UNIVERSITAS
GADJAH MADA
PERANCANGAN PONDASI BORED PILE UNTUK STRUKTUR CONVEYOR BELT BATU BARA
Danar Pramudya Surya Nugraha, Dr. Eng, Ir. Fikri Faris, S.T., M,Eng., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

INTISARI

Penelitian ini bertujuan untuk mengevaluasi perhitungan pondasi *bored pile* terhadap beban struktur *conveyor belt* batubara. *Conveyor belt* merupakan infrastruktur penting dalam sistem distribusi batubara pada PLTU yang bekerja secara kontinu sehingga membutuhkan pondasi yang mampu menahan beban struktur secara aman dan stabil. Pondasi *bored pile* dipilih karena sesuai untuk kondisi tanah lunak hingga sedang, memiliki kapasitas daya dukung tinggi, serta minim getaran saat pelaksanaan konstruksi.

Metode penelitian yang digunakan adalah metode kuantitatif dengan pendekatan analisis geoteknik berdasarkan data tanah hasil Standard Penetration Test (SPT), data struktur *conveyor belt*, dan metode perhitungan daya dukung pondasi *bored pile* menggunakan metode Meyerhof. Analisis meliputi perhitungan beban *conveyor belt*, kapasitas daya dukung ujung tiang (Qp), kapasitas daya dukung selimut (Qs), kapasitas daya dukung ultimit (Qu), kapasitas daya dukung izin (Qa), serta analisis penurunan pondasi (*settlement*) menggunakan pendekatan Poulos dan Davis.

Hasil penelitian menunjukkan bahwa total beban struktur *conveyor belt* sebesar 66 ton dengan beban desain ultimit sebesar 93 ton. Beban yang bekerja pada tiap support *conveyor* sebesar 50 kN. Berdasarkan data tanah borehole S-173, kondisi tanah di lokasi penelitian didominasi oleh pasir medium dense hingga dense dengan nilai N-SPT berkisar antara 9–22. Pondasi *bored pile* yang digunakan memiliki diameter 300 mm dan kedalaman 8 meter. Hasil perhitungan menggunakan metode Meyerhof menunjukkan bahwa kapasitas daya dukung ujung tiang sebesar 56,6 kN dan kapasitas daya dukung selimut sebesar 135,7 kN sehingga diperoleh kapasitas ultimit pondasi sebesar 192,3 kN. Dengan faktor keamanan sebesar 3, diperoleh kapasitas daya dukung izin sebesar 64,1 kN. Nilai tersebut lebih besar dibandingkan beban yang bekerja sehingga pondasi *bored pile* dinyatakan aman terhadap beban struktur *conveyor belt*. Hasil analisis penurunan menunjukkan nilai *settlement* total sebesar 0,545 mm yang terdiri dari penurunan elastis batang tiang (S1) = 0,241 mm, penurunan ujung tiang (S2) = 0,262 mm, dan penurunan akibat beban selimut (S3) = 0,042 mm. Nilai tersebut masih berada jauh di bawah batas penurunan izin 10 mm.

Berdasarkan hasil analisis dapat disimpulkan bahwa pondasi *bored pile* diameter 300 mm dengan kedalaman 8 meter memenuhi persyaratan keamanan dan layak digunakan pada struktur *conveyor belt* batubara.

UNIVERSITAS
GADJAH MADA
PERANCANGAN PONDASI BORED PILE UNTUK STRUKTUR CONVEYOR BELT BATU BARA
Danar Pramudya Surya Nugraha, Dr. Eng, Ir. Fikri Faris, S.T., M,Eng., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Kata kunci: *bored pile*, *conveyor belt*, daya dukung pondasi, Meyerhof, *settlement*, PLTU.

UNIVERSITAS
GADJAH MADA
PERANCANGAN PONDASI BORED PILE UNTUK STRUKTUR CONVEYOR BELT BATU BARA
Danar Pramudya Surya Nugraha, Dr. Eng, Ir. Fikri Faris, S.T., M,Eng., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

ABSTRACT

This study aims to evaluate the calculation of *bored pile* foundations subjected to the structural load of a coal *conveyor belt* system. The *conveyor belt* is an essential infrastructure component in the coal distribution system of the power plant, operating continuously and requiring a foundation capable of safely and stably supporting structural loads. *Bored pile* foundations were selected because they are suitable for soft to medium soil conditions, provide high bearing capacity, and generate minimal vibration during construction.

The research method used in this study is a quantitative approach based on geotechnical analysis using Standard Penetration Test (SPT) data, *conveyor belt* structural data, and the Meyerhof method for *bored pile* bearing capacity calculations. The analysis includes the calculation of *conveyor belt* loads, end bearing capacity (Qp), skin friction capacity (Qs), ultimate bearing capacity (Qu), allowable bearing capacity (Qa), and *settlement* analysis using the Poulos and Davis approach.

The results show that the total structural load of the *conveyor belt* is 66 tons, with an ultimate design load of 93 tons. The load acting on each *conveyor* support is 50 kN. Based on borehole S-173 soil data, the soil condition at the study site is dominated by medium dense to dense sand with SPT values ranging from 9 to 22. The *bored pile* foundation used has a diameter of 300 mm and a depth of 8 meters. The Meyerhof calculation results indicate that the end bearing capacity is 56.6 kN and the skin friction capacity is 135.7 kN, resulting in an ultimate bearing capacity of 192.3 kN. By applying a safety factor of 3, the allowable bearing capacity obtained is 64.1 kN. This value is greater than the working load, indicating that the *bored pile* foundation is safe against the *conveyor belt* structural load. *Settlement* analysis results show a *settlement* value of 0.545 mm, consisting of pile shaft elastic settlement (S1) = 0.241 mm, pile tip settlement (S2) = 0.262 mm, and skin friction-induced settlement (S3) = 0.042 mm. This value remains well below the allowable *settlement* limit of 10 mm.

Based on the analysis results, it can be concluded that the 300 mm diameter *bored pile* foundation with an 8-meter depth satisfies the safety requirements and is suitable for use in the coal *conveyor belt* structure.

Keywords: *bored pile*, *conveyor belt*, bearing capacity, Meyerhof, *settlement*, steam power plant.