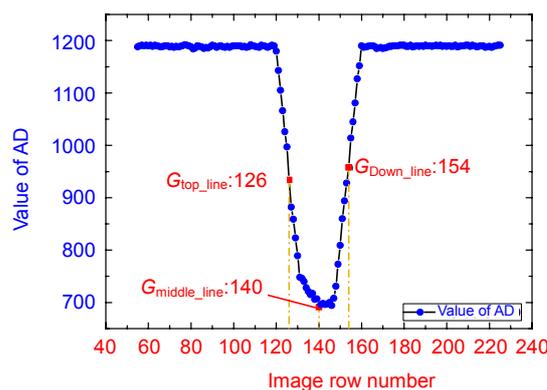


The precise positioning system of mica trough based on machine vision

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Positioning results of mica slot's center line

Overview: In the process of using locomotive motor commutator, due to the copper brush constantly rubbing, the copper scraps accumulate in the mica under the action of long time. In this case, the boundary between the copper and the mica slot becomes blurred, thus the motor commutator needs to be repaired on a regular basis. A traditional method is to use a laser-modulated positioning mica slotting system to perform engraving of the mica slot. However, the system detects the location of the mica slot depending on the reflectance of the laser, which is so different between copper bars and mica pieces. It can only get the approximate position of its center line and often appear missing and wrong situation. Therefore, it is necessary to perform error compensation by manual verification before each cutting to avoid unnecessary damage to the motor commutator, and at the same time, this method makes the work efficiency low. In order to improve the positioning accuracy and efficiency, this paper proposes an accurate positioning method of mica trough based on machine vision, which can effectively overcome the difficulties in precise extraction of the mica groove edges belong to motor commutator. In every working cycle, the system utilizes CCD camera to capture the current motor commutator surface image, then transfers the picture to the system's numerical calculation module. Combining with the positioning error correction model constructed by the system, the self-designed precision compensation algorithm can accurately locate center line of the mica slot. After the positioning result transmitted to the main control unit, the servo system can control the burin to move to the designated position cutting the groove. When the above tasks are completed, the motor commutator can rotate into the next working cycle. The core part of the system is the precision compensation algorithm, which can precisely control each part of the center line positioning process of the mica slot, make precise positioning of the edge of the mica slot and avoid making the scratch mistaken for mica slot. Then finding out the correct location of the center line of the mica slot, the algorithm can also avoid the emergence of some extreme conditions to ensure the stable operation of the entire system. The experimental results show that the system can accurately calculate the midline position of the mica slot and control the positioning error of the knife between positive and negative 0.02 mm, which effectively improves the positioning accuracy and efficiency.

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