# Abstract

PSO (Particle Swarm Optimization) algorithm which is based on the behavior of a group of birds in search of food that is widely used to solve various optimization problems. A new approximated algorithm is proposed to solve the optimization problem to find minimum value of makespan in job-shop scheduling problems. This algorithm is based on the development of basic PSO algorithm combined with local search algorithms, namely SA (Simulated Annealing). SA is expected to help the PSO particles to avoid being trapped in a local minimum value, because SA has a certain probability to avoid the trap of local minimum values and SA also has control over the search process through the Cooling Schedule. Both methods are combined algorithm named HPSO (Hybrid PSO).

**Keywords** : Hybrid optimization · Job-shop scheduling · Particle swarm optimization · Simulated annealing