عنوان مقاله:

RAM analysis of earth pressure balance tunnel boring machines: A case study

محل انتشار:

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خلاصه مقاله:

Earth pressure balance tunnel boring machines (EPB-TBMs) are favorably applied in urban tunneling projects. Despite their numerous advantages, considerable delays and high maintenance cost are the main disadvantages these machines suffer from. Reliability, availability, and maintainability (RAM) analysis is a practical technique that uses failure and repair dataset obtained over a reasonable time for dealing with proper machine operation, maintenance scheduling, cost control, and improving the availability and performance of such machines. In the present study, a database of failures and repairs of an EBP-TBM was collected in line 1 of Tabriz subway project over a 26-month interval of machine operation. In order to model the reliability of the TBM, this machine was divided into five distinct subsystems including mechanical, electrical, hydraulic, pneumatic, and water systems in a series configuration. According to trend and serial correlation tests, the renewal processes were applied, for analysis of all subsystems. After calculating the reliability and maintainability functions for all subsystems, it was revealed that the mechanical subsystem with the highest failure frequency has the lowest reliability and maintainability. Similarly, estimating the availability of all subsystems indicated that the mechanical subsystem has a relatively low availability level of 52.6%, while other subsystems have acceptable availability level of 97%. Finally, the overall availability of studied machine was calculated as 48.3%.

کلمات کلیدی:

availability, maintainability, reliability, tunnel boring machine