RINGKASAN

Pungky Permadi. Jurusan Teknik Industri. Fakultas Teknik Universitas Brawijaya. Mei 2015. Perancangan Ulang Tata Letak Fasilitas Dengan Menggunakan Algoritma CRAFT Guna Mengurangi Jarak *Material Handling*. (Studi Kasus PT Pelangi Indokarya, Surabaya). Dosen Pembimbing: Nasir Widha Setyanto dan Ceria Farela Mada Tantrika.

Persaingan antar perusahaan yang bergerak di bidang *Engineering, Procurement and Constructions* (EPC) semakin ketat. Salah satu perusahaan tersebut adalah PT Pelangi Indokarya. PT Pelangi Indokarya merupakan salah satu perusahaan yang bergerak dibidang konstruksi baja. Produk yang tiap tahun selalu dibuat oleh PT Pelangi Indokarya adalah *pipe rack*. Dalam proses pembuatan *pipe rack* terjadi pemborosan jarak perpindahan dikarenakan *workshop* yang terpisah sejauh 4 km. hal tersebut mengakibatkan pemborosan dalam hal waktu dan juga total jarak perpindahan. PT Pelangi Indokarya mempunyai rencana untuk memindahkan mesin dari *workshop* 1 ke *workshop* 2 sesuai dengan rencana yang telah dibuat, namun masih ragu dalam implementasinya.

Pada penelitian ini dilakukan perancangan ulang tata letak fasilitas pada *workshop* 2 PT Pelangi Indokarya. Sebelum dilakukan perbaikan tata letak, terlebih dahulu diadakan evaluasi terhadap *initial layout* yang telah dimiliki perusahaan. *Initial layout* yang dimaksud yaitu *layout* rencana (*planning layout*) setelah dilakukan pemindahan mesin pada *workshop* 1 ke *workshop* 2. Hasil dari evaluasi *planning layout* selanjutnya akan dibandingkan dengan tiap alternatif *layout* hasil pengolahan tata letak dengan menggunakan algoritma CRAFT.

Setelah dilakukan pengolahan dengan menggunakan algoritma CRAFT dengan bantuan Winqsb, dapat diketahui bahwa jarak perpindahan pada *initial layout* adalah 7464,32 cm pada ukuran skala atau 22392,96 m pada ukuran sebenarnya. Metode CRAFT dengan menggunakan *software* Winqsb memberikan 4 alternatif *layout* yaitu dengan *improve by exchanging 2 departments*, *improve by exchanging 3* departments, *improve by exchanging 2 then 3 departments*,dan *improve by exchanging 3 then 2 departments*. *Layout* terpilih adalah *layout* yang memberikan pengurangan total jarak perpindahan tertinggi atau yang memberikan total jarak perpindahan paling rendah. *Layout* yang memberikan total jarak perpindahan terkecil dan mempunyai prosentase pengurangan jarak tertinggi adalah *layout* alternatif keempat, yaitu *improve by exchanging 3 then 2 departments*. *Layout* dari hasil *improve by exchanging 3 then 2 departments* sesuai skala yang dibuat memberikan total jarak perpindahan sebesar 4720.38 cm atau 14161.14 m pada jarak sesungguhnya , berkurang sebesar 2753.94 cm atau 8261.82 m pada jarak sesungguhnya, dengan prosentase pengurangan jarak sebesar 36.894%. Dengan menggunakan alternatif *layout* terpilih, total jarak perpindahan *forward* adalah sebesar 9273,50 m, berkurang sebesar 4092,45 m atau 30,61%. Sedangkan total jarak perpindahan *backward* adalah sebesar 3688,86 m, berkurang sebesar 8007,56 m atau 68,46%. Adapun perbandingan total jarak perpindahan *forward* dan *backward* adalah sebesar 71,5 : 28,5.

Kata Kunci: CRAFT, *layout*, total jarak perpindahan, *material handling*, *forward*, *bacward*, *pipe rack*.

SUMMARY

Pungky Permadi, Department of Industrial Engineering, Engineering Faculty, Universitas Brawijaya, 2015, Facilities and Layout Redesign by Using CRAFT Algorithm to Decrease Material Handling Distance (Case Study: PT Pelangi Indokarya, Surabaya), Supervisor: Nasir Widha Setyanto and Ceria Farela Mada Tantrika.

Competition between companies which operates in the field of Engineering, Procurement and Constructions (EPC) are increasingly tighter. One of these companies is PT Pelangi Indokarya. PT Pelangi Indokarya is a company which specialized in steel construction. Pipe rack is a product that was annually produced by PT Pelangi Indokarya. Wasteful expenditure is experienced within pipe rack production due to excessive travelling distance of workshops as far as 4 km. This had resulted in unnecessary usage of time, and total travelling distance. PT Pelangi Indokarya planned to move machines from workshop 1 to workshop 2, however they are uncertain about the implementation.

In this research, redesign of facilities and layout within workshop 2 of PT Pelangi Indokarya were done. Before improvement of layout were done, the initial layout needed to be evaluated first. The initial layout is the planning layout which owned by companies after machine movement from workshop 1 to workshop 2. The result of planned layout evaluation was then compared with every type of alternative layout generated by using CRAFT algorithm.

After calculations were done, travelling distance of initial layout was identified at 7464.32 cm (scaled measurement) or 22392.96 (actual measurement). CRAFT method using Winqsb software had generated 4 alternative layouts which were improve by exchanging 2 departments, improve by exchanging 3 departments, improve by exchanging 2 then 3 departments, and improve by exchanging 3 then 2 departments. The results of total moving distance of these four alternative layouts were then compared to the existing layout. The selected layout were the one which yielded the highest decrease in total travelling distance or the one which yielded the least total travelling distance. Layout which yielded the least total travelling distance with the highest decrease in total travelling distance percentage was the fourth layout, which were improve by exchanging 3 then 2 departments. Layout generated from improve by exchanging 3 then 2 departments resulted in total travelling distance of 4720.38 (scaled measurement) or 14161.14 m (actual measurement), decreased at 2753.94 (scaled measurement) or 8261.82 m (actual measurement), with decreased distance percentage at 36.894%. With the selected alternative layout, total forward distance was 9273.50 m, decreased as much as 4092.45 m or 30.61%. Total backward distance was 3688.86 m, decreased as much as 8007.56 m or 68.46%. Based on that, the ratio of total forward distance and backward distance was 71.5 : 28.5.

Keywords: CRAFT, layout, total travelling distance, material handling, forward, bacward, pipe rack.