

## **Features of behavior of acoustic emission signals at dynamic tests of prestressed concrete elements of rail ways**

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### **ABSTRACT**

Reinforced concrete is a combination of two different in their mechanical characteristics of materials: iron (steel) and concrete. They worked together in the design as a monolithic whole. Effectiveness of joint work is so different from existing material and it is possible and profitable thanks to their mechanical properties. To quantify the fracture loads of railway prestressed concrete sleepers the dynamic bending tests were carried out. In the set of tests the initial (first) crack, the crack opening and crash event of prestressed monobloc sleepers were registered by a Method of Acoustic Emission (MAE). It is shown that MAE allows to fix the beginning of cracking and evolution of cracks earlier, than other instrumental and visual inspection. During visual inspections (no longer than 5 min between the dynamic loading steps) for crack shores opening measurement the cracks are "healing". This effect it is clearly seen by the Acoustic Emission signals movement on the next loading step. The cracks "curing" time is reduced from one load step to another. The received results will allow to define further quality of clutch of armature with concrete, and as consequence, quality of pulling together efforts of any preliminary intense reinforced concrete designs. During the stepwise loading test for prestressed reinforced concrete sleepers, at the beginning of each loading stage on the graphs of the total number of acoustic emission impulses have been revealed "plateau" (the absence of accumulation of pulses). This shows the effect of healing of cracks in concrete. This effect can be used as an additional criterion for testing the quality of adhesion reinforcement with concrete sleepers.

### **KEYWORDS**

*prestressed monobloc railway sleepers, method of acoustic emission, dynamic bending loading, the effect of cracks "healing"*

### **REFERENCES**

1. EN 13230-2:2002 E.. Railway applications.-Track-Concrete sleepers and bearers. Part 2. Brussels. European Committee for Standardization, 2002, 32 p.
2. Doroshko S., Banovs M. Acoustis emission testing of aircraft constructions. Universidad de Sun Buenaventura, Bogota, Colombia, Ingenium, No.14, 2008, pp.5-13.