AUTOMATIC MEASUREMENT SYSTEM FOR CRANE MEASUREMENT

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Abstract: New way of geometric parameter determination of crane rails comes out from integration of geodetic (robot station) and non-geodetic (electronic measurement systems) technologies into one unit. The measuring system consists of robot station and remote control unit with the radio modem, standard and 360° reflecting prism, notebook, amplifier, inductive transducers, terminal and connecting cables. The robot station with the radio modem and the prism for orientation are located on the floor and create a static part of the measurement system. The 360° prism is attached to the moved part of the measurement system, which is drifted by a crane. The robot station is equipped with Automatic Target Tracking (LOCK) and Automatic Target Recognition (ATR). Position of the 360° prism is determined by the 3D polar method, dependent on the railway length from one or several instrument positions. The measured data (a horizontal direction, a vertical angle and a slope distance) are registered to the notebook. Electronic transducers are fixed to the moved part of the measurement system. Two inductive sensors with 100 mm range and 80mV/V sensitivity determine the relative position of the rail to the prism centre in both vertical and transverse direction. The analogue output signal is send to the measuring amplifier (Spider8 from Hottinger Baldwin Messtechnik (HBM) is used), filtered and transformed to digital data sets stored by the notebook. The data processing consists of the connection of both files into one and the rail position calculation. The accuracy of the rail position depends on the accuracy of the prism position, of the system geometry and determination of electronic sensor position changes. The relative position of the reflecting prism and the transducers (their definition points) are determined in laboratory with accuracy of 0,5 mm.

1. Measurement system description

Measurement system consists of the geodetic and non geodetic part, which are connected into one unit. The system based on kinematics method of measurement and enables to carry out the measurement during the crane operation [1].

Measurement system consists of:

- robotic measurement station Leica TCA 1101 with a radio modem and remote control unit,
- standard prism,
- 360° prism,
- portable operative personal computer,