UDC 621.391

**CONSTRUCTION OF A PARMETRIC MODEL OF A ROBOT ASSEMBLY**

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Robot consists of swivel part, manipulator and metal base. Inside of the base the swivel mechanism is located along with electropheumatic valves and connecting fittings. Lateral base sides have got removable doors that prevent access to swivel mechanism (fig.1).

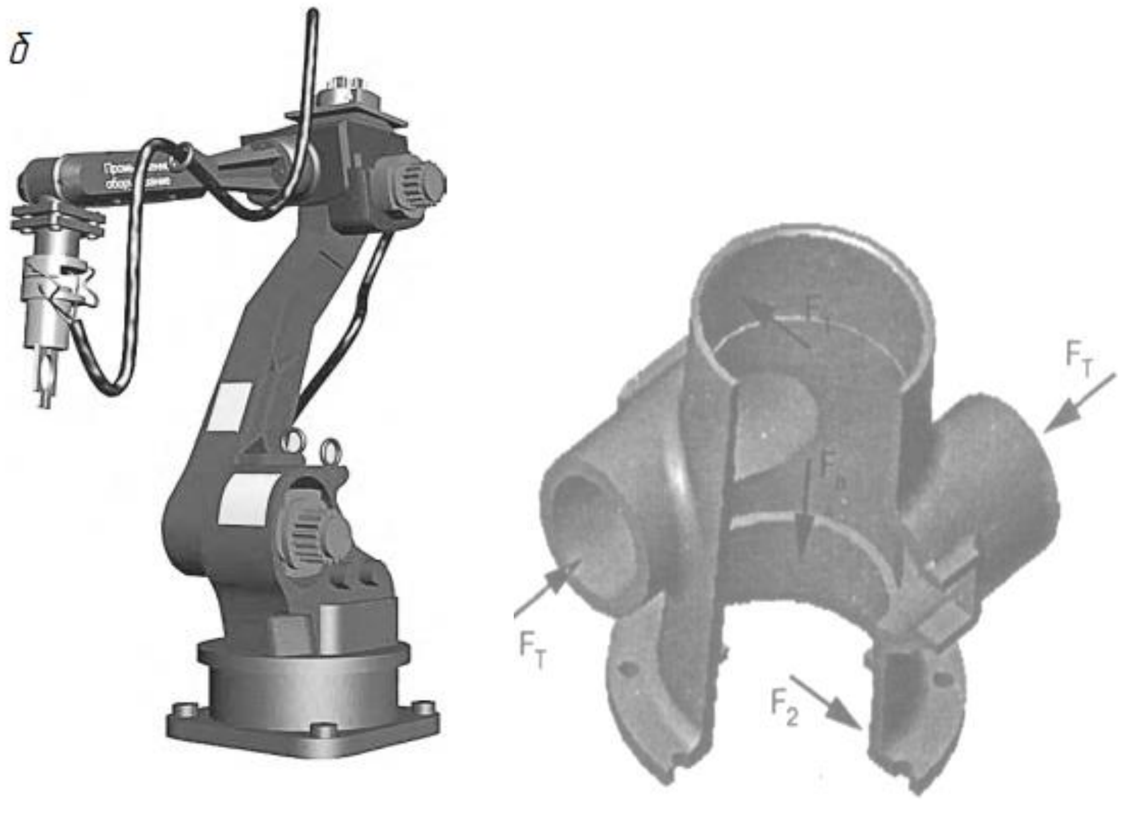


Figure 1 – Robot structure examples (left), robot’s swivel mechanism and workloads (on ringt)

Let us first construct a parametric model of the design object. A fragment of the program in the APDL language is shown in the following figure (fig. 2).

Analysis of the results shows that (fig. 3, 4):

– the maximum displacements occur in node number 26176 and amount to 0.21576E-003 m;

– the maximum tensile stress is S1 = 185 MPa;

– the maximum compressive stress is S3 = –123 MPa;

– the maximum von Mises stress is 189 MPa;
– the maximum shear voltage is SXY = 35 MPa.

```
! start coordinates
xn = 0
yn = 0
zn = 0
x = xn
y = yn
z = zn
delta = 0! just a variable
ugla = 0
Pi = acos (-1)

! flange parameters
tFlanec = 0.015! flange thickness
rvFlanec = 0.1! flange inner radius
rnFlanec = 0.16! flange outer radius
polojOtver = rvFlanec + 0.666666 * (rnFlanec-rvFlanec)
delta = 360 / kolOtvFlanec

! parameters of horizontal cylinders
rvCylin = 0.05! inner radius of the cylinder
dCylin = 0.32! cylinder length
lflan = 0.175! height from the base of the flange
lMejCylins = 0.2! distance between cylinders
! boss parameters
dOtser = 0.2! distance from the center of the part to the bosses
tolsh = 0.02! boss thickness
lVMenStor = 0.05! length of the smaller inner side
lVBolStor = 0.09! the length of the larger inner side
lNMenStor = lVMenStor + tolsh! length of the smaller outer side
lNBolStor = lVBolStor + tolsh! the length of the larger outer side

! parameters of the cone and its inner cylindrical surfaces
hCone = 0.35! cone height
rVPod = 0.1! radius of the hole for the upper bearing
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Figure 2 – A fragment of the program in the APDL language

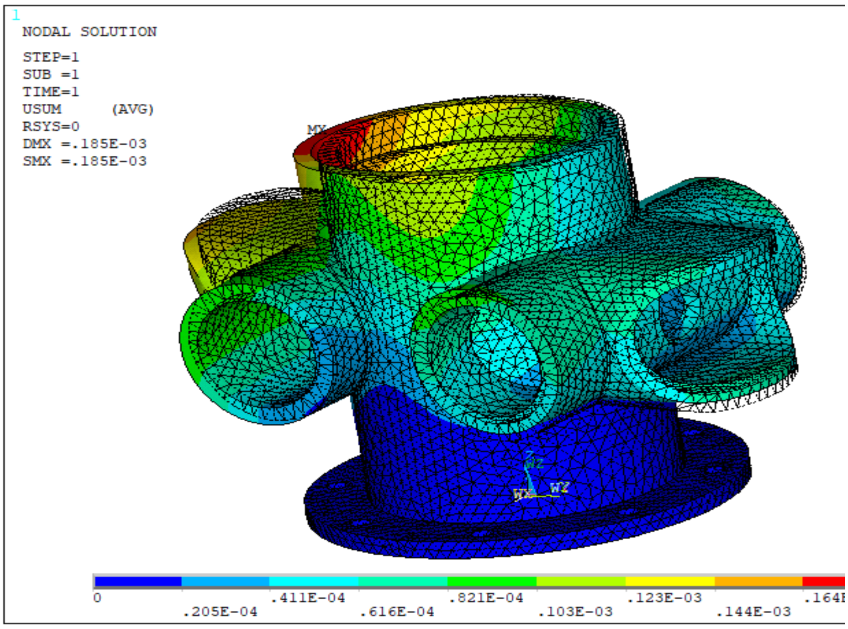


Figure 3 – Deformed and initial state after loading

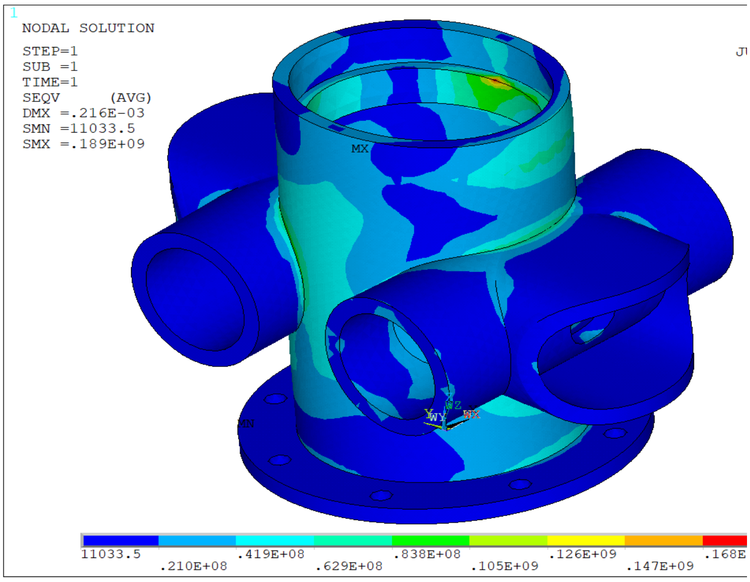


Figure 4 – Distribution of equivalent stress according to von Mises

The results of modeling the stress-strain type of the structure under working load are presented and the corresponding fragments of the model file in the APDL language are given. The possibility of performing optimization to reduce the material consumption of the product has been substantiated.