

Before the Line: Robust Capabilities of Design Software Enables Streamlined EV Module Assembly Layout

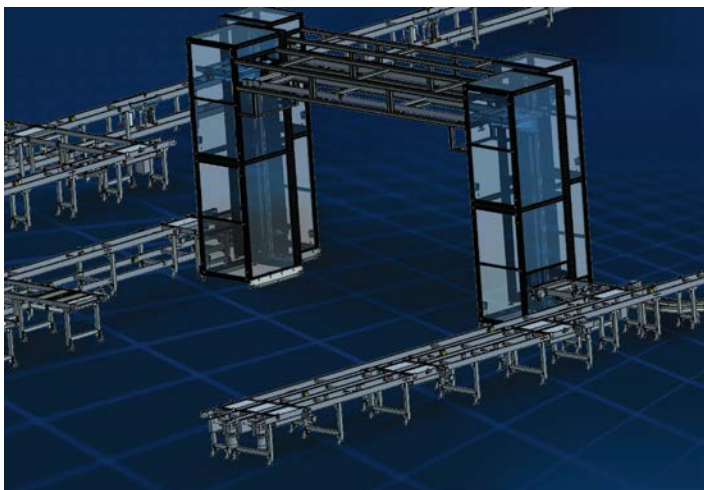
Every story has a beginning, and for every assembly line, that story begins with layout design. In the complex case that is manufacturing assembly, the design engineering process is often an overlooked chapter that is central to the project narrative.

The design phase is the first touchpoint in determining the project's success. If executed inefficiently, team members have a rocky journey ahead of them. If it's executed well, the result is a more streamlined process from start to finish.

CHALLENGE

When a large electric vehicle (EV) company requested a turnkey battery module assembly system for cylindrical lithium-ion cells with an aggressive lead time, established Bosch Rexroth integrator partner Eagle Technologies knew the initial proposal was going to be critical.

In addition to time constraints, additional challenges included floor space and access to machine processes while maintaining a significant throughput for the system. This new line included several parallel processes in order to meet requirements and a conveyor capable of handling complex routing and variations driven by the build schedule. There were two basic module types and three different cell manufacturers involved, resulting in twelve different part numbers that would be produced on the final line with pallets accommodating all of them.



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SOLUTION

By combining their extensive experience in the EV market and Bosch Rexroth's technologies, Eagle Technologies tackled this application head-on. The completed systems produce a module every 7.4 seconds. They start with automatically depalletizing and deboxing the incoming cells (130/box) and end with handing off assembled and tested modules to the battery pack assembly line.

Using Bosch Rexroth's free design engineering tool, MTpro, and their extensive knowledge of Bosch Rexroth's conveyance and aluminum framing products, the Eagle Technologies team generated a highly accurate system layout at the quoting stage.

This impacted the project in two ways:

- 1) It enabled the design team to develop a robust layout at the onset.
- 2) It allowed Eagle Technologies to kick off the project with an accurate Bill of Material that could be submitted as an order within weeks, instead of months.

To meet the lead time for such a robust line design, modules had to be ordered early, even before mechanical engineering was completed. This made the accurate Bill of Material especially critical to the successful execution of the project.

From the conveyor standpoint, a common challenge Eagle Technologies encounters is other suppliers do not provide CAD blocks before the order is placed, preferring to provide complete design support after the order is placed.

This exposes unnecessary risk by not having detailed information in the quote stage, and can slow down the transition from the 2D proposal to a complete 3D line layout. By utilizing Bosch Rexroth's MTpro program, Eagle Technologies eliminated those risks and had CAD blocks available to quickly generate a comprehensive design.

"Because of the lead time for most projects, we built the line based on our proposal drawings, which we can do because of MTpro," Eagle Technologies Sr. Key Account Manager Earle Cooper said. "If we didn't have that tool, we wouldn't be able to do that and meet the needs of the customer."

With MTpro, Eagle Technologies was able to provide an extremely detailed assembly line layout. Paired with a quoting tool from Bosch Rexroth, Eagle Technologies was not only able to provide a detailed Bill of Material, but an accurate cost and comprehensive layout.

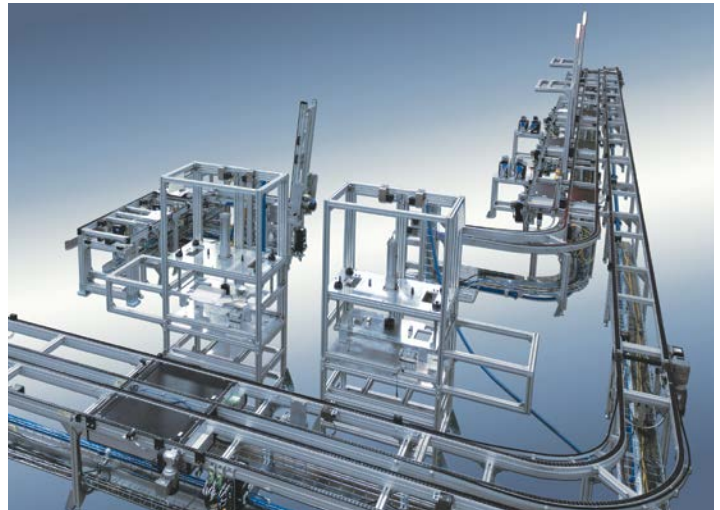
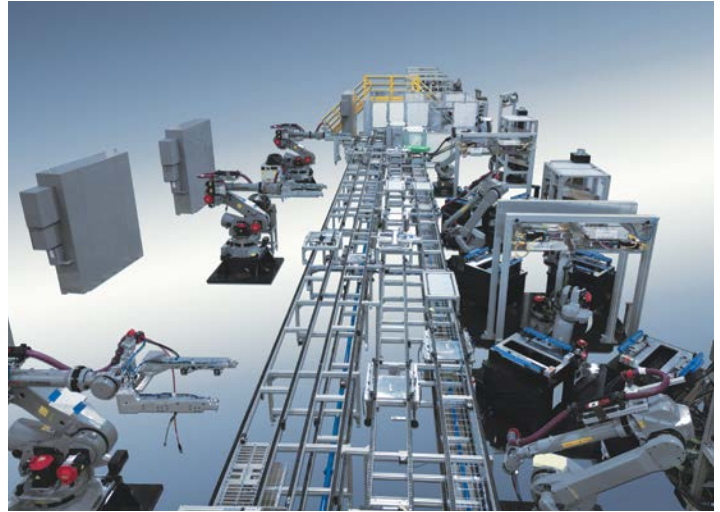
RESULT

The overall layout went through 15 revisions before converting to an order, and Eagle Technologies had quick and easy access to CAD blocks for all of Bosch Rexroth's TS 2plus conveyor modules, aluminum structural framing, and additional components needed to complete the layout.

Then, it went into the design phase.

For this project, the proposal layout was so close to the final project, the design phase was seamlessly executed, saving months of time. The final system was massive and was too large to fit as a singular unit in any of Eagle Technologies' facilities, which 150,000 square feet each. To meet the customer's timeline, the project was broken into three phases to accommodate runoff and install but also to have a built-in redundancy.

With the installation of all three phases of the line, Eagle Technologies successfully met the customer's timeline but not without an appreciation for how the start impacted the trajectory of the entire project. By utilizing an effective and efficient design process, the project was setup for success before construction began, which saved all parties time, money, and resources.



With MTpro, the assembly line project was set up for success before construction began

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