

## A self-acting mobile robot for monitoring floor flatness

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### ABSTRACT

As part of the structural inspection, compliance with the specified flatness tolerances according to DIN (in particular DIN 18202:2019-07) has to be checked. Today, the monitoring of the flatness is carried out mainly with levelling instruments and tacheometers. However, these measuring methods are time-consuming, as staking out the measuring grid and capturing the heights are performed manually. In addition, the data evaluation must be done in a separate work step. Therefore, we developed the mobile robot RITA for height measurement in combination with a stationary tacheometer. Now, the entire process of flatness control is carried out automatically, and heights are recorded reliably in real-time. For practicality, we developed a compact design of the mobile robot in combination with hardware modules. Our reflector tracking unit makes it possible to follow the reflector on the robotic platform in order to maintain the line of sight to the tacheometer. Furthermore, our mechanical pendulum unit ensures that the height measurement is always carried out vertically, even if the robot itself is tilted. Initial practical tests have shown that the high demands on the robotic platform are met and that the implementation of the flatness control can be automated. For that, investigations concerning the location accuracy of the robot were carried out, and the height measurement was validated. It turns out, that demands in the lowest millimeter range are fulfilled. Overall, these tests showed the enormous gain in performance due to the newly developed height measurement robot compared to the previous slow, complex, and tiring manual process.

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