

SUMMARY

The facility layout relates to the arrangement and placement of equipment, departments, machines, and workstations. A good plant layout can effectively improve the performance of the production line, maximize productivity, and reduce costs. In this thesis, the aim was to study the importance of layout planning in the bottle filling production industry and model and simulate a virtual production line, then analyze how the layout has impacted the performance of the virtual production. The evaluation of the layout in section 4.3 showed that the six principles of facility layout studied in the sub-section 2.2.3 were achieved. The modelled layout boasts the principle of integration and flexibility, minimum distance and material handling, cubic space utilization, safety and satisfaction, flow, and expansion. There are different types of layouts as studied in subsection 2.2.1 however, the type of layout used in this modelling is product layout. Product layout helps to produce an efficiently high volume of goods otherwise known as mass production by placing the equipment and machines like an assembly line.

Equipment utilization analysis conducted in section 5.1 showed that two of the three selected equipment were utilized within 2 to 3 minutes of production, thereby minimizing idle time. The principle of minimum distance implemented in the model enabled to achieve low idle times. The bottle crowner machine maintained an average of 75 per cent idle time for the whole production time. This high idle time was not caused by minimum distance but rather, due to the operating principle of the selected machine in the simulation software. Analysis carried out in section 5.2 showed that inventories were properly managed. The number of bottles received after 2 hours of simulation was 4080 pieces and the number of bottles packaged within the same period was 3930 pieces, and by dividing 4080 by 3930 and multiplying by 100%, it showed that more than 96% of received bottles were packaged. Less than 1 per cent were rejected due to defects in crowning and more than 2.7% of bottles were still on the line. All the equipment has an identical production rate of 34 bottles per minute in a 2-hour simulation time which showed that there were no delays in the production line and products moved downstream. This is in line with the principle of flow which states that products should move forward to prevent backtracking and unnecessary delays.