

Optimasi penjadwalan produksi kemasan kayu dengan sistem job shop melalui penerapan algoritma differential evolution

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Abstrak

Besarnya kebutuhan akan kemasan kayu dalam kegiatan perdagangan menuntut produsen kemasan kayu untuk mengembangkan sistem penjadwalan produksi yang optimal agar dapat memenuhi permintaan pasar. Penelitian ini membahas optimasi penjadwalan produksi kemasan kayu, khususnya pallet, dengan system job shop melalui penerapan algoritma Differential Evolution. Prinsip algoritma DE sesuai dengan analogi evolusi biologi yang terdiri dari proses inialisasi populasi, proses mutasi, proses pindah silang, dan proses seleksi. Tujuan dari penelitian ini adalah untuk meminimumkan total biaya (dalam satuan waktu) yang timbul sebagai akibat dari keterlambatan dalam proses produksi kemasan kayu, khususnya pallet yang dipergunakan untuk mengemas barang-barang ekspor.

Penelitian dilakukan melalui studi kasus dengan mengamati proses produksi pallet pada suatu produsen pallet. Hasil dari penelitian ini adalah diperolehnya usulan penjadwalan produksi dengan penurunan total biaya keterlambatan sebesar 25,22%, (dari 23590 menit menjadi 17640 menit) serta penurunan pada kriteria lainnya seperti jumlah pesanan yang terlambat, total waktu keterlambatan, dan waktu penyelesaian. Simulasi penambahan kapasitas menunjukkan bahwa penambahan jumlah mesin pada stasiun serut dan potong dapat menghilangkan keterlambatan dan meningkatkan output hingga 95%.

.....The ever increasing need of wooden packaging , whether for international as well as inter-islands transportation of traded goods, has required the producers of wooden packaging to develop an optimized production scheduling system to fulfill the market demand. This research studies the optimization of the job shop production scheduling system of wooden packaging, particularly pallet, through the application of the Differential Evolution (DE) algorithm. The principles of the DE algorithm is in line with the biological evolution analogy which consists of the initialization of population, mutation, crossover, and selection processes. The DE algorithm has some excellent features namely the concept is simple, easy to apply, quick in producing solutions, and robust. The objektif of this research is to minimize the total cost (in time unit) resulting from the delay in the production process of wooden packaging, particularly pallet.

This research is a case-study which is carried-out by observing pallet production process at a wooden packaging manufacturer. The company produces wood packaging, mainly pallet, which are used for the packaging of exported goods. This research leads to a recommendation on the wooden packaging production schedule with more efficient cost. The total cost resulting from the delay in the production is reduced by 25,22% (from 23590 minutes to 17640 minutes). There are also reductions in the total of tardy job, total of tardiness, and makespan. A simulation of work station capacity upgrade also shows that the addition of the number of machineries in planing and sawing station will eliminate delay and increase output up to 95%.