



INDUSTRIAL VISIT TO BIOCON SDN BHD

Applications of Biotechnology and Information Systems



INTRODUCTION



December 23, 2025

The industry visit to Biocon Sdn Bhd in Gelang Patah, Johor provided valuable exposure to real-world biotechnology operations and industrial practices. Students of Computer Science of Bioinformatics and Data Security from Faculty of Computing learned how biotechnology processes are integrated with computing systems by understand data analysis, automation, and computing systems work in supporting biopharmaceutical production and quality control. This visit also allowed students to appreciate the relevance of bioinformatics knowledge in industrial settings and future career pathways.

OBJECTIVES

The objective of this industrial visit is:

- to provide students a direct exposure to integration of computing, biotech, and regulatory practices in industry.
- to explore the use of information systems, use in quality control, regulatory documentation.
- to enhance understanding of relationship computing and manufacturing system.
- to understand Research and Development (R&D) in discovery, formulation and improvement of Drug Substances (DS) and Drug Product (DP).



front desk

Biocon Sdn Bhd

Biocon Sdn Bhd is a biotechnology-based pharmaceutical company primarily involved in the manufacturing of insulin and other biopharmaceutical products. To serve the global demand for insulins, Biocon Biologics has created a Center of Excellence (CoE) for insulins in Malaysia with end-to-end capabilities for manufacturing human insulin and insulin analogs. The company focuses on applying advanced biotechnology processes to produce high-quality, affordable medicines that meet international standards. The Company has been working closely with the Ministry of Health, Malaysia (MoH) to meet the increasing needs of diabetes patients and reduce Malaysia's dependency on imported insulin. Since 2016, Biocon Biologics has supplied more than 87 million insulin cartridges to the MoH, helping nearly 300,000 diabetes patients across the country. Biocon Biologics is a leading global biosimilars company with world-class 'lab to market' capabilities across development, manufacturing, and marketing, and it became the world's first company to receive U.S. Food and Drug Administration for its biosimilar Insulin Glargine in 2021.

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Observations & Technical Insights

Biotechnology Operations Observed

The DP process initiates the fermentation and crystallization to generate solid particles of powder. It was then bottled and visually inspected for quality. Last step will be the packaging. It involves Pen Assembly and Pen Packaging. All items are being handled with safety strictly.

Then, during the visit to Biocon's R&D facility, we observed key upstream and downstream bioprocessing activities. Upstream processes included cell culture and fermentation, where yeast cells are used to produce recombinant proteins and stored at -80 °C to maintain stability. Processes such as cell harvesting, centrifugation, and cell separation were carried out to prepare materials for purification. Downstream operations focused on insulin purification, including enzyme treatment and analytical testing to ensure product quality.

Overall, Biocon Malaysia works under Environment, Health, Safety & Sustainability(EHSS) framework. Their compliances with local & international regulations signify their determination in serving customer within an environment that does not neglect the needs of operational safety and environmental protection.

Role of Computing and Information Systems

Computer station at DP process allows computer assisted supervision. It handles data collection at various stage through sensors and database to ensure traceability. Machine monitoring and maintenance systems make certain that the operation is effective and safe.

Also, Computing systems play an important role in supporting R&D operations at Biocon. Laboratory instruments are connected to computer-based systems for real-time monitoring, data collection, and analysis. Experimental data, process parameters, and quality results are digitally recorded, enabling accurate documentation, validation, and regulatory compliance.

In DS they also prioritize the absolute use of computing as 90% of the regulation and process are computational works. The system used will ensure the batch production are top notch and ready for the next process. Since the operations are heavily rely on computing systems, it limited the needs of human labor. Thus reducing the possibilities of accidental defect that can damage the company for about USD300,00 per batch.



upstream region



downstream region



Lab-to-Market Translation

In DP process, it involves validation, testing and regulatory compliance to ensure product condition. It shows how laboratory research can be transformed into commercial medicines. A Detailed database can successfully ensure the experimental output become a DP such as insulin pens.

The visit demonstrated how laboratory research is transformed into commercial pharmaceutical products. Extensive testing, validation, and documentation ensure that products meet international quality and safety standards before large-scale manufacturing. This structured approach allows Biocon to move efficiently from research to production.

Integration of Computing, Networks, and Biology

It makes an efficient, reproducible and safe production of biopharmaceuticals across the DP process by ensuring smooth data flow between instruments, sensors and management systems. It can facilitate coordination across large-scale manufacturing.

Then, Biocon integrates biological processes with computing and automated systems to support efficient operations. Laboratory equipment communicates with software systems through internal networks, allowing smooth data flow, monitoring, and process control. This integration ensures consistency, traceability, and scalability in pharmaceutical manufacturing.

Lastly, large-scale manufacturer as Biocon would not compromise the failure in networking and data system flow. So, they will safeguard the core of their products quality and company reputation.

LEARNING OUTCOME

The industrial visit to Biocon provided comprehensive exposure to the end-to-end biopharmaceutical manufacturing process, covering Research & Development (R&D), Drug Substance (DS), and Drug Product (DP) facilities. We gained a deeper understanding of how biotechnology products progress from laboratory research to large-scale manufacturing and final drug formulation. The visit enhanced our knowledge of insulin production, purification, formulation, and quality assurance processes.

Through this visit, we observed the importance of strict safety protocols, cleanroom environments, and standard operating procedures (SOPs) across all facilities. We learned how advanced equipment, automation, and computer-based monitoring systems are used to control processes, collect data, and ensure product consistency. The visit also strengthened our soft skills, including professional communication, teamwork, and industry awareness, which are essential in a regulated industrial environment.



REFLECTION

The visit effectively linked our academic studies in Technology and Information Systems with real industrial applications. It demonstrated how computing systems, data analytics, and information management support biological processes in R&D, manufacturing, and quality control. This exposure broadened our perspective on career opportunities in biotechnology, pharmaceutical manufacturing, industrial automation, and data-driven healthcare industries.

CONCLUSION

Overall, the visit to Biocon was an insightful and educational experience that showcased the integration of biology, engineering, and information systems across different operational sites. Observing the complete workflow—from research to drug substance production and final drug product formulation—highlighted the complexity and precision required in the biopharmaceutical industry. Such industry visits play a vital role in preparing students for future technical and professional careers.



ACKNOWLEDGEMENT

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