

WHITEPAPER:

The Future is Electric: Supply Chain Packaging Implications of Electric Vehicle Adoption







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The future of mobility and autonomous driving is here, and it will soon impact every facet of our life — from consumer vehicles and public transportation to last-mile delivery services and ridesharing.

While it may seem as though electric vehicles (EVs) are a recent addition to the automotive industry, they're far from new. In fact, electric cars have been around since the early 1800s — far earlier than traditional gas-powered engines. While internal combustion engines have dominated the last century of the auto industry, the tide is shifting as more companies turn to sustainable forms of mobility. With electrification in full swing across the vehicle manufacturing sector, the automotive supply chain is becoming increasingly complex. In this white paper, we will explore the trends impacting electrification adoption and explain how EVs impact part packaging and the respective supply chains.

Trends Impacting EV Adoption

Sales and production of EVs continue to accelerate in both the United States and abroad, but there are several key factors that will impact their widespread adoption.

INFRASTRUCTURE

Charging infrastructure will be vital for the mass adoption of EVs across the various regions in the United States. More charging stations are needed to curb range anxiety and make EVs a realistic option for all consumers. The current overall range of EVs is approximately 250 miles, and the time it takes to charge them, while it varies greatly, is typically much longer than it would take to fill up your gas tank. These long charging times and the need for more robust charging infrastructure are two main barriers for widespread adoption, making an increase in charging stations vital for EVs' proliferation.

GOVERNMENT REGULATIONS

Government regulations also heavily influence the push for EVs. Up until the Biden administration, U.S. regulations have been extremely lenient on traditional vehicle production. But by 2030, President Joe Biden wants 50% of all new vehicles to be powered by battery electric, battery electric, plug-in hybrid electric or fuel cell EV powertrains. European countries and China continue to dominate the United States in EV adoption due to their strict greenhouse gas regulation, which catapulted the industry forward. While government regulations drive adoption abroad, market share has been the key motivator in the domestic production of EVs.



SUSTAINABILITY

There is an element beyond government regulations pushing for reduced greenhouse gases and air pollutants: Consumers are more interested and invested in sustainability than ever before. This eye for the environment and pursuit of zero emissions has consumers considering the switch to EVs. But in order to make EVs an economically viable option for consumers, reducing battery costs will be necessary. As the most expensive component of EVs, reducing battery costs will be a catalyst for their growth among these sustainability-conscious consumers.

TECHNOLOGY

Technology is also at play. Autonomous driving is no longer a figment of the imagination. The transition toward electric-powered vehicles has led to more autonomous vehicles (AVs). The race for autonomous mobility is on, as AVs afford benefits like reduced traffic incidents, improved delivery services and the potential for ride-share vehicles in urban areas.

All in all, electrification will reshape the global automotive supply chain as we know it. With these trends driving adoption in the United States and abroad, it's clear that EVs are here to stay, making batteries a mainstay of the automotive market.

Understanding the EV Supply Chain

Lithium-ion batteries (LIBs) have become the preferred energy source in this monumental shift in the automotive and transportation industry. As the consumer EV penetration rate in North America continues to increase, it's critical to understand the challenges and nuances associated within the EV supply chain. Batteries are at the forefront of these challenges due to their high value, their complex regulations and the severe risk they pose during a thermal runaway.

LIBs are classified as a Class 9 dangerous good. Dangerous goods are any items or substances that, when transported, can pose a risk to health, safety, property or the environment. This classification is why the Pipeline and Hazardous Materials Safety Administration (PHMSA), with the U.S. Department of Transportation (U.S. DOT), has set aside extensive regulations for the packaging of dangerous goods to maintain the safe transport and storage of these items. Each battery pack is also required to pass specific performance testing to be certified. These requirements are put in place to ensure the packaging will fully contain the dangerous good when undergoing the stresses and shocks seen in the shipping environment. Failure to comply with these regulations could be catastrophic.

“As a whole, the supply chain has become increasingly complex, driving a greater need for protective yet innovative packaging solutions. From ESD-safe dunnage and totes to multi-material packaging solutions for dangerous goods, ORBIS is your one-stop-shop for all your EV packaging needs”.

**- Shane Felix
EV Packaging Specialist**

Due to the rise in EV production, battery shippers are under more enforcement scrutiny than ever before, making it imperative to utilize packaging that is not only compliant but also will protect the battery during transport. But finding the proper packaging and mode of shipment can be a sophisticated and painstaking process. That's why it's important to work with a packaging supplier that has extensive knowledge of the dangerous goods packaging regulations and is certified with the U.S. DOT to provide large-format LIB packaging solutions.

EVs Impact on Packaging

The adoption of EVs will profoundly impact the automotive supply chain. The move from internal combustion engines (ICEs) to electric motors will be one of the biggest changes the auto industry has ever faced. These changes will have tremendous implications for the packaging needed to move, store and sequence EV batteries and parts and will require auto companies to be nimble to adapt.

Despite having far less components, EVs are widely known to be more expensive to manufacture than their ICE counterpart. This is mainly attributed to the battery — making up almost 30% to 40% of the vehicle's value. The supply chain has a role in this, as majority of battery production is overseas, with North America producing a small fraction of the global LIB capacity. As more supply will inevitably begin to localize to drive down transportation cost, this will undoubtedly drive a greater need for robust, yet sustainable, packaging solutions.

To make EVs more affordable, there will be extreme emphasis on driving down cost within the supply chain. As a result, packaging will be a major focus. For decades, the automotive industry has relied on reusable, standardized packaging to move parts efficiently. Since EVs have different types of parts and components, the packaging needed to hold and protect these items also will evolve. Similarly, automotive manufacturers are looking to drive out costs and improve vehicle performance through alternative lightweight materials and parts. This means packaging will still need to be space-efficient, sustainable, easily managed, and lightweight while having even more protective requirements as parts evolve to high-value, electric-based components.



Why Reusable Packaging?

Reusable plastic transport packaging can help OEMs drive down costs, achieve sustainability and increase efficiency throughout the complicated EV supply chain.



REDUCE TRANSPORTATION COSTS

With transportation costs heightened and EVs costly, finding freight efficiencies through packaging is imperative for outbound part shipment. For example, an automotive supplier reduced freight cost by more than 70% in converting from a non-collapsible steel bin into a collapsible plastic bulk container. Savings were generated by both the lighter tare weight of the packaging as well as better cube utilization in empty return shipments because the packaging is collapsible.

It is important to plan for return logistics. Using packaging that's collapsible or nestable allows companies to save money on return freight. Due to the standardized dimensions and collapsible nature of many reusable plastic packaging solutions, more packaging fits in standard trucks so manufacturers can limit the number of trucks needed for a return trip. This leads to fewer trips, more cost savings and reduced emissions.



PROTECT SENSITIVE PARTS

As electronic controls are growing in use, the sensitivity of vehicle components is increasing. Concerns about electrostatic discharge (ESD) damage to the high-tech interior of these vehicles is driving new packaging needs. The components associated with new sensors, slim control panels and massive screens all require a heightened focus on part protection. ESD-safe protective packaging protects materials that come into contact with static electricity during handling, shipping and storage.

With more sensitive and costly parts also comes a need for protective dunnage, which is designed to tightly hold car parts and absorb shock during transit. Much of the dunnage used in EV supply chains is increasingly made from flexible fabrics, instead of fixed cell, to adequately protect these parts while allowing for more parts per container.



FOCUS ON SUSTAINABILITY

Although cost is still the main driver of decisions, sustainability has moved up in importance to become key in the decision-making process. This emphasis on sustainability extends all the way through to packaging choices. Reusable packaging solutions can offer transportation benefits that reduce greenhouse gas emissions. They last for many cycles through the supply chain, leading to a compelling return on investment. At the end of their life, reusable packaging solutions can be recovered, recycled and reprocessed into new packaging products, without entering the solid waste stream.

Consumers will want to know the production of EVs is environmentally conscious. Reusable plastic packaging can help companies add sustainability to their supply chain while reducing costs and enhancing profitability.

Why Reusable Packaging?



ENSURE EFFECTIVE FLEET MANAGEMENT

With the high cost of EVs, OEMs want to prevent having excessive inventories and overhead costs, making packaging visibility even more important. Supply chain disruptions can increase dwell time, making it difficult to get empty containers back to the Tier 1 supplier in time to ship more parts to the OEM. Through effective packaging management and track-and-trace technologies — like radio-frequency identification (RFID), Bluetooth and Global Positioning System (GPS) — OEMs can make sure their packaging is available and at the right place at the right time.

ORBIS® Corporation's Reusable Packaging Management services facilitate all efforts needed to track, retrieve, sort, clean and inventory packaging assets. Using these services from a trusted packaging provider can help achieve connectedness across the supply chain and streamline operations.



SUPPORT FOR AUTOMATION AND ROBOTICS

According to the World Economic Forum, half of all work tasks will be handled by machines in 2025.¹ With the necessity to create line-side efficiencies, automation provides automakers with much needed flexibility in production. The uniform design of reusable plastic packaging solutions seamlessly interface with automated systems, reducing system downtime found with inconsistent packaging design.

Although the overall principles remain the same, packaging for EV parts will come under additional scrutiny as companies work to meet strict packaging regulations while driving out supply chain costs. As the interest in EVs continues to expand, it's important to work with a packaging provider that can help your operation transition to meet the automotive supply chain's changing needs.



¹ <http://reports.weforum.org/future-of-jobs-2018/shareable-infographics/>

Packaging Solutions for Your Operation

As an international leader in reusable packaging, ORBIS Corporation offers a variety of solutions fit for the unique and complex needs of the electric vehicle supply chain:

BULK CONTAINERS

ORBIS offers many collapsible and nestable solutions that are lightweight and durable. The heavier parts used in EV production require packaging that is lightweight and durable. ORBIS' BulkPak® containers are available in many footprints to fit a wide variety of parts and components, regardless of size and shape. Designed for maximum packout and transportation efficiencies, the HDMP series bins from ORBIS are collapsible, are stackable and have a standardized footprint. This bin is designed to fit 84 filled bins per inbound truckload and 252 collapsed bins per return truckload versus the standard 208 bins per return truckload.



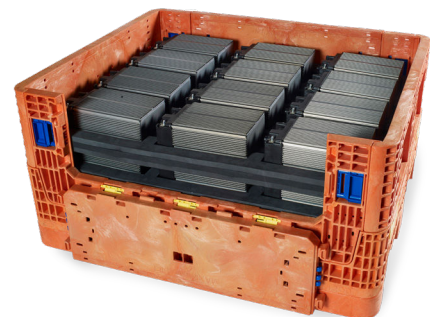
THERMOFORMING

ORBIS has the capabilities to custom-design and fabricate a wide range of reusable thermoformed packaging, including molded dunnage, ESD trays, divider sets and more. Custom-thermoformed packaging is ideal for automotive parts, including the lighting and interior trim parts of EVs.



BATTERY PACKAGING

ORBIS' IonPak® is the first European plastic packaging solution made to carry LIBs and is certified by the United Nations. This transport container for solid dangerous goods is collapsible and recyclable, bringing considerable transportation cost savings and operational benefits to the global supply chain. Easily paired with customized, shock-absorbing dunnage, IonPak is designed to securely hold LIBs horizontally during transit. With IonPak, ORBIS can partner with battery providers to create custom-tailored solutions that exceed federal regulations. ORBIS also can perform all the necessary performance testing to be a one-stop shop for large-format battery providers.



Packaging Solutions for Your Operation

METAL RACKS

ORBIS offers metal solutions that are designed to be extremely durable and protect the high-cost, sensitive parts and components of EVs throughout the supply chain. Metal rack solutions are engineered to move, transport and sequence specific parts, meaning they can be designed to best fit a particular product. They can be configured to any required size, shape, capacity or style to accommodate the unique needs of the EV supply chain. Integrating metal racks and protective dunnage helps workers optimize what they bring to the line and offers picking efficiencies.



PROTECTIVE DUNNAGE

Custom, protective ORBIShield® dunnage is designed for each part and application to optimize pack density and ensure part quality. Choose from plastic corrugated divider sets, foam packs, part cradles, molded foam, fabric bags and foam/plastic assembly sets to protect product throughout the supply chain. Combine dunnage with a bulk container, metal rack or hand-held tote for a complete solution.



Automotive OEMs and their tiered suppliers have a lot of change on the horizon. They have to not only figure out how to run these new-age supply chains but also meet consumer demands for sustainability. With evolving packaging solutions, OEMs can develop flexible approaches for their packaging to create a streamlined and efficient EV supply chain.



ABOUT ORBIS CORPORATION

ORBIS — powered by Menasha — is built on more than 170 years of material handling expertise. ORBIS helps world-class customers move their product faster, safer and more cost-effectively with reusable totes, pallets, containers, dunnage and racks. Using a proven approach, ORBIS experts analyze customers' systems, design a solution and execute a reusable packaging program for longer-term cost savings and sustainability. Using life-cycle assessments to compare reusable and single-use packaging, ORBIS also helps customers reduce their overall environmental impact. ORBIS is a part of Menasha Corporation, one of the oldest family-owned manufacturers in the United States. As a steward of sustainability, ORBIS is committed to a better world for future generations. Headquartered in Oconomowoc, ORBIS has more than 2,500 employees and 55 locations throughout North America and Europe.

-  REDUCE WASTE
-  SAVE COSTS
-  IMPROVE EFFICIENCY
-  OPTIMIZE SHIPMENTS
-  PROTECT PRODUCT
-  OPTIMIZE AUTOMATION
-  REDUCE TRIP COSTS

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