

## AMAC-UK Nenad Bicanic Academic Award

### Report on the research visit to the University of Nottingham:

#### *“Mechanical characteristics of the bitumen stabilized ballast”*

Supported by the AMAC-UK's Nenad Bicanic Academic Award for 2017, I had the privilege to visit the Transportation Engineering Centre at the University of Nottingham during two weeks in June 2017 and carry out collaborative research at their Pavement department.

The research focus of this visit was the problem of stabilization of the railway ballast, the layer of irregularly crushed stone that is placed between the tracks in order to bear the load from the railway ties, reduce vibration and facilitate water drainage.



Different methods of railway ballast stabilisation help in increasing of the achievable train speeds, prolong the lifespan of the railway infrastructure and increase the safety of passengers. More specifically, I am researching different methods of stabilisation of the ballast bed using ballast bonding, in which specific additional substances are added to bond the ballast stones at their edges and contact points.

According to the previously submitted research proposal, during my research visit, we analyzed the ballast bonding method that is based on adding bituminous emulsion after the ballast is laid down. Given the uniquely designed laboratory for ballast stability at the host university, we conducted several laboratory tests that would not be possible to implement in Croatia, such as the PUMA test and test of the quality of the bituminous emulsion.

The main goal of the experiments was to determine the behavior of bonded ballast at different temperatures, which is important since it determines the scope of application of this ballast bonding

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method. For instance, in order to be applicable to Croatian conditions, a ballast bonding method should stay stable at the temperature degree range between -20 and 50 degrees Celsius.



After the initial analysis of the experimental results, I am happy to report that the measurements show sufficient temperature stability of this method. This motivates further research of characteristics of bitument stabilized ballast, such as its mechanical stability, vibration coefficients, and others.

As a result of this collaboration and the conducted experiments, we are currently finalizing data analysis and will publish the results in a conference and a journal paper. Finally, after experiencing and learning about the test procedures used at the University of Nottingham, the research group that I belong to is currently in the process of starting a similar laboratory in Croatia.

The research that I had chance to carry out at the University of Nottingham, thanks to AMAC-UK's Nenad Bićanić Academic Award has had an exceptional influence on my future scientific career. It enabled me to carry out the research on the behaviour of the railway ballast that is a crucial part of my doctoral thesis at the University of Zagreb, provided me with the chance to collaborate with a world-class research institution in the United Kingdom, and has resulted in positive results that have a potential to influence how the railway ballast is constructed in Croatia.



I would like to wholeheartedly thank the whole AMAC-UK for the honour of receiving this award and the opportunities that this award has created. I look forward to continuing my doctoral education and will do my best to continue improving the reputation of Croatian research abroad.

Viktorija Grgić