

Assessment of the transportation route of oversize and excessive loads in relation to the load-bearing capacity of existing bridges

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Abstract. Transportation routes of oversize and excessive loads are currently planned in relation to ensure the transit of a vehicle through critical points on the road. Critical points are level-intersection of roads, bridges etc. This article presents a comprehensive procedure to determine a reliability and a load-bearing capacity level of the existing bridges on highways and roads using the advanced methods of reliability analysis based on simulation techniques of Monte Carlo type in combination with nonlinear finite element method analysis. The safety index is considered as a main criterion of the reliability level of the existing construction structures and the index is described in current structural design standards, e.g. ISO and Eurocode. An example of a single-span slab bridge made of precast prestressed concrete girders of the 60 year current time and its load bearing capacity is set for the ultimate limit state and serviceability limit state. The structure's design load capacity was estimated by the full probability nonlinear MKP analysis using a simulation technique Latin Hypercube Sampling (LHS). Load-bearing capacity values based on a fully probabilistic analysis are compared with the load-bearing capacity levels which were estimated by deterministic methods of a critical section of the most loaded girders.