EXPERIMENTAL RESEARCH OF MECHANICAL CHARACTERISTICS OF RAILWAY VEHICLES SAFETY COUPLING COMPONENTS

Marija N. Vuksic Popovic[1*], Jovan D. Tanaskovic[2], Dejan B. Momcilovic[3] , Vojkan J. Lucanin[2]

[1]Academy of Technical and Art Applied Studies, High Railway School of Vocational Studies, Belgrade, Serbia

[2] University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia

[3] Institute IMS, Belgrade, Serbia

*Corresponding author e-mail: marija.vuksic.popovic@vzs.edu.rs

Abstract

The coupling system provides a mechanical connection between European railway vehicles. Screw couplings are designed as a safety device in railway vehicles with coupling links and screw as two main components intended to break. Failure of these components is necessary when the load between vehicles is exceeded, otherwise more significant draw gear elements will fracture. The analysis of train break cases shows that the failure of the links occurs only in an approx. 6% of cases. Therefore, the links taken from exploitation after more than 30 years in operation were tested to determine their mechanical characteristics. Tensile testing was performed according to the ISO 6892-1 standard with a continual force and a minimal and maximal test speed prescribed by ISO 6892-1. The values of mechanical characteristics of coupling links are substantially improved during production after heat treatment by hardening and tempering. However, test results of mechanical characteristics didn't meet all prescribed limits for the minimum requirements according to UIC 826. The current regulations of mechanical characteristics were not in force in time of link production. Examination of the tested links showed a ductile fracture and the cross-sectional area shows the planar stress state.

Keywords

Railway; Coupling; Fracture; Experimental investigations

Acknowledgement

The research work is funded by the Ministry of Education, Science and Technological Development of Republic of Serbia, Project Contract 451-03-9/2021-14/200105 from February 5th 2021.