

# **Influence of roundabout capacity enhancement on emission production**

**Andrea Kocianova<sup>1</sup>, Marek Drliciak<sup>1</sup> and Eva Pitlova<sup>1</sup>**

<sup>1</sup>Department of Highway Engineering, Faculty of Civil Engineering, University of Žilina, Univerzita 8215/1, Žilina, 010 26, Slovakia

E-mail: [eva.pitlova@fstav.uniza.sk](mailto:eva.pitlova@fstav.uniza.sk)

**Abstract.** Secondary effects of intersections insufficient capacity in urban areas are negative impacts on environment out of acceleration and deceleration of vehicles moving in long queues. The positive influence of increased intersection performance to reduce delays and queues, as well as negative impacts on the atmosphere is presented in this paper. The case study includes two single-lane roundabouts located close to each other in Žilina. Both roundabouts do not comply with the current traffic loads. This results in long queues and delays lasting not just during the peak hours. The solution to this problem is a new type of roundabout – turbo-roundabout. Capacity characteristics of both the current and new state are determined by microsimulation using PTV Vissim software. Obtained main characteristics of traffic flows are used as inputs to establish emission productions of NO<sub>x</sub>, CO and HC at the roundabout entries. The paper shows that proposed basic turbo-roundabout provides significant higher capacity performance compared with current state. Waiting times and queue lengths decrease about ten times. Due to this reduction, emission productions decrease about 50-60%.