENSION = +
COMPRESSION = -

** MAXIMUM STRESS INTENSITY OPTION SELECTED **
** WERCO DESIGN OPTION SELECTED -
ALLOWABLE STRESS INTENSITY (PSI) 15000.
DESIGNED PAD THICKNESS (INCHES) 0.2500

OUTPUT DATA (ALL STRESSES ARE GIVEN IN (PSI))

CIRCUMFERENTIAL STRESSES-	TYPE	DUE TO	AU	LOCATION AL	BU	BL
	MEMBRANE	(FY)	-595.	-595.	-595.	-595.
	BENDING	(FY)	-2027.	2027.	-2027.	2027.
	MEMBRANE	(MZ)	0.	0.	0.	0.
	BENDING	(MZ)	0.	0.	0.	0.
	MEMBRANE	(MX)	2201.	2201.	-2201.	-2201.
	BENDING	(MX)	6440.	-6440.	-6440.	6440.
MEMBRANE STRESSES			1606.	1606.	-2796.	-2796.
BENDING STRESSES			4412.	-4412.	-8467.	8467.
TOTAL CIRCUMFERENTIAL STRESSES			6019.	-2806.	-11263.	5671.

LONGITUDINAL STRESSES-	TYPE	DUE TO				
	MEMBRANE	(FY)	-482.	-482.	-482.	-482.
	BENDING	(FY)	-2770.	2770.	-2770.	2770.
	MEMBRANE	(MZ)	0.	0.	0.	0.
	BENDING	(MZ)	0.	0.	0.	0.
	MEMBRANE	(MX)	615.	615.	-615.	-615.
	BENDING	(MX)	10155.	-10155.	-10155.	10155.
MEMBRANE STRESSES			133.	133.	-1098.	-1098.
BENDING STRESSES			7386.	-7386.	-12925.	12925.
TOTAL LONGITUDINAL STRESSES			7518.	-7253.	-14023.	11828.

SHEAR STRESSES	DUE TO				
TORSIONAL MOMENT (MY)		1079.	1079.	1079.	1079.
SHEAR LOAD (FX)		-692.	-692.	692.	692.
SHEAR LOAD (FZ)		0.	0.	0.	0.
TOTAL SHEAR STRESSES		387.	387.	1771.	1771.

COMBINED STRESS INTENSITY	7612.	7306.	14088.	12301.

WERCO 107/297 OUTPUT

- Input Echo with Error and Warning messages
- Stress Report in WRC 107 Spreadsheet Format
- Lists Bulletin Factors used in the calculations
- Required Reinforcing Pad Thickness
- Sizes Minimum Wall Thickness for nozzles
- Calculates Nozzle re-pads, if required