CASE STUDY

# SIMULATION OF A BIOSCIENCES MANUFACTURING UNIT

## PROJECT SUMMARY

In the field of Bioscience Manufacturing, the back-end manufacturing process involves production and treatment of electronic chips required for DNA sequencing. The client wished to analyze process bottlenecks while arriving at the optimal capacity to meet demand, as well as observe effects of production on daily capacity by experimenting with different yield rates. Target production of 55,000 chips per month was achieved.

## SYSTEM DESCRIPTION

This back-end manufacturing process involves performing various activities on SMRT cells. These SMRT cells (chips) are grouped into a set of 8 cells (strips). A set of 22 strips forms 1 wafer. The wafer is taken through the QC processes and is then broken down into chips for activities like UV treatment. They are then bundled as strips for other processes such as laser trimming and leak testing before finally being packed for dispatch. The simulation modeled all the equipment as per the process sequence.

## OPPORTUNITY

The first task was to identify bottlenecks in the process. Next, we sought to determine the existing capacity per day in terms of strips, chips and wafers. This also involved experimenting on variables such as (among others) reduced processing time, decreased direct labor, or increased yield to see the effect on throughput. These experiments would also help in quarterly production planning to meet the whole year's demand.

## APPROACH

Overall objective of this project was to model the process flow and carry out preliminary bottleneck/ capacity analysis.

## SOLUTION

The simulation model was designed according to the process sequence under decided variables, such as given processing time, yield rates and batch sizes to evaluate system throughput under different scenarios. The following recommendations were offered:

- The equipment Bagger was the bottleneck in the process. It was handling the product at multiple stages in the process. An alternative equipment could bring down the congestion
- Changing yield rates could have a significant effect on the throughput of the process. The model was handed over for what-if experimentation.

## BENEFIT

Based on these recommendations and implemented changes, the facility was better utilized to produce the targeted production rate of 55,000 chips per month.

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