

2.8 Material mechanical properties

Marine steel Grade A was selected as the material for the deck structure. The mechanical and physical properties used in the analysis include a Poisson's ratio of 0.28, a Young's modulus of 2.10×10^5 N/mm², a density of 7.8×10^{-9} ton/mm³, and a gravitational acceleration of 9.81×10^3 mm/s² (Table 6).

Table 6 Mechanical properties of marine steel grade A

Parameter	Value	Unit
Poisson's Ratio (ν)	0.28	-
Young's Modulus (E)	2.10×10^5	N/mm ²
Density (ρ)	7.8×10^{-9}	ton/mm ³
Gravity (g)	9.81×10^3	mm/s ²

2.9 Boundary conditions

A simply supported boundary condition was applied to the modeled deck structure. The displacements at both ends and along the side boundaries of the modeled region were restrained in the X-, Y-, and Z-directions, while rotational degrees of freedom were left unconstrained (Figure 12). In addition, displacement in the Z-direction was constrained along the outer boundary lines at the free ends of the columns and walls in order to represent the structural support conditions more realistically (Figure 13, Figure 14).

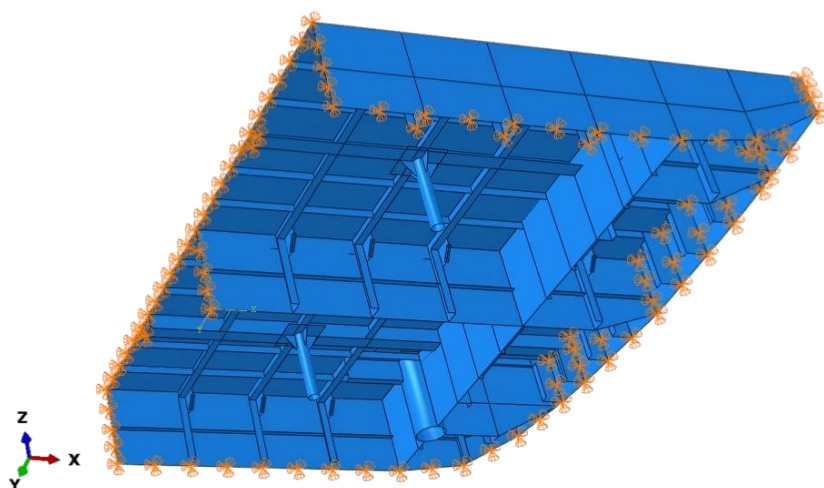


Figure 12 Representation of the simple support boundary condition in the cross-section view

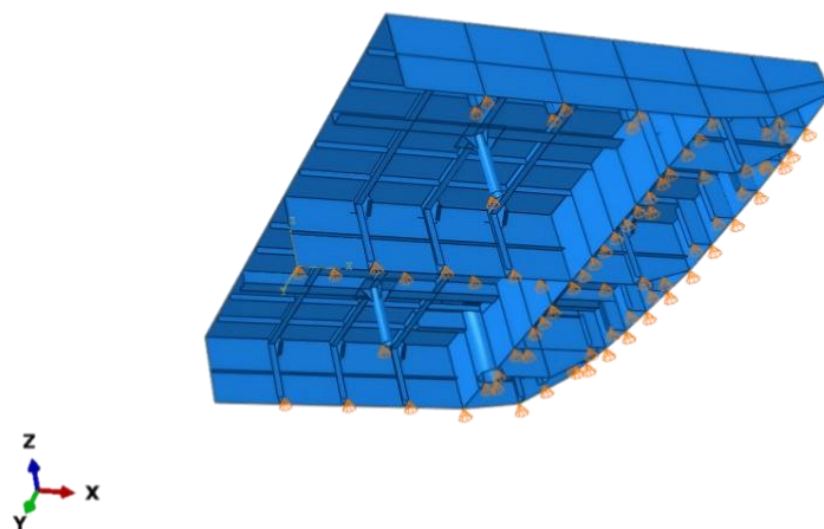


Figure 13 Illustration of Z-direction displacement constraint in 3D view