**TITLE OF THE PAPER**

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**Introduction**

After couple of serious railway accidents caused by cracks of railway axles or tyred wheels, such as the most serious accident in the last decade, which happened in Viareggio, Spain in 2009, the problem of exploitation durability of railway axles has been arisen, especially fatigue cracks formation and sufficient technical supervision of wheelsets being both in-service and out of service. At the same time the technical progress in the ultrasonic test area has become a great ally in popularization of the running gear elements’ supervision and elimination of defective components. Additionally, there is a close connection between two terms - reliability and secured exploitation of rolling stock – highlighted.

**Research problem and research methodology**

In the presentation, the sources of fatigue cracks formation in railway axles are presented.

There is shown a comparison of internal integrity requirements that need to be met for a new railway axis and for a one that has been already in-service. The source documents are presented, which regulate the research methodology with a comparison of a unified research methodology with a type A visualization according to PN-EN 12668-1:2010 and with a type D visualization (Phased Array), which is inconsistent with PN-EN 12668-1:2010 and widely used in industry.

The carried tests and the analysis of the results allow the conclusion that Phased Array technique is a technique for future, much shortening ultrasonic scanning of railway axis and partially eliminating the process of results interpretation. However, there is a serious barrier to be overcome before the PA technique will be successfully implemented. The method validation must be performed , which is expensive and time-consuming, as well as, the research instructions of railway axis, taking into account new technique, must be developed.

**Conclusions**

The obtained results indicate the need for detailed tests to validate the method in order to place it in service by railway carriers. It is necessary though to establish a coordinating body to take action in terms of design and unification of national requirements for wheelsets in-service with the European railway market in order to maintain the rolling stock in-service at the highest possible level.

**Literature**

1. Hottowy G.: *Powstawanie i rozwój pęknięć zmęczeniowych w osiach kolejowych*. Materiały szkoleniowe niepublikowane. Warszawa 2010.
2. Antolik Ł.: *Instrukcja badania ultradźwiękowego metodą uproszczoną osi kolejowych typu B/130*. Materiały szkoleniowe niepublikowane. Warszawa 2012.
3. Winter P.: *International Union of Railways, compendium on ERTMS*. Eurail Press. Hamburg 2009.

**Atention.**

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