Mathematics and time

Science, Mathematics

Calculation of Labour Utilization

Time used by assistant supervisors for production process = 100% -10% = 90% Therefore, the total available labour = 18 + 0. 9*4 = 21. 6 Maximum labour hours/ month = No. of days*labour hrs available/day*total available labour = 20*8*21. 6 = 3456 hrs Actual labour hours used = 1531. 7 hrs Capacity Utilization = Actual labour hours used/ Maximum labour hours available = (1531. 7/3456) * 100 = 44. 32% This figure does not include the time taken by labour to rework on the parts rejected or returned by the customer. Hence, the actual labour utilization would be more than the above-calculated figure. However, we believe that the above time signifies the actual time spent by labor in producing or working on new parts.

Profile operation (Fabrication) - Break-even analysis: Let the optimal order size be N boards

- a) Using Punch Press: Total Operating Time = Setup time + Cycle Time*N = 50 + 1*N = 50 + N
- b) Using CNC router: Operating Time = Setup time + Cycle time*N = 150 + 0. 5*N= 150 + 0. 5N We would use the CNC router when its operating time is less than that of the punch press. i. e. 150 + 0. *N ? 50 + N => 0. 5*N ? 100 => N ? 200 => N ? 200 boards Thus, for orders above 200 boards, the CNC router should be used as it will take less time and hence, would produce more number of boards.

Drilling Operation (Image Transfer) – Break Even Analysis Let the optimal order size be N boards

- a) Using Manual drill: Total Operation Time = Setup time + Run time = 15 + 0. 08*500*N = 15 + 40N
- b) Using CNC drill: Total Operation Time = Setup time + Run time = 240 + 0. 004*500*N = 240 + 2*N We would use the CNC drill when its operating time is less than that of the punch press. 240 + 2*N ? 15 + 40*N => 38*N ? 225 => N ? 5. 92 => N ? 6 boards

Therefore, for orders with size above 6 boards or more, CNC drill should be used as it will take less processing time and hence would increase the capacity. In addition to this, we can also calculate capacity utilization using the available run time. Thus the maximum number of boards that can be produced is limited by the capacity of drilling(which is 6359) inclusive of CNC as well as manual drilling.