RCF skin model:

Dimensions:

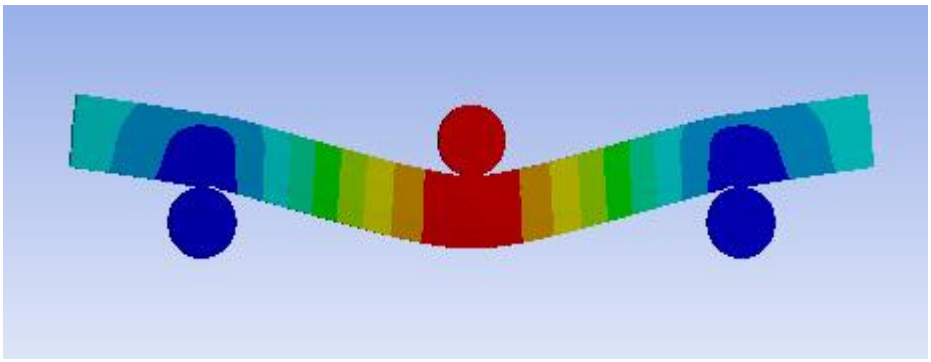
t_{s1}=t_{s2} = 2.8 mm, t_c= 7.2 mm, width (b) = 25.6 mm

Material properties

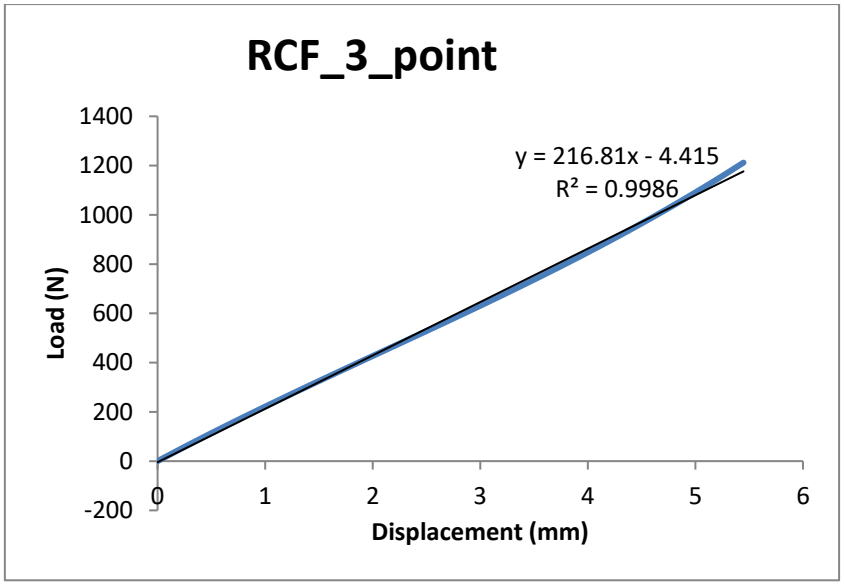
Type of Material	E1 (GPa)	E2 (GPa)	G12 (GPa)	G13 (GPa)	G23 (GPa)	µ12	Density (kg/m3)
RCF skin	14.96	1.49	0.52	5.72	0.50	0.4	1034
PET foam	2.5	2.5	0.018	0.018	0.018	0.43	1380

3-pointand 4-point bending FEM analysis

Deformation plot



Load displacement plot



Calculation of bending stiffness and shear rigidity:

1. Shear rigidity (U) = 12.94 e^3N
2. Flexural stiffness (D) = 41.03e^6 N/mm^2

(From ASTM D7250/D7250M – 20, Equations 7 and 8)

Hybrid skin model:

Dimensions:

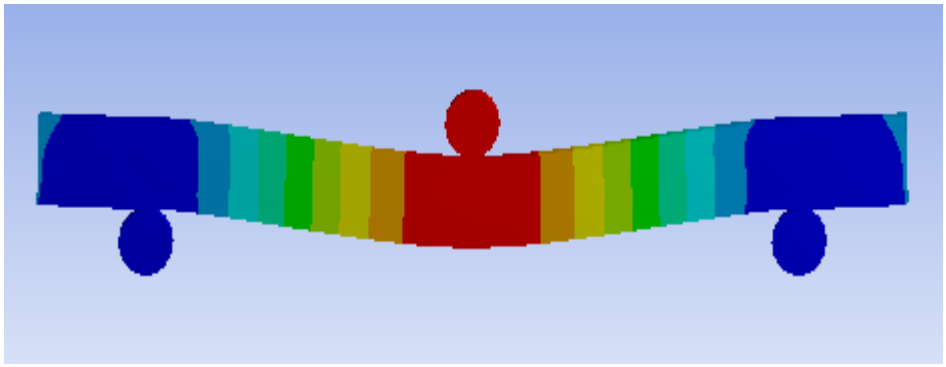
t_{s1}=t_{s2} = 3.4 mm, t_c= 10 mm, width (b) = 33.6 mm

Material properties

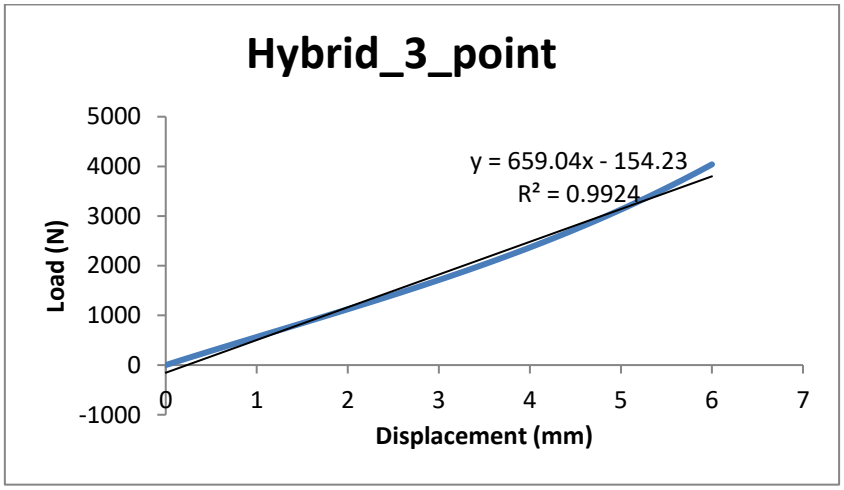
Type of Material	E1 (GPa)	E2 (GPa)	G12 (GPa)	G13 (GPa)	G23 (GPa)	μ12	Density (kg/m3)
Hybrid skin	21.84	1.70	0.6	8.07	0.61	0.41	1085
PET foam	2.5	2.5	0.018	0.018	0.018	0.43	1380

3-pointand 4-point bending FEM analysis

Deformation plot



Load displacement plot



Calculation of bending stiffness and shear rigidity:

3. Shear rigidity (U) = $30.96e^3$ N
4. Flexural stiffness (D) = 141.57 e^6 N-mm^2

(From ASTM D7250/D7250M – 20, Equations71 and 8)

FEM Details:

S. No	*Sample*	*Element type*	*DoF*	*No. of Nodes*	*Total DoF*
1.	***RCF(3-point)***	SOLID186 (20 nodes)	3 (x, y, z)	6034	18102

2.	***Hybrid (3-point)***	SOLID186 (20 nodes)	3 (x, y, z)	6938	20814
3.	***RCF(4-point)***	SOLID186 (20 nodes)	3 (x, y, z)	7360	22080
4.	***Hybrid(4-point)***	SOLID186 (20 nodes)	3 (x, y, z)	8694	26082

Results:

S. No	***Sample***	***Flexural stiffness (***N-mm^2)	***Transverse shear rigidity (N)***
1.	***RCF***	$41.03e^6$	$12.94e^3$
2.	***Hybrid***	$131.1\ e^6$	$42.18e^3$