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Editorial

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Transport authorities develop infrastructure-management strategies and life-cycle maintenance plans to meet asset performance requirements. Optimising infrastructure performance based on available funds, users' cost and risks is important to achieve customer satisfaction. Therefore, understanding the infrastructure materials, components and whole-system performance will help to accomplish the authority's objectives. Practical research and technical development are required to improve modelling, analysis, design and performance of road, airfield, bridge and tunnel infrastructures.

This issue of *Transport* presents five technical papers covering a wide range of infrastructure types and research-and-development themes. Modelling highway maintenance procurement, innovative asphalt patch repair, airport concrete pavement design, assessment of bridge deck dynamic response to loading and modelling high-speed rail tunnel pressure-relief ducts are detailed in this issue. Implementing the above practical research findings can improve transport infrastructure design and performance to meet stakeholders' expectations.

Zhang *et al*. (2019) developed a system dynamic to model the impact of stakeholders on the highway maintenance process. The interaction between highway operators, government agents and users is analysed in the context of highway maintenance, condition performance, available budget, user's satisfaction and risks. The impact of funding strategy and subsidy allocation on performance is also assessed. The authors develop and evaluate a cause–effect model to account for factors that influence maintenance and stakeholders.

Byzyka *et al*. (2019) identified the performance issue of hot asphalt mix patch repair. Poor compaction of the patch repair at the interface with existing asphalt pavement can lead to premature failure. They proposed a novel pothole repair technique, using an infrared heating system, to improve compaction and future performance. The authors carried out laboratory trials and validated the solution using a three-dimensional (3D) finite-element (FE) thermal model to assess the loss of temperature during the patch repair. They present the advantage of preheating the existing surface to reduce temperature loss at the interface and achieve better compaction.

Thermal and aircraft-induced stresses within concrete pavements are modelled by Lee *et al*. (2019) using an FE analysis program. A statistical regression model of the combined stresses was developed, and the results are compared with load-induced stress using traditional Westergaard plate on an elastic foundation model. The authors propose modifying the Federal Aviation Authority's concrete fatigue model used for airport concrete pavement design considering their research findings. Concrete pavement design can be carried out and slab thickness, bay size and joints spacing calculated for given aircraft loading, foundation support and environmental conditions using the proposed improved model.

The response of bridge deck pavement surface to dynamic loading is evaluated by Han *et al*. (2019). The authors developed a 3D FE vehicle–bridge–bridge deck surfacing vibration model to investigate the combined impact of surface roughness and vehicle velocity on the dynamic bridge behaviour under random vehicle loads. The results are compared with the international roughness index to control vehicle speed based on bridge surface roughness.

Seo and Ha (2019) assessed the effect of pressure-relief ducts on tunnel traction demand. High-speed trains generate sudden aerodynamic resistance upon entering tunnels, which requires higher train traction power. Pressure-relief ducts and vertical shafts are commonly used to reduce the aerodynamic resistance and traction power demand of high-speed trains. The authors used one-dimensional numerical simulation to model several case studies in South Korea. They demonstrated that cross-sectional areas of both the tunnel and the pressure-relief ducts are closely related to the aerodynamic conditions and traction power demand of a train in a tunnel. A recommendation is made to modify the cross-sectional area and distance between ducts as the most efficient approach to achieve traction power demand for the operation of high-speed trains in a tunnel.

I hope you enjoy reading the five interesting, practical research papers which cover a range of transport infrastructures including roads, airports, bridges and tunnels.

REFERENCES

Byzyka J, Chamberlain DA and Rahman M (2019) Development of advanced temperature distribution model in hot-mix asphalt patch repair. *Proceedings of the Institution of Civil Engineers – Transport* **172(4)**: 199–209, https://doi.org/10.1680/jtran.17.00022.

Han F, Wang H and Dan DH (2019) Dynamic response of a bridge deck pavement. *Proceedings of the Institution of Civil Engineers – Transport* **172(4)**: 221–232, https://doi.org/10.1680/jtran.17.00009.

Lee JH, Kim YT, Tonn S, Cho NH and Jeong JH (2019) Airport concrete pavement design by environmental and double dual tandem gear loadings. *Proceedings of the Institution of Civil Engineers – Transport* **172(4)**: 210–220, https://doi.org/10.1680/jtran.17.00025.

Seo SY and Ha H (2019) Effect of pressure-relief ducts on traction demand in a tunnel: a numerical evaluation. *Proceedings of the Institution of Civil Engineers – Transport* **172(4)**: 233–245, https://doi.org/10.1680/jtran.17.00037.

Zhang H, Zhao J and Tam VWY (2019) System dynamics-based stakeholders' impact analysis of highway maintenance systems. *Proceedings of the Institution of Civil Engineers – Transport* **172(4)**: 187–198, https://doi.org/10.1680/jtran.17.00070.