List 6

Task 1

Prepare a beam model of a load-bearing structure made entirely of square tubes with dimensions 40 mm x 40 mm x 4 mm, according to the dimensions shown in the drawing below. Define the computational model according to the provided loads and supports, assuming that the structure is made of structural steel (Young's modulus E = 200 GPa; Poisson's ratio v = 0,3), and the forces are as follows: $F_1 = 2 \text{ kN}$, $F_2 = 2 \text{ kN}$, and $f_3 = 1 \text{ kN/m}$.



Task 2

Prepare a beam model of a load-bearing structure made entirely of pipes with an outer diameter of 40 mm and an inner diameter of 30 mm, according to the dimensions shown in the drawing below. Define the computational model according to the provided loads and supports, assuming that the structure is made of structural steel (Young's modulus E = 200 GPa; Poisson's ratio v = 0,3), and the force is: F₁ = 10 kN.



Knowing that the permissible stress is σ_{dop} = 100 MPa, determine the variants of potential structural changes that will ensure safe operation. At the same time, please consider that the positions of the force and supports cannot change, and the frame cannot be expanded on its left side.