



OPEN IIoT CASE STUDY: ENHANCING WAREHOUSE AUTOMATION WITH INNOVATIVE SYSTEM ARCHITECTURE AND AUTOMATION

While the ‘Smart Factory’ revolution is in full force, some manufacturers are still struggling to keep up with the latest technological advancements due to either time or cost constraints. As a result, they are left with outdated and inefficient systems in their plants that can hamper productivity and cause unplanned equipment breakdowns. Luckily the solution is often simpler – and more cost-effective than manufacturers might think.

This compelling case study delves into the journey of revamping a high-profile distribution centre nestled in North Rocks, Sydney that resulted from a collaboration between Open IIoT member Harry Mulder of Beckhoff Automation and Lucky Thommadura Managing Director of Layer Seven Automation.

With Harry’s background as a member of Open IIoT – a cohort of Australia’s most prominent automation brands advocating for increased Industry 4.0 adoption – Lucky knew that he would be the right partner in devising a solution for the unique challenge he was tasked with.

Plagued by an outdated system, the distribution centre faced a daunting challenge: how to enhance efficiency, flexibility, and connectivity while keeping costs in check. The answer lay in a cutting-edge solution, featuring Beckhoff’s advanced Industrial PC (IPC). The resulting innovative architecture not only overcame the hurdles but set new benchmarks for operational excellence, real-time data insights, and cost-effectiveness.

THE CHALLENGE

“The distribution centre was facing a challenge with their old Dexion system, consisting of 700m of conveyor line and 28 diverter stations. It had worked well for many years, but the controller boards started to fail one by one, and it became clear that it was reaching the end of its life. It was a propriety system and new parts were expensive, so we had to explore alternative solutions,” Lucky shares.



Layer Seven Automation found the ideal solution in Beckhoff’s C6920 IPC which linked to all the diverter stations, via an EtherCAT industrial network. The single central controller did the job of a traditional programmable logic controller (PLC), but having Windows allowed a virtual environment to be configured, which proved to be invaluable for testing and commissioning.

This setup offered numerous benefits, including significantly faster operational processes, real-time program testing from multiple locations, (including working at home), cloud-based capabilities and third-party connectivity.

The project was executed in phases, starting with the replacement of the boards at each diverter station with Leuze scanners. The advanced scanners offered built-in I/O points, streamlined wiring and simplified design, while the EtherCAT network provided speed and reliability.



KEY OUTCOMES

The innovative solution delivered remarkable outcomes, including:

- **Fast Program Execution Times:** The IPC offered rapid deployment capabilities, including network updates, an essential feature for a logistics centre in a post-COVID environment.
- **Easy Programming:** Even employees with minimal industrial programming experience were able to quickly get up to speed with the user-friendly interface of the Beckhoff IPC.
- **Real-time Data Capture:** The new system captured raw barcode data from scanners, decoded it in real-time, and executed logic for each zone, ensuring efficient box routing and diversion.
- **The Benefits of a Windows OS:** The IPC's Windows Operating System allows users to create their own programs and messaging systems to run concurrently with the control program.
- **Robust Event Logging:** Every box detection was recorded as an event in Beckhoff's TwinCAT event log and Layer Seven's queuing system. IIoT data was generated for RabbitMQ, a message queuing program, chosen for its suitability for this specific application.
- **Enhanced Visualisation:** Data from the Beckhoff controller was extracted via its ADS protocol, allowing real-time visualisation of operations. This data can be sorted into databases and message queues, facilitating dynamic reporting and analysis.
- **Operational Efficiency:** The system enabled the distribution centre to manage peak occupancy zones effectively, thereby optimising resources and reducing operational bottlenecks. It will also allow for better reporting for management.
- **Cost Savings:** The new architecture proved highly cost-effective, replacing the need for multiple replacement boards with a single, efficient controller solution.
- **Data Security:** The Beckhoff-based solution provided enhanced security by isolating the EtherCAT network, limiting exposure to potential threats. Other facilities, like Windows' Firewall, are also in use.



FUTURE PLANS

“We have plans to implement redundancy in the form of a hot standby CPU for increased system availability. Additionally, the distribution centre intends to optimise the system execution load to accommodate web services for visualisation purposes. The use of ADS to extract data for further processing and integration into ERP systems like SAP and MS-Dynamics is a key part of these plans,” comments Lucky.

Hear more about this innovative project, directly from the real-life implementers on the Industry 4.0 and Beyond podcast, available at www.openiiot.com.au/open-iiot-podcast, on Spotify or wherever you get your podcasts.

“This case study outlines the innovative architecture implementation at the distribution centre and serves as a testament to the power of automation and efficient system design. By leveraging Beckhoff’s IPC technologies and strategic planning, the client achieved enhanced operational efficiency, real-time data insights, and a cost-effective solution for future scalability,” Harry concludes.



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These topics are discussed in detail on the new Industry 4.0 and Beyond Podcast by Open IIoT. Find all episodes of the Industry 4.0 and Beyond podcast on our website [HERE](#) or on your preferred streaming platform.

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About the Open IIoT Group: Open IIoT is an initiative of some of Australia's most prominent automation brands – SMC Corporation ANZ, Beckhoff Automation, NORD DRIVESYSTEMS, Balluff, Argus and our newest addition, KUKA Robot Automation. It was founded with the mission of delivering valuable, efficient and easy-to-understand information on Industry 4.0, IIoT and other related topics to end-users and the broader manufacturing industry. Our Industry experts break down the jargon and tackle real-world automation concerns to help customers unlock IIoT opportunities for commercial value – and ultimately advance Australia's economy through smart manufacturing.



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