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Fokus-emne: IT i vejsektoren

Titel: **Turbo roundabouts as Civil Cells**

Poster presentation of the Master Thesis "A comparative analysis of Turbo-Roundabouts and conventional roundabouts by the use of Civil Cells and a socio-economic discussion".

The implementation of the turbo roundabout in Denmark seems to be a quite fresh topic for Danish road industry. Therefore, investigation of advantages and disadvantages of implementing a turbo roundabout in relation to a conventional multilane roundabout could give a better overview of its application and related benefits. The presentation in form of a poster will present some of the issues raised during the process of geometric design of roundabouts using Bentley PowerCivil.

In the design process, a double roundabout interchange serves as the case study and Civil Cells as the tool to create dynamic adaptable templates of constituent elements of both types of roundabout. An investigation of this new technology in relation to a design of roundabouts seems to be an interesting combination due to the fact, that roundabouts have a more complex geometry than standard intersections, especially turbo roundabouts. Almost automatic adaptation of those geometric templates in many other projects may have a huge influence on the road industry and consulting companies in the future.

A review of roundabouts in use today shows that new types are constantly being developed that try to solve the existing problems with traffic safety, efficiency and the negative effects of traffic on the environment. Recently, turbo roundabouts have been recognized as a good alternative to conventional double-lane roundabouts and have the unique geometry that could improve traffic safety. This type involves changes in the geometry of the circulatory area and uses raised lane dividers to physically separate traffic lanes.

The aims of the study were to find a way to create a geometric template that would automatically adapt to new alignments of turbo roundabouts, explain the benefits of implementing such a technology and define the gains from developing and implementing this new type of roundabout from a socio-economic point of view. There has been very little work directed towards new technologies supporting road infrastructure design. Subsequently, the creation and application processes of intelligent Civil Cell

templates for the turbo roundabout and the conventional double-lane roundabout have been examined using the Civil Cell tool of Bentley PowerCivil program. Simultaneously with the design of templates, the advantages and disadvantages of the turbo roundabout over the conventional roundabout were investigated from a theoretical point of view. The designing part involved, among others, an analysis of several design concepts and a deliberation on mutual dependencies between constituent elements of each template. The results showed that the geometry of the circulatory area of the turbo roundabout strongly influences the degree of complexity of the design process. For designers, the most important factor in designing and applying Civil Cell templates is that, once prepared, Civil Cell templates will pay off in future projects and will significantly reduce design time. The theoretical part included a socio-economic discussion in the form of a comparative analysis of the two types of roundabouts and a brief evaluation of a real-life case. The theoretical study shows that the turbo roundabout decreases the number and severity of traffic accidents, negative effects of traffic on the environment and in some cases increases capacity as well as construction costs. For society, the most important factor in developing and implementing turbo roundabouts is the improvement of traffic safety.