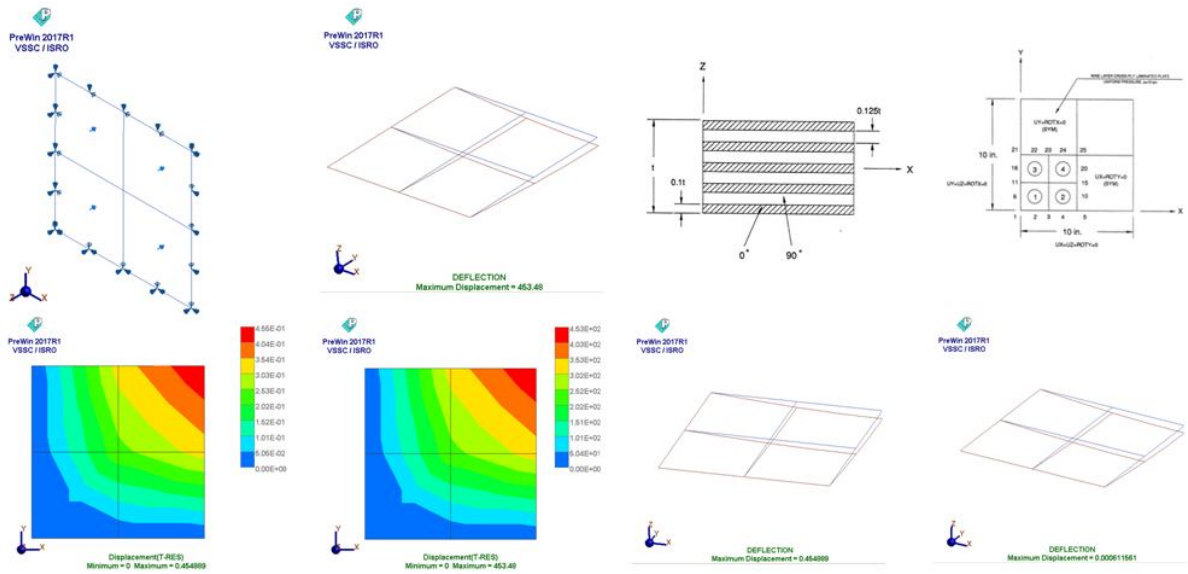
Static analysis of nine layer cross-ply orthotropic plate



Material property	:	($E_X = 40.0 \times 10^6 psi$, $E_Y = 1.0 \times 10^6 psi$, $G_{XY} = G_{XZ} = 0.6 \times 10^6 psi$, $G_{YZ} = 0.5 \times 10^6 psi$, $\nu = 0.25$, $F_{XT} = 150.0 \times 10^3 psi$, $F_{XC} = 100.0 \times 10^3 psi$, $F_{YT} = 10.0 \times 10^3 psi$, $F_{YC} = 15.0 \times 10^3 psi$, $F_S = 20.0 \times 10^3 psi$)
Element type	:	3-D eight noded laminated composite shell element, nine layers laminated square plate, ten inches wide, is simply supported and subjected to a uniform pressure of 10 *psi*, The lamination is alternating at 0° and 90° with respect to global X-axis. The total thickness of the five layers at 0° is same as the total thickness of the four layers at 90°. At X = 0.0 in, simply supported boundary conditions $U_Y = U_Z = ROT_X = 0.0$.At Y = 0.0 in, simply supported boundary conditions $U_X = U_Z = ROT_Y = 0.0$.At X = 5 *in*, symmetric boundary conditions $U_X = ROT_Y = 0.0$.At Y = 5 *in*, symmetric boundary conditions $U_Y = ROT_X = 0.0$
Finite element statistics	:	Number of nodes: 21; Number of elements: 4; Degrees of freedom: 81

Thickness to length ratio (t/a)	Central transverse deflection		
	Theoretical value	FEAST^{SMT}	NISA2®
0.1	0.0005844	0.0006115	0.0005848
0.01	0.4486	0.4548	0.4474
0.001	447.2	453.48	365.30