INTISARI

ANALISIS PENINGKATAN EFISIENSI PRODUKSI KUDA-KUDA BESI DENGAN PENDEKATAN LEAN MANUFACTURING DAN VALUE STREAM MAPPING (VSM) PADA BENGKEL LAS TAKA JAYA

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Penelitian ini dilakukan di Bengkel Taka Jaya untuk mengoptimalkan lini produksi konstruksi kuda-kuda besi yang terindikasi memiliki efisiensi rendah. Tahapan penelitian dimulai dengan pemetaan aktivitas menggunakan *Activity Mapping* untuk mengklasifikasikan aktivitas *Value Added* (VA), *Non-Value Added* (NVA), dan *Necessary Non-Value Added* (NNVA). Pengukuran waktu kerja dilakukan melalui *Time Study* secara mendalam pada tiga stasiun kerja utama, yaitu stasiun pemotongan, perakitan, dan pengelasan. Pemetaan kondisi awal dituangkan dalam *Current State Map* yang menunjukkan nilai *Process Cycle Efficiency* (PCE) sebesar 64,63% dengan total *lead time* produksi sebesar 644,93 menit..

Identifikasi akar masalah dilakukan dengan metode *5 Whys Analysis* dan prinsip Ekonomi Gerakan. Hasil analisis menunjukkan adanya pemborosan dominan berupa *waste of motion*, *waiting*, dan *defect* akibat tata letak alat yang tidak terorganisir serta metode kerja manual yang belum terstandarisasi. Berdasarkan temuan tersebut, dilakukan analisis perbaikan menggunakan teknik ECRS (*Eliminate, Combine, Rearrange, Simplify*). Langkah perbaikan meliputi penataan ulang (*Rearrange*) alur material antar stasiun kerja guna meminimalkan *material handling*, serta pengusulan alat bantu produksi berupa penggunaan Klem C dan penyediaan rak alat modular di setiap stasiun kerja guna memastikan posisi peralatan berada dalam jangkauan optimal operator.

Penelitian ini juga merumuskan *Standard Work* berupa Standar Operasional Prosedur (SOP) pada setiap stasiun fabrikasi guna menjamin konsistensi proses. Hasil perancangan kondisi mendatang yang dituangkan dalam *Future State Map* menunjukkan peningkatan efisiensi yang signifikan. Perbandingan performansi menunjukkan kenaikan nilai PCE menjadi 86,63% dan reduksi total waktu produksi sebesar 163,83 menit dari kondisi awal. Implementasi usulan ini membuktikan bahwa integrasi metode *Lean Manufacturing* dan Ekonomi Gerakan mampu meningkatkan produktivitas serta standarisasi kerja pada industri manufaktur skala kecil.

Kata Kunci: *Lean Manufacturing, Value Stream Mapping, Time Study,* Ekonomi Gerakan*, ECRS, SOP.*

ABSTRACT

ANALYSIS OF PRODUCTION EFFICIENCY IMPROVEMENT FOR STEEL ROOF TRUSSES USING LEAN MANUFACTURING AND VALUE STREAM MAPPING (VSM) APPROACH AT TAKA JAYA WELDING WORKSHOP

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This research was conducted at Taka Jaya Workshop to optimize the production line of steel roof trusses, which indicated low efficiency. The research stages began with activity mapping to classify activities into Value Added (VA), Non-Value Added (NVA), and Necessary Non-Value Added (NNVA). Work time measurements were performed through an in-depth Time Study at three main workstations: cutting, assembly, and welding. The initial mapping was documented in a Current State Map, which revealed a Process Cycle Efficiency (PCE) of 64.63% with a total production lead time of 644.93 minutes.

The root cause identification was carried out using the 5 Whys Analysis method and Motion Economy principles. The analysis results showed dominant wastes in the form of motion, waiting, and defects caused by unorganized tool layouts and non-standardized manual work methods. Based on these findings, improvement analysis was conducted using the ECRS (Eliminate, Combine, Rearrange, Simplify) technique. Improvement steps included rearranging the material flow between workstations to minimize material handling, as well as proposing production aids such as the use of C-Clamps and the provision of modular tool racks at each workstation to ensure equipment is within the operator's optimal reach.

This study also formulated Standard Work in the form of Standard Operating Procedures (SOP) for each fabrication station to ensure process consistency. The future state design, documented in the Future State Map, showed a significant increase in efficiency. Performance comparison indicated an increase in the PCE value to 86.63% and a total production time reduction of 163.83 minutes from the initial condition. The implementation of these proposals proves that the integration of Lean Manufacturing and Motion Economy methods can enhance productivity and work standardization in small-scale manufacturing industries.

Keywords: *Lean Manufacturing, Value Stream Mapping, Time Study, Motion Economy, ECRS, SOP.*