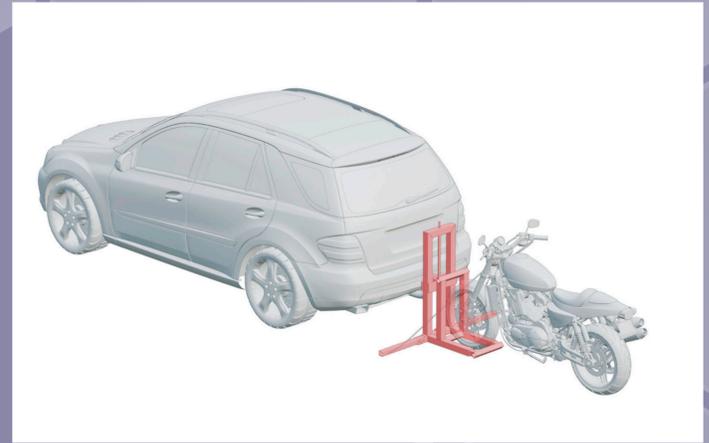
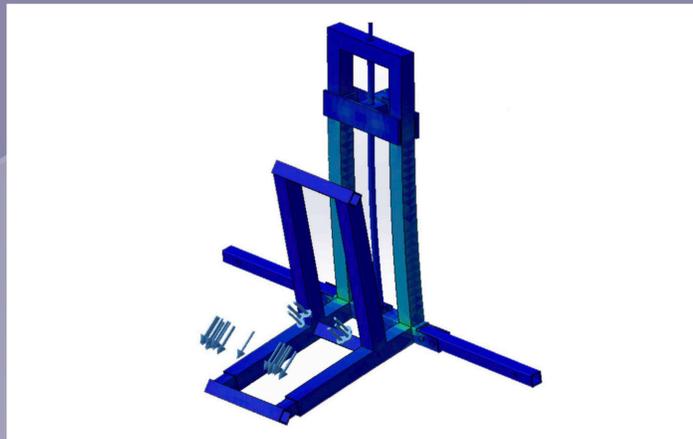


# ANALYSIS OF THE CONSTRUCTION OF A LIGHTWEIGHT TRANSPORT DEVICE

The article presents the analysis of a lightweight transport device's construction for mopeds and light motorcycles, developed on the basis of a patent number PL 224395 entitled „A car device for transport, especially for mopeds, motorcycles and lightweight quadricycles”. The device according to the concept is mounted on the tow bar of a passenger car and enables towing motorcycles and other vehicles without the assistance of additional persons. For this reason, it has a significant limitation, since the vertical force acting on the tow ball in the vast majority of these devices should not exceed 100 kg. This condition limits the weight of towed motorcycles.



1. Visualization of the prototype device



2. ANSYS calculations

Therefore, at the stage of constructing the designed device, at first the output data has to be determined, then using the digital simulation technique, perform an initial analysis of the device's structure. The input data was determined by the construction dimensions and the preliminary analysis was carried out for two materials. The FEM analysis of the device's structure for static and dynamic loads was carried out on the basis of prepared 3D model. It should be noted that static loads result mainly from a mass of a transported element being at rest or incidental events such as the person entering the platform during assembly of the elements to be transported.

The dynamic loads, on the other hand, result from the kinematics motion, the mass of transported vehicle and the device itself. They are a natural consequence of overcoming random irregularities on the road by the vehicle as well as from the speed profile being implemented. Acceleration and braking are maneuvers that are connected with inertia forces additionally acting on the designed device. The braking process is particularly dangerous from the point of view of the safety of using the device, but above all due to a safety of a moving vehicle.



3. Lightweight transport device mounted on the tow hook



4. The motorcycle installed on the lightweight transport device

For this reason, the detailed analysis of the device's structure was carried out in the article with particular attention to the most loaded device nodes. The analysis of nodes in terms of permissible loads will allow to optimize the structure of the device, especially in terms of reducing the transport device's weight.