



PV Fea
cetim



“Complex Pressure Vessels dimensioning”
The only FEA program on the market enabling
fast and accurate Pressure Vessels dimensioning



MATCOR
a cetim company



INDUSTRIAL REQUIREMENTS

Dimension and optimization of complex Pressure Vessels following building codes CODAP®, ASME and EN 13445

PV-Fea brings powerful and trustable solution based on 50 years of Cetim's experience in Pressure Vessel dimensioning and optimization. PV-Fea works also for accessories, structures and mechanical components. PV-Fea is able to process loadings that cannot be processed directly by regular codes: loading that are not pressures (punctual or sharing stresses), heads with off-center/ slanted openings near large angles outside of limits planned by codes, very near pipes...

APPLICATION DOMAINS

PV-Fea enables the dimensioning and optimization of complex Pressure Vessels in many engineering disciplines such as aeronautical, food, chemical, shipbuilding, Gas, Nuclear, Offshore, Petrochemical, Pharmaceutical, Filtration, Brewing, Beverage, Water treatment, piping and power.

UNIQUE FEATURES

PV-Fea contains powerful modeling and meshing units, in order to handle complex geometries

PV-Fea offers an associativity with SpaceClaim, the leader software for engineering, mechanical design and 3D manufacturing.



Use SpaceClaim Engineer to:

- › Load existing CAD models whatever their source and format
- › Clean the geometry
- › Edit new 3D model using special sheet metal functions
- › Quick convert 3D model in sheet metal part
- › Take into account sheet metal properties (thickness, bending radius, K factor)
- › Prepare 3D model for FEA computation
- › Export 3D model in PV-Fea computation unit
- › Export 3D model in PV-Fea while preserving attributes (meshing, boundary conditions, loadings)

UNIQUE FEATURES

Finite Element Analysis benefit against Analytic methods

- › Intersections of piping elements
- › Special components for which internal pressure design stress codes are available but no calculation norms for external forces and moments
- › Components where the standards of k- and i-factors are unsatisfactory
- › Special components without k- and i-factors defined in the stress codes
- › Analysis of local stress utilization, e.g. for life-time analysis
- › Optimization of details in pipe and vessel constructions
- › Nozzle and cams at vessel with or without reinforcement
- › Big diameter tubes with miter bends
- › Calculations with to measured pipe segments (as-built), e.g. bends
- › Damage analysis at corroded or eroded pipes
- › Detail analysis of bend deformation due to internal pressure or bending in oval bends

WHY SELECT PV-FEA

- › Assistance to constraints counting following code
- › Constraints linearization in thickness for 2D/3D volume elements
- › Rectangular and Non-Circular Pressure Vessel Analysis
- › Comprehensive Error Checking
- › Saddle, Leg, and Skirt Design
- › Analysis for Horizontal Shipping of Vertical Vessels
- › Wind Analysis
- › Seismic Analysis
- › Steel Databases and Modeling

- › Fast and accurate complex Pressure Vessels dimensioning
- › Full compliance with international standards building codes
- › Cost-effective design and optimization



EXPERIENCE RETURN

50 years of experience in mechanical product computation, dimensioning and analysis enable CETIM to propose dedicated support for engineering consultants:

- › Reminds of FEA theory
- › PV-Fea specific training session
- › FEA domain comprehensive training
- › Technical hotline
- › Project coaching through internet
- › Onsite Pressure Vessel expertise

TECHNICAL REQUIREMENTS

Supported file formats

IGES, STEP, STL, Parasolid, VDAFS, ProEngineer, CATIA V4, DXF-DWG, CATIA V5, UNIGRAPHICS, INVENTOR, SOLIDWORKS, ACIS SAT.

Minimal hardware/software configuration:

32/64 bits computation, Windows® Seven.



TECHNICAL FEATURES

Functions	PV-Fea	Functions	PV-Fea
Problem Types		Geometric modeling	
Linear static analysis	X	Parametric pattern maker based on the core ACIS	X
Linear Dynamic analysis	X	Boolean operations	X
Buckling analysis	X	Imprint surfaces for the loadings and boundary conditions	X
Plugin Specific		Creation of surface in Nurbs	X
Spaceclaim	X	Extrusion, Revolve, Sweep, Shell/Surface	X
Cadfix *	X	Automatically mesh	
Creation of Sheet Metalwork parametric components		Shell elements	X
Quality check of cylindrical, spherical and conical shell	X	Automatic meshing	X
Torispherical head	X	Mesh size control	X
Hemispherical head	X	Mesh quality verification	X
Elliptical head	X	Creation of nozzle associated with the components	
Blind head	X	Flange plate extension added	X
Interpretation of the results		Protruding nozzle	X
Interactive results using 3D framework	X	Pad reinforcing automatically added	X
3D dynamic cutting	X	Integrally reinforced nozzle	X
Post-processing results using criterion	X	User interface	
Contour plot of stresses and displacements	X	Context menus	X
Query on results		Icons, dialog box	X
Plotting Tresca criterion with respect to the computed (or analytical) nominal stress	X	Taking quick and easy hand	X
Useful tools for the design by analysis	X		

New concepts in mechanical engineering

As the leading French player in the fields of mechanical engineering innovation and R&D, Cetim has built up a wide network of partners. Its engineers and technicians operate in more than 30 countries each year.

R&D function is carried out either within specific sectors or cutting across sector boundaries, and within either a national or an international context.

Cetim provides a comprehensive array of services to the mechanical engineering industry from consulting to testing and from engineering to training in new skills.

Cetim is a member of the Carnot institutes network and a founding member of the *Alliance Industrie du Futur*.



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