

## PERFORMANCE OF ACCURATE MEASUREMENTS OF DIMENSION OF GEOMETRICAL ELEMENTS OF RAILWAY INFRASTRUCTURE WITH PORTABLE COORDINATE 6-AXIS MEASURING ARM

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### Introduction

Measurements are one of the most important stages in the production process of any modern device. They are performed in particular during the manufacturing process during which individual parameters of the product are assessed as qualifying as meeting or not meeting specific requirements. More complex measurements can be made on entire assembled components, semi-finished products as well as finished products.

The equipment, products and blanks operating in rail transport belong to one of the few that have to work without failure for a well-defined long time. During their use, periodic maintenance inspections and repairs of used elements are carried out. It is then important to take measurements of the wear of selected elements of the device [1].

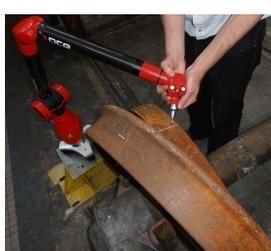
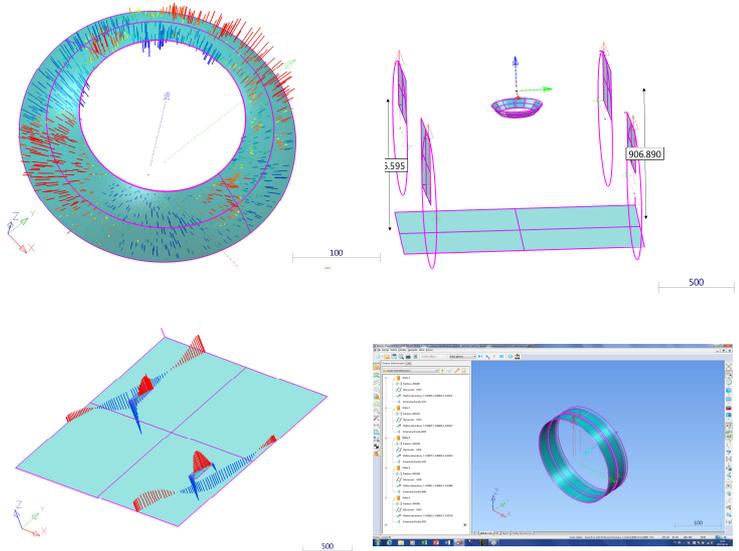
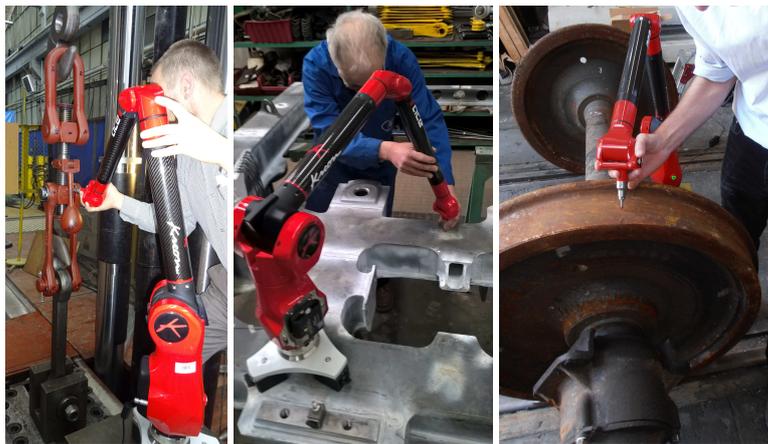
Currently, the railway still uses specialized calipers, instruments, templates and electronic measuring instruments to perform quick measurement of selected parameters of rolling stock components and railway infrastructure [2, 3, 4].

### Research problem and research method

The paper presents an example of application and measurement results of geometrical dimensions made with the use of a portable 6-axis measuring arm. Elements of rolling stock, eg: trolleys, wheelsets, wheel disks, hoops, etc. which are worn or damaged, eg as a result of derailment, are so deformed that their boundary dimensions are exceeded. The construction of standard railway measuring instruments did not allow for reliable measurements. Only the use of a universal portable coordinate measuring arm allows to determine the values of selected dimensions.

### Results

The measuring arm was used to determine the dimensions of prestressed concrete sleepers, the dimensions of carriages, wheelsets, wheel disks, couplers. Obtained results of measurements were used to conduct the analysis in the development of post-accident expert reports [5].



### Applications and Summary

Effectively, quickly and accurately. Measurements of constructionally assembled elements and products have become easy when portable accurate coordinate measurement arms capable of operating in production conditions and software allowing for collective elaboration of measurement results results obtained with the use of these devices appear. Therefore, it is possible to not only reliably and quickly measure, but also to assemble and compare several measurement results, to make graphs of shape errors or to analyze changes in surface geometry that progress along the way it is worn. Coordinate measuring arm is useful at all stages of formation and operation of the device. They can be used to check the wear of components and to document the quality of new or renovated products.

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### Abstract

Performing measurements in an efficient and reliable manner requires the use of modern computerized devices. One of these is the portable 6-axis coordinate measuring arm. It is a universal measuring device that can work both in the laboratory and in the production hall. The presented device has been thoroughly checked during many measurements of geometric dimensions. The results of measurements and their subsequent in-depth analysis enabled the development of a number of measurement certificates, reports, expert opinions and publications.