

## EVALUASI KINERJA DAN PERBAIKAN STRUKTUR BETON

### GEDUNG PENDINGIN AIR (*COOLING WATER TOWER*)

Studi Kasus Struktur Pendingin Air PT. Kaltim Parna Industri,  
Bontang, Kalimantan Timur

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#### INTISARI

Struktur bangunan pada umumnya direncanakan dapat berfungsi selama masa layan tertentu. Namun selama masa layannya, bangunan rentan terhadap kerusakan akibat beberapa hal. Struktur bangunan ini mengalami degradasi material akibat serangan korosi pada baja tulangan beton. Setiap kerusakan diusahakan dapat dideteksi dan ditangani sedini mungkin, agar tidak menimbulkan kerusakan yang semakin besar yang dapat memicu dan memperparah kerusakan bangunan tersebut. Penelitian dilakukan dalam rangka evaluasi kinerja struktur pendingin air PT. Kaltim Parna Industri yang terletak di tepi pantai Tanjung Harapan, Bontang, Kalimantan Timur.

Dalam penelitian ini dilakukan pemeriksaan secara visual dan pengujian mutu beton di lapangan dengan alat *Schmidt hammer* dan UPV. Evaluasi kinerja struktur, kekuatan kolom, balok serta pelat mengacu pada SNI-2847-2002, dengan penerapan beban gempa berdasarkan SNI-1726-2002, serta memberikan usulan perbaikan dan perkuatan struktur yang diperlukan. SAP 2000 digunakan untuk analisis struktur guna mendapatkan nilai kuat perlu ( $R_u$ ). Beton 2000 digunakan untuk analisis struktur kondisi *existing* guna mendapatkan kuat rencana ( $R_n$ ). Komponen struktur dikatakan aman jika kuat rencana lebih besar atau sama dengan kuat rencana atau  $(\phi \cdot R_n) \geq R_u$ . Perbaikan elemen struktur dilakukan dengan metode *coating* dan injeksi.

Hasil pengujian bahan didapat kuat tekan rerata beton ( $f_c'$ ) *existing* struktur pendingin air sebesar 27,28 MPa. Hasil analisis struktur gedung *existing* adalah semua komponen struktur gedung aman, baik terhadap kekuatan maupun kekakuan. Hasil evaluasi kinerja struktur didapatkan kinerja batas layan dan kinerja batas ultimit gedung memenuhi syarat SNI-1726-2002. Untuk menghindari kerusakan yang semakin parah direkomendasikan bahwa struktur pendingin air PT. Kaltim Parna Industri perlu perbaikan dengan penutupan lapisan kedap air dengan cara *coating* dan *epoxy injection* pada struktur beton yang mengalami retak-retak. Proteksi Katodik juga diperlukan untuk mencegah terjadinya korosi baja tulangan.

Kata kunci : degradasi material, evaluasi kinerja struktur, metode perbaikan

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## **ABSTRACT**

*The buildings are built as the public during certain life time. But during his maid, buildings vulnerable to damage caused by several things. The building material degrad due to corrosion attack on steel reinforcing bars. Any attempted damage can be detected and treated as early as possible, so as not to cause greater damage that can trigger and exacerbate damage to the building. The research was conducted to evaluate of the performance of water cooling structure PT. Kaltim Parna industries located on the waterfront Tanjung Harapan, East Kalimantan.*

*In this research, visual inspection and quality testing concrete in the field by using a Schmidt hammer and UPV. The evaluation are the performance of the structure, strength columns, beams and plates refer to SNI-2847-2002, with the implementation of earthquake loads based on SNI-1726-2002, and propose improvements and retrofitting necessary structures. SAP2000 is used for structural analysis necessary to obtain strong value ( $R_w$ ). Beton2000 is used for structural analysis of existing conditions in order to get stronger provided ( $R_n$ ). The structure components are categorized as safe condition if its design strength is greater or equal than required strength or  $(\phi \cdot R_n) \geq R_u$ . Improvements made to the structural element coating and injection methods.*

*Test results obtained materials mean concrete compressive strength ( $f_c'$ ) existing water cooling structure of 27.28 MPa. The results of analysis of the existing building structure were all components of the building structure are safe, both for strength and stiffness. Structural performance evaluation results obtained performance limits and performance limits ultimit intellectually qualified building SNI-1726-2002. To avoid more severe damage recommended that the structure of water cooling PT. Kaltim Parna industry needs to repair the closing of the waterproof coating and epoxy coating by injection in concrete structures suffered cracks. Cathodic protection is also needed to prevent corrosion of the steel reinforcement.*

**Keywords :** *degradation of the material, structural performance evaluation, improvement*