

# TECHNOLOGICAL SYSTEM FOR PROFILING/ RE-PROFILING RAILWAY WHEEL SETS

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**Abstract:** This paper presents some considerations on the development of a technological system for profiling/ re-profiling and measurement the profile of the railway wheel sets in order to improve maintenance and security of railway transport. Lathes for reshaping the wheels and wheel sets of the railway vehicles are diversified and modernized in accordance with the requirements of railway transport. The paper presents some considerations on modernization of a conventional lathe with two working units by adaptation of CNC equipment for driving and measuring simultaneous both wheels on an axle. On radial sledge of each working units, on which are mounted the profiling tools, in the immediate proximity of them, are placed the measurement systems in order to determine the axial position of lateral internal faces of the wheels, the diameters of the wheels and the main geometrical parameters of the rolling profiles. The measurements are done before re-profiling to determine the wear of the profile and choice the diameter and the profile of the wheels after reshaping and after processing, to determine the conformance with specifications.

**Keywords:** railway wheel sets, wheel lathing, railway wheel profile, wheel wear

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## 1. Introduction

Improving the safety and security of transport and reducing the negative effect on the environment has been a major objective in the last decades, due to the rapidly increasing needs of freight and passenger transport and due to the reversible relation between human and nature, as well as health and traffic.

Especially, the high-speed train requires careful consideration of the problems related to the contact between wheel and track. Worldwide there is an intense concern for the development of high-speed railway transport as an advantageous alternative to the road and even air transport, in terms of traffic safety, transport capacity, energy consumption and environmental protection [1].

The performance of rolling stock maintenance will have a great influence on transport safety and passengers comfort. A key element in the maintenance of the rolling stock is the re-profiling of the wheel sets.

The reasons for re-profiling wheels are [2]:

- **Corrective maintenance:** keeping the safety limits according to standards; removing the wheel defects and wear;
- **Conditional maintenance:** optimization the re-profiling interval determined by research; removing wheel defects at the beginning; minimization of components stress; noise reduction; improve the wheel life time.

Three major aspects require special attention in wheel re-profiling process:

- choosing the appropriate profile
- framing prescribed tolerances

- compliance with surface quality.

The importance of improving the wheel sets re-profiling technology results not only from the need to reduce maintenance costs, but also from the need to enable modern high speed trains to use their potential under conditions of reliability and safety of transport.

Unfortunately in most railway workshops from our country and from many other countries, for turning the profiles of the train wheels are used machine tools manufactured as far back as the '60- '70 years. Their performance no longer meets current requirements of precision and productivity [8]. Purchase and installation of new modern machines is too expensive for these workshops. By using modern electronics and software technology these machines can be modernized and automated with lower costs. CNC technology provides opportunity for retrofitting and automation the existing lathes used by railway maintenance workshops for re-profiling wheel sets. Implementation of CNC offer a number of new possibilities including improving wheel running profile measurement, maintaining a database with measured profiles and with normalized profiles, wheel profile optimization, intelligent machining cycles and simplified operator interface.

The technological measurement and manufacturing system presented in this paper, includes: wheel profile and diameter measurement before and after machining; a CNC system with 4 translation axis integrated in structure of a horizontal lathe type UB 150 - RAFAMET-Poland, with two working units, for driving and control of reshaping and measurement processes; intelligent machining cycles for wheel turning and measurement.