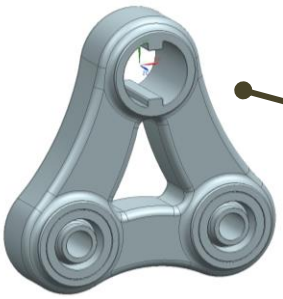
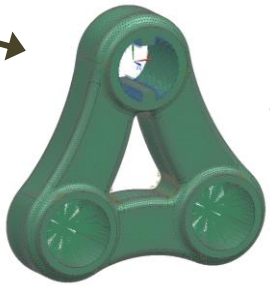
Emil Černý, University of West Bohemia

Design of the optimized part with 3D printer

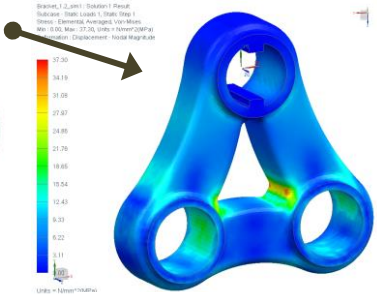
Material of the part: Polycarbonate (PC)
Tensile strength: 68 MPa



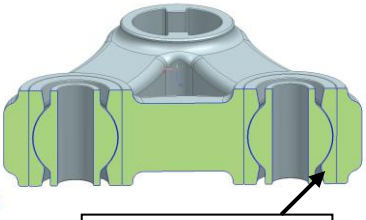
Pic. 1: Original design



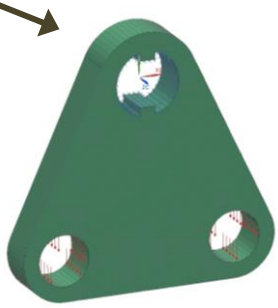
Pic. 2: Finite element method (FEM) mesh



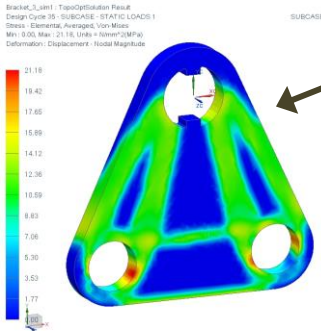
Pic. 3: Structural analysis



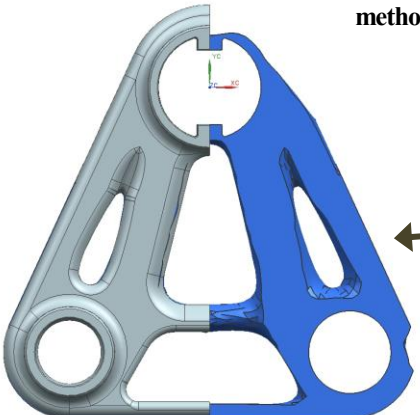
Spherical housing



Pic. 4: Mesh for topology optimization

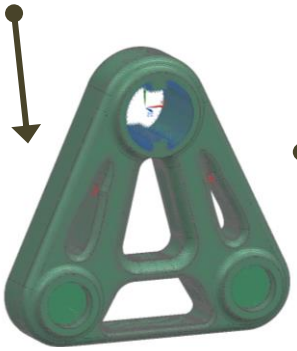


Pic. 5: Results of the topology optimization

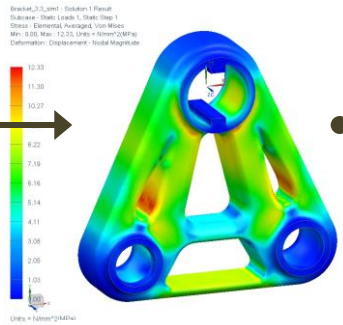


Pic. 6: Design based on the optimization

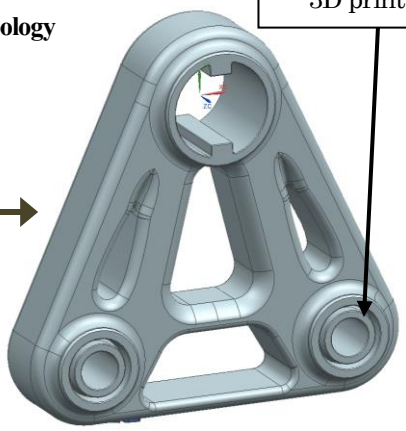
Simpler due to 3D print



Pic. 5: Final part with mesh



Pic. 6: Structural analysis



Pic. 9: Final design

	Force	Stress	Deformation	Force	Stress	Weight	Components	Dimensions
Original part	6 000 [N]	34,25 [MPa]	0,57 [mm]	17 200 [N]	breakdown	138 [g]	5	100x100x28
Optimized part	6 000 [N]	12,33 [MPa]	0,25 [mm]	17 200 [N]	35,34 [MPa]	120 [g]	3	100x100x28
Improvement		**64 %**	**56 %**			**13 %**	**-2**	