

ABSTRAK

***RATE OF BOLT INSTALLATION* PADA AXERA 7 DAN DD422I DI GBC-KL PTFI: STUDI KOMPARATIF, MODEL PREDIKSI, DAN EVALUASI OPERASIONAL**

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Perbedaan teknologi Axera 7 dan DD422I menimbulkan dugaan perbedaan kinerja pemasangan *bolt*. Padahal, kinerja pemasangan *bolt* tidak hanya ditentukan oleh teknologi (parameter mesin), melainkan juga berbagai faktor lain seperti kondisi massa batuan dan aktivitas operasional lainnya. Sehingga, perbedaan teknologi bisa jadi tidak menimbulkan adanya perbedaan kinerja operasional. Kompleksitas faktor-faktor tersebut menyebabkan evaluasi kinerja pemasangan *bolt* atau nilai *rate of bolt installation* tidak dapat disimpulkan secara langsung dan perlu analisis berbasis data lapangan. Namun, PTFI belum mempunyai sumber atau hasil studi berdasarkan kondisi lapangan yang ada saat ini mengenai analisis tersebut.

Belum adanya studi tersebut berdampak pada belum tersedianya sumber yang objektif mengenai unit mana yang memiliki *rate of bolt installation* lebih baik dan apakah perbedaan *rate of bolt installation* kedua unit benar-benar terjadi. Selain itu, belum tersedia model awal untuk memperkirakan *rate of bolt installation* berdasarkan faktor-faktor di lapangan yang relevan. Terakhir, belum tersedia identifikasi aktivitas operasional *jumbo drill* untuk upaya perbaikan operasional (*improvement opportunity*). Penelitian ini bertujuan memecahkan masalah tersebut.

Data yang diperoleh akan diolah sesuai dengan tujuannya. Pengolahan data menggunakan teknik analisis statistik inferensial dengan pendekatan komparatif, lalu teknik analisis statistik korelasi dan regresi dengan pendekatan eksplanatori-prediktif, dan terakhir teknik analisis statistik deskriptif dengan pendekatan deskriptif-analitis. Hasil pengolahan data akan digunakan untuk pembahasan.

Hasilnya, Axera 7 dan DD422I baru menghasilkan perbedaan *rate of bolt installation* yang signifikan ketika pada kondisi minim dipengaruhi oleh faktor dominan lain, seperti perbedaan kondisi massa batuan. Lalu, model NLMR yang dibangun mampu merepresentasikan hubungan nonlinier antara parameter mesin, faktor geometrik, dan kondisi massa batuan. Terakhir, upaya perbaikan perlu diarahkan pada perbaikan sistem logistik, keandalan utilitas, dan metode kerja.

Kata kunci: Identifikasi, Model, *Rate of Bolt Installation*, Signifikansi Perbedaan

ABSTRACT

RATE OF BOLT INSTALLATION ON AXERA 7 AND DD422I AT GBC-KL PTFI: COMPARATIVE STUDY, PREDICTION MODEL, AND OPERATIONAL EVALUATION

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The technological differences between the Axera 7 and DD422I have led to suspicions of differences in bolt installation performance. However, bolt installation performance is not solely determined by technology (machine parameters), but also by various other factors such as rock mass conditions and other operational activities. Therefore, technological differences may not necessarily lead to differences in operational performance. The complexity of these factors makes it impossible to directly evaluate bolt installation performance or rate of bolt installation and requires analysis based on field data. However, PTFI does not yet have study results based on current field conditions for such analysis.

The absence of such studies has resulted in the lack of objective sources regarding which unit has the better rate of bolt installation and whether the difference in rate of bolt installation between the two units actually exists. Furthermore, there is no baseline model available to estimate rate of bolt installation based on relevant field factors. Finally, there is no identification of jumbo drill operational activities for operational improvement opportunities. This research aims to address these issues.

The data obtained will be processed. Data processing used inferential statistical analysis techniques with a comparative approach, followed by correlation and regression statistical analysis techniques with an explanatory-predictive approach, and finally, descriptive statistical analysis techniques with a descriptive-analytical approach. The data processing results will be used for discussion.

The results show that the Axera 7 and DD422I only produced significant differences in rate of bolt installation when under conditions minimally influenced by other dominant factors, such as differences in rock mass conditions. Furthermore, the developed NLMR model is capable of representing the nonlinear relationship between machine parameters, geometric factors, and rock mass conditions. Finally, improvement efforts need to be directed at improving logistics systems, utility reliability, and work methods.

Keywords: *Identification, Model, Rate of Bolt Installation, Differences*