

# Accuracy analysis of earthworks performed by shovel working mechanism

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*In civil engineering, when laying trenches for urban communications in infill construction, there is a need to use high-precision construction machines equipped with control systems. The most promising are the machines built on adaptive methods, since they make it possible to synthesize the control algorithm in the work process. The need for such systems is due to the high requirements to performing excavation works, established by construction norms and rules. A significant proportion of the work on constructing the communications is carried out using a shovel excavator with a hydraulic drive. To obtain practical recommendations for improving the accuracy and application of control systems, a mathematical model of the operating mechanism of a shovel excavator has been developed. This model allows us to estimate the accuracy of excavation, analyze possible sources of geometric errors and make up a working area and service area. The developed model makes it possible to analyze the kinematic and technological errors and the sources of their appearance. We propose two ways to reduce the errors to acceptable limits, either using the control system or without using it on existing equipment.*

**Keywords:** shovel excavator, mathematical model, automatic control system, service zone, precision

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