

PERENCANAAN ULANG PEMELIHARAAN MESIN *PRESS* 300/400T DENGAN METODE *RELIABILITY CENTERED MAINTENANCE II* (RCM II) DAN *FUZZY FAILURE MODE, EFFECTS, AND CRITICALITY ANALYSIS* (*Fuzzy-FMECA*)

(Studi Kasus: PT. Panasonic Manufacturing Indonesia)

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ABSTRAK

Mesin *press* 300/400T merupakan salah satu mesin yang memiliki peran penting dalam proses produksi di PT. Panasonic Manufacturing Indonesia. Namun, tingginya frekuensi *breakdown*, terutama pada kategori *Tooling/Die Failure*, menyebabkan *downtime* yang cukup besar dan berdampak pada rendahnya *availability* mesin. Penelitian ini bertujuan untuk merancang ulang strategi pemeliharaan mesin *press* 300/400T dengan mengintegrasikan metode *Fuzzy Failure Mode, Effects, and Criticality Analysis* (*Fuzzy-FMECA*) dan *Reliability Centered Maintenance II* (RCM II). *Fuzzy-FMECA* digunakan untuk menentukan prioritas risiko berdasarkan parameter *severity*, *occurrence*, dan *detectability*, sedangkan RCM II digunakan untuk menentukan tindakan pemeliharaan yang sesuai. Analisis keandalan selanjutnya dilakukan untuk menentukan interval *preventive maintenance*, kemudian dievaluasi melalui pendekatan *Reliability-Availability-Maintainability* (RAM) dan analisis biaya. Hasil *Fuzzy-FMECA* tahap pertama menunjukkan bahwa *dies* REG-TP-4 menjadi *dies* paling kritis dengan nilai FRPN sebesar 512,38. Analisis lebih lanjut terhadap komponen penyusunnya menunjukkan bahwa *Punch* memiliki prioritas risiko tertinggi dengan FRPN sebesar 550. Berdasarkan RCM II, delapan komponen direkomendasikan menggunakan *Scheduled On-Condition Task* dan enam komponen menggunakan *Scheduled Restoration Task*. Interval *preventive maintenance* ditetapkan setiap 23,26 jam operasi atau sekitar satu hari kerja. Strategi yang diusulkan menghasilkan *availability* teoritis *dies* sebesar 99,5% dan diproyeksikan meningkatkan *availability* mesin dari 77,68% menjadi 93,53%. Dari sisi biaya, *preventive maintenance* untuk komponen *scheduled restoration* menghasilkan biaya sekitar 47% lebih rendah dibandingkan *corrective maintenance*. Hasil penelitian menunjukkan bahwa integrasi *Fuzzy-FMECA* dan RCM II dapat memberikan dasar pemeliharaan yang lebih terstruktur, berbasis risiko dan keandalan, sekaligus lebih efisien secara ekonomi.

Kata Kunci: RCM II, *Fuzzy-FMECA*, *Reliability*, *Availability*, dan *Preventive Maintenance*.

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ABSTRACT

The 300/400T press machine plays an important role in the production process at PT. Panasonic Manufacturing Indonesia. However, frequent breakdowns, particularly those related to Tooling/Die Failure, have resulted in considerable downtime and reduced machine availability. This study aims to redesign the maintenance strategy for the 300/400T press machine by integrating Fuzzy Failure Mode, Effects, and Criticality Analysis (Fuzzy-FMECA) with Reliability Centered Maintenance II (RCM II). Fuzzy-FMECA was applied to prioritize failure risks based on severity, occurrence, and detectability, while RCM II was used to determine appropriate maintenance actions. Reliability analysis was then conducted to establish the preventive maintenance interval, followed by an evaluation using the Reliability-Availability-Maintainability (RAM) approach and maintenance cost analysis. The first-stage Fuzzy-FMECA identified REG-TP-4 as the most critical die, with an FRPN value of 512.38. Further analysis of its components showed that the Punch had the highest risk priority, with an FRPN value of 550. Based on the RCM II analysis, eight components were assigned Scheduled On-Condition Tasks, while six components were assigned Scheduled Restoration Tasks. The proposed preventive maintenance interval was determined to be every 23.26 operating hours, equivalent to approximately one working day. The proposed strategy resulted in a theoretical die availability of 99.5% and was projected to increase overall machine availability from 77.68% to 93.53%. From an economic perspective, preventive maintenance for components categorized under Scheduled Restoration Tasks was approximately 47% less costly than corrective maintenance. These findings indicate that integrating Fuzzy-FMECA and RCM II provides a more structured maintenance strategy based on risk and reliability while offering better economic efficiency.

Keywords: RCM II, Fuzzy-FMECA, Reliability, Availability, dan Preventive Maintenance.