

Modeling Composite Overwrapped Pressure Vessels using WoundSim and Abaqus/FEA



WoundSim 2026 GA

HOME LAYOUT PRE-DESIGN FEA MANUFACTURING HELP

COPVS MANUFACTURING RESULTS

Attributes Compute Path Compute Patterns Export

Project-1

- Materials (1)
- Mandrels (1)
- Models (1)
- Model-1
 - Layout Model
 - COPVs (1)
 - Assembly Instances (1)
 - COPV-1-1
 - Predesign Model
 - FEA Model
 - Attributes

Model-1 > COPV-1 > LAYER 8

Thickness Cylinder : 1.0
 Angle Cylinder 1 : 8.03
 Angle Cylinder 2 : 8.03
 Resin Mass : 0.00021
 Fiber Mass : 0.00054
 Total Mass : 0.00075

Laminate Table

On	Type	End Position	Angle Cylinder	End Radius	Enc X
1	Helical_Geodesic	By-Angle	8.62		
2	Hoop	By-X-Coord	89		220
3	Helical_Geodesic	By-Angle	14.72		

Layer Parameters

Fiber Path Coverage Pattern

Model-1 > COPV-1 > LAYER 1

Compute Patterns Clear Patterns

Available Patterns

Sort by: Coverage Deviation

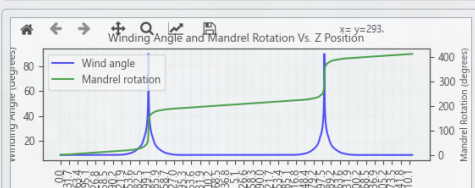
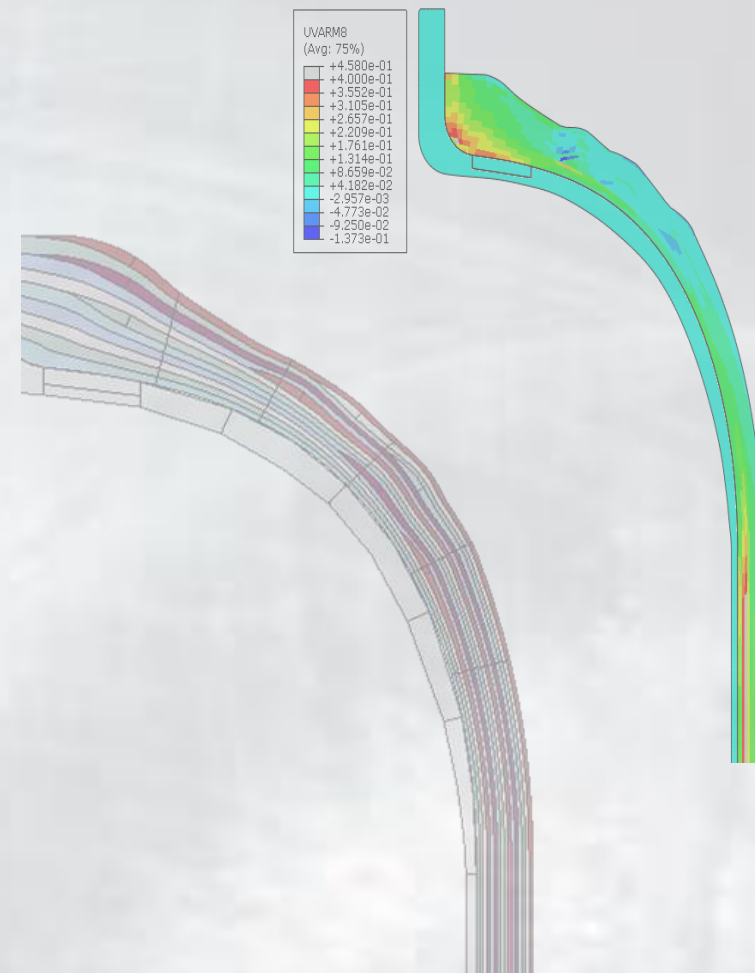
Pattern Number	Skip Index	N Circuits	N Turns	Overlap	Coverage (%)	Deviat (%)
1	7	9	62	1,15	-0,05	99,5
2	8	8	63	1,13	0,1	101
3	17	11	62	1,18	-0,03	99,8

Global Results

Mandrel Section Layout Section Path View Pattern View

Layer 1-Pattern 7-62circuits

Winding Angle and Mandrel Rotation Vs. Z Position

About this Course

Course objectives

- Upon completion of this course, you will be able to:
 - ▶ Define a COPV model in WoundSim
 - ▶ Build an FEA model of the tank using Abaqus/FEA software

Targeted audience

- Simulation Analysts

Prerequisites

- This course is recommended for engineers with some experience using Abaqus

Course Content

Lecture 1: WoundSim Overview

Lecture 2: COPV Creation in WoundSim

Mandrel/Liner Definition

Material Definition

Composite Layup Definition

Lecture 3: Analytic Predesign

Lecture 4: 2D COPV Creation in Abaqus

Lecture 5: 3D COPV Creation in Abaqus

Brick & Cylindrical Elements

Shell Elements

Lecture 6: Post Processing

Lecture 6: Applications Cases

Burst

Autofrettage

Buckling/Debonding

Drop Test/Impact