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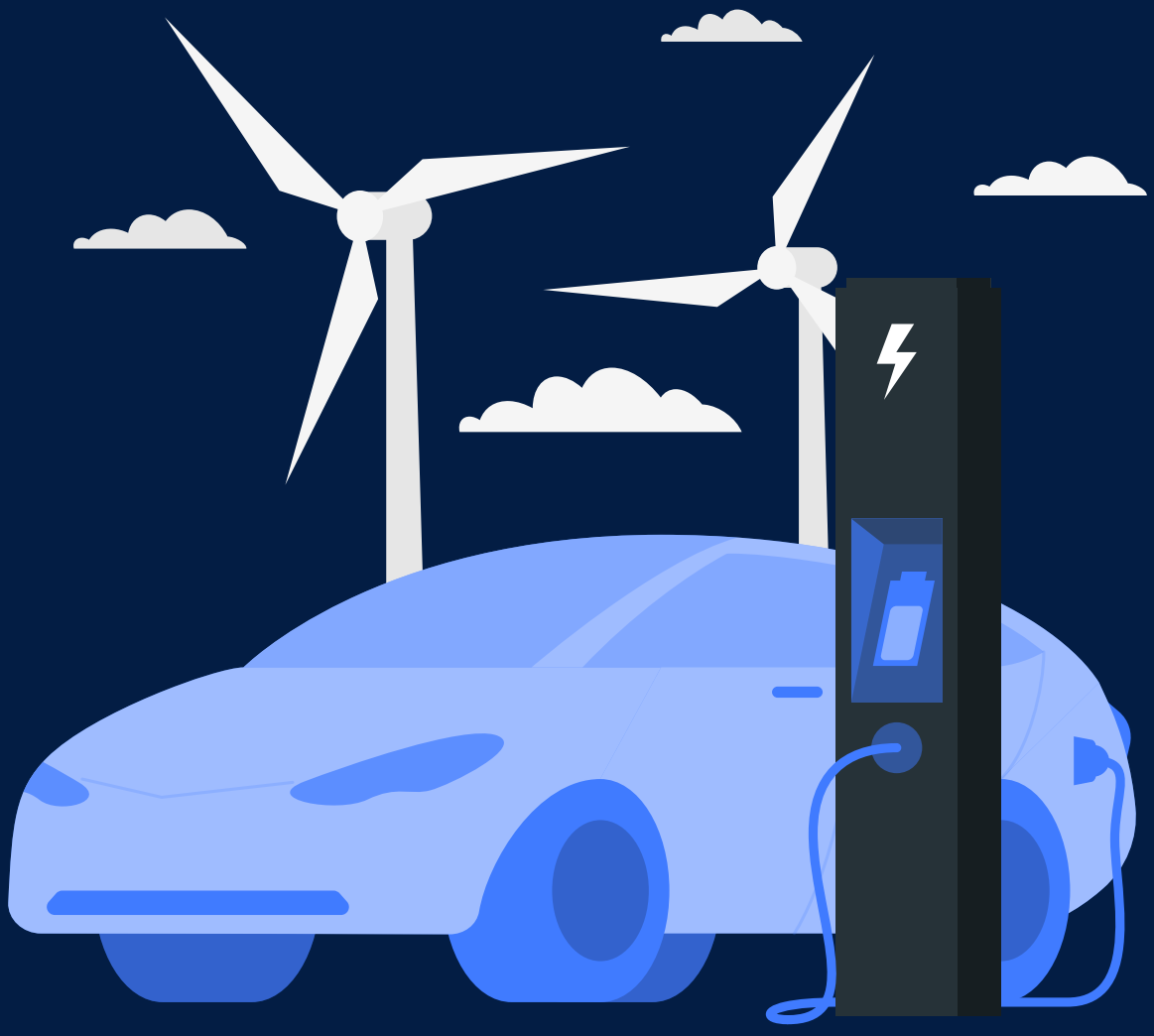
Electric Vehicles:

Product Simplification Does Not Diminish Need for Planning & Scheduling



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Electric vehicles (EVs) have been identified as the centerpiece of future transportation and logistics, providing a greener alternative to traditional fossil fuel-consuming vehicles. As of 2019, there were nearly 5.4 million hybrid electric vehicles on American roads and around 1.4 million full electric "plug in" vehicles, with these figures expected to rise in coming years.

So, what does this mean for the auto industry? Are these vehicles simpler or more complex to manufacture, and what kind of planning and scheduling software support do manufacturers need to succeed in this relatively new market?

A Simpler Set-Up: EVs Have Fewer Parts

An electric vehicle is a highly sophisticated piece of engineering. However, sophistication does not necessarily mean increased complexity — at least not in terms of the parts and components used in the manufacture of the vehicles. Compared to traditional internal combustion engine (ICE) cars, by some measures EVs require 80% fewer parts: no ICE, oil system, gaskets and valves, transmission, exhaust system, radiator etc. It is also estimated that assembling an EV takes 40% fewer labor hours.

Such product simplification has a significant impact on manufacturing. As these parts are not required, the planning and scheduling process should also be simplified. But is this really the case?

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Increased Complexity in Other Areas

The lack of an internal combustion engine does not necessarily make an electric vehicle a "simple" piece of technology. There are several components and features that add to the complexity of an EV, both in terms of its concept and its construction, including: a high-capacity battery, charging system, center console and numerous electronic accessories.

Different EV models require different batteries and even the same EV model often comes with different battery options. Producing, transporting, storing, and assembling battery cells/modules/packs into EVs adds complexity to production planning and scheduling.

As well, early adopters in the EV market are likely to be technophiles who want to accessorize their cars with a broad range of custom tech: self-driving technology, vehicle tracking, navigation systems, onboard connectivity and Wi-Fi, touchscreen functionality, power and connective outlets, among other accessories. Additional high work features in demand include two-tone paints. All these features add to manufacturing complexity.

A High-Risk Supply Chain

This complexity is compounded by a high-risk supply chain, with potential for disruption. Batteries are expensive and require minerals like Lithium and Cobalt that are largely only used for battery production and can be difficult to source. If there is one thing the semiconductor shortage, pandemic and various natural disasters over the past decade have taught us, it is that we need to balance efficiency with resiliency. Problems at one end of the supply chain should not snowball into sustained shutdowns at other plants.

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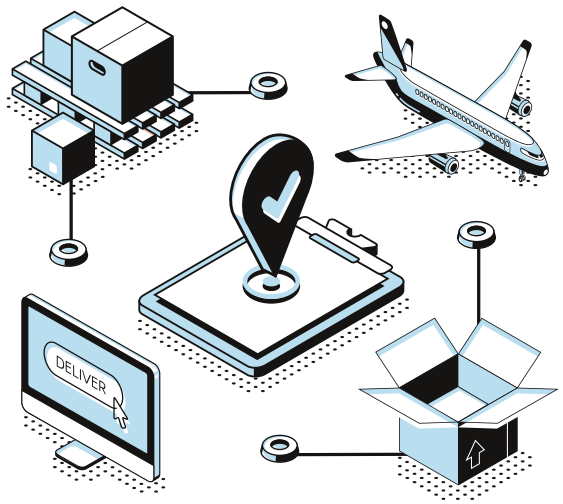
Plus, the Usual Challenges

Except for the lack of ICE assembly, much of the auto assembly for EVs is unchanged. There are the familiar challenges of maintaining throughput in the Body area, minimizing color changeovers in Paint, and spacing out high work vehicles in Trim. As variety and volume increase, properly sequencing these areas becomes more and more complex. As always, poor sequences can significantly add to the cost of production, and lead to inefficiencies across the supply chain.



How Planning & Scheduling Can Help

Modern APS systems, such as Optessa. use the latest AI and optimization techniques to address these problems head on. Modern planning systems can optimize and regenerate plans in a matter of minutes, allowing manufacturers to respond quickly to supply chain disruptions and demand fluctuations. They can also explicitly include considerations of supply chain resiliency and stability when generating plans.

Optimized production sequences can restore body shop throughput, minimize color changeovers in the paint shop (even with two tones) and space high work vehicles to make the most of available material and labor. Distributing features evenly across a production day has the added benefit of reducing supply chain inventories. And Optessa's algorithms run so fast that they enable Real-Time Optimization of plans and schedules.

All these capabilities add up to significant cost savings for EV manufacturers, allowing them to be profitable and competitive in price with ICEs.

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A Disruptive Opportunity

Manufacturing companies globally are investing in digital transformation and the Industry 4.0 vision of highly automated factories with interacting intelligent autonomous systems operating at high levels of efficiency. One advantage EV manufacturers have is to leapfrog their competition by investing in the disruptive technologies of tomorrow today. Any digital transformation strategy should include the next generation of APS tools ("Planning and Scheduling 4.0") which are key enablers of Industry 4.0.

About Optessa

Optessa is a leader in intelligent planning, sequencing, and scheduling optimization software with many successful implementations among top tier global manufacturers.

Optessa products have wide applicability in industries as diverse as auto OEMs, suppliers, power equipment, electronics, semiconductor, and mills; batch process industries such as food and beverage, and paints; as well as shipping and logistics. The company has offices in Edmonton, Alberta, Canada; Hazlet, New Jersey, USA; and Goa, India. Optessa's leadership team combines deep expertise in software, mathematics, manufacturing, and optimization technologies with unmatched customer commitment.

Optessa supports global deployment at more than 100 distinct manufacturing facilities and production areas. We also partner with industry leaders, Deloitte and Tech Mahindra, to further enhance our client support.