

## ABSTRAK

Proses Major Overhaul pada Pembangkit Listrik Tenaga Air (PLTA) Cirata merupakan kegiatan pemeliharaan berkala yang dilakukan setiap 40.000 jam operasi untuk menjaga keandalan dan kinerja pembangkit. Salah satu lintasan kritis dalam Major Overhaul adalah proses pembongkaran dan pemasangan upper wearing ring pada turbin, yang selama ini masih menggunakan metode konvensional. Metode tersebut membutuhkan waktu relatif lama, melibatkan banyak personel, serta memiliki risiko kerusakan komponen dan kecelakaan kerja. Berdasarkan permasalahan tersebut, dilakukan studi dan pengembangan inovasi berupa spooring, yaitu special tools yang dirancang untuk mendukung proses pembongkaran dan pemasangan upper wearing ring secara lebih efektif dan presisi. Metodologi yang digunakan meliputi observasi lapangan selama kegiatan magang industri di PT PLN Nusantara Power UP Cirata, analisis permasalahan menggunakan pendekatan RCPS, perancangan alat berdasarkan kebutuhan beban kerja, serta evaluasi manfaat teknis dan ekonomis. Hasil kajian menunjukkan bahwa penggunaan spooring mampu mempercepat durasi pekerjaan hingga dua hari, mengurangi jumlah tenaga kerja, menurunkan risiko kerusakan komponen, serta meningkatkan aspek keselamatan kerja. Selain itu, inovasi ini memberikan manfaat finansial berupa penghematan biaya pemeliharaan dan potensi peningkatan Equivalent Availability Factor (EAF) pembangkit. Dengan demikian, spooring berpotensi menjadi solusi aplikatif dan berkelanjutan untuk mendukung efisiensi Major Overhaul PLTA Cirata.

**Kata kunci:** Major Overhaul, PLTA Cirata, Spooring, Special Tools, Upper Wearing Ring, Efisiensi Pemeliharaan.

## ABSTRAK

The Major Overhaul process at the Cirata Hydroelectric Power Plant (HEPP) is a periodic maintenance activity carried out every 40,000 operating hours to maintain the reliability and performance of the power plant. One of the critical paths in the Major Overhaul is the dismantling and installation process of the upper wearing ring on the turbine, which has traditionally been performed using conventional methods. These methods require relatively long working time, involve a large number of personnel, and pose risks of component damage and occupational accidents. Based on these issues, a study and development of an innovative solution in the form of sporing, a specially designed tool, was conducted to support a more effective and precise dismantling and installation process of the upper wearing ring. The methodology applied includes field observations during an industrial internship at PT PLN Nusantara Power UP Cirata, problem analysis using the RCPS approach, tool design based on workload and mechanical requirements, and evaluation of technical and economic benefits. The results indicate that the use of sporing is able to shorten the working duration by up to two days, reduce manpower requirements, minimize the risk of component damage, and improve occupational safety. Furthermore, this innovation provides financial benefits in the form of maintenance cost savings and potential improvement in the plant's Equivalent Availability Factor (EAF). Therefore, sporing has the potential to serve as an applicable and sustainable solution to enhance the efficiency of the Major Overhaul process at Cirata HEPP.

**Keywords:** Major Overhaul, Cirata Hydroelectric Power Plant, Sporing, Special Tools, Upper Wearing Ring, Maintenance Efficiency.