

ELECTRIFYING PROGRESS IN E-MOBILITY MANUFACTURING THROUGH PROCESS FLUID SOLUTIONS

Pascal Rival, Global Director e-Mobility, Quaker Houghton



The automotive industry's transition to electric vehicles (EVs) is happening fast. And with the change comes new challenges that original equipment manufacturers (OEMs) will need to tackle to stay competitive. In the race to build EV components more efficiently and more sustainably, component manufacturers should consider a sometimes overlooked but critical factor to their productivity: industrial process fluids.

Despite supply chain disruptions and weak overall auto markets in 2022, the global EV market saw rapid growth. In fact, the production of battery electric vehicles (BEVs) nearly doubled year over year, from 4.9 million vehicles produced in 2021 to over 8.7 million in 2022, according to data from S&P Global Market Intelligence. That growth is only going to continue, with BEVs and hybrid electric vehicles (HEVs) projected to make up 59% of the overall automotive market by 2029.

Automakers are ramping up EV-related investments and announcing big goals for EV production, with several large consumer car manufacturers promising all-electric lineups in the next 15 years. Automakers that have embraced an EV strategy and increased their EV production have seen overall sales grow, despite the turbulent market conditions. That's a clear signal that EVs will continue to drive business growth for automakers and component manufacturers alike – as long as they can keep production efficient and cost-effective.

With Change Comes Challenge for EV Component Manufacturers

For OEMs and component manufacturers to stay competitive in this rapidly changing industry, they'll need to transition their operations from manufacturing internal combustion engines (ICE) to account for EVs, hybrids and sometimes all three. They'll also need to work to meet ever-higher expectations for lower costs, shorter lead times and more sustainable manufacturing processes that reduce waste and emissions.

To meet these expectations, OEMs must solve a variety of technical challenges in three key areas of EV manufacturing: battery production, lightweighting and eliminating noise, vibration and harshness (NVH). Manufacturers must find efficient methods for forming battery casings while maintaining the highest degree of cleanliness. And to get the greatest possible driving range from the battery, major structural components should be as lightweight as possible. That means working with different materials, new component designs and concepts, and near-net-shape manufacturing to improve downstream production. And to maximize the performance quality and driving experience of the EV, manufacturers also need to eliminate noise and vibration by improving surface quality and cleanliness.



Making Progress With Process Fluids

To meet these challenges, component manufacturers are investing in new machines and new processes to optimize their production. While doing so, they should be sure not to overlook the importance of process fluids. Transitioning to new equipment and operations is a perfect time to take a closer look at the industrial fluids needed for each application – because choosing the right fluid can have an equally significant impact on the productivity, efficiency and sustainability of an operation.

Industrial process fluids play a critical role in a wide range of metalworking applications, like die casting, forging, forming, metal removal, heat treatment and cleaning. The right fluid technology partner can also provide advanced solutions, like coatings, surface treatments and porosity sealants, to enhance the quality and longevity of components.

When it comes to choosing process fluids for EV production, failing to look at the total cost of ownership with process fluids can lead to major missed opportunities. Finding the optimal fluid solution will not only reduce total cost of ownership, it can also play a transformative role in the EV manufacturing process. Here are some key EV applications where fluid solutions can significantly enhance the process.



Lightweighting Vehicle Structures

To illustrate just how important process fluids can be, consider the trend toward mega casting. By die casting entire automotive structural parts such as a rear underbody or battery casing as one piece, manufacturers can streamline manufacturing processes, eliminating whole assembly processes and material waste, while providing a lighter-weight structure for the vehicle.

Die release lubricants have a critical role to play in this process, but not all lubricants are created equal. By switching from water-based lubricants to electrostatic, water-free die release technology, manufacturers can greatly improve the cycle time, efficiency and sustainability of the process, with no wastewater or effluent, no need for compressed air to blow off the die, and less energy usage overall.

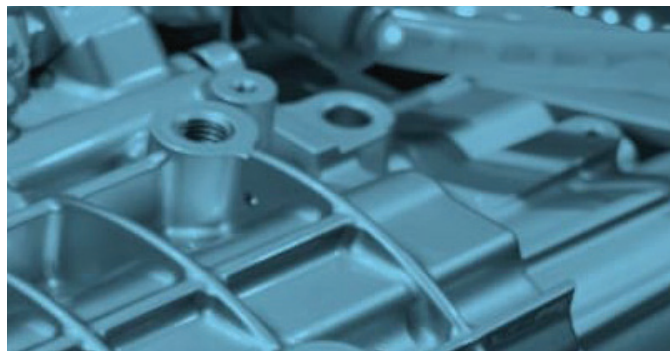
Aluminum also has a major role to play in vehicle structures for EVs because of its light weight. However, this nonferrous metal is extremely malleable, so manufacturers need effective heat treatment solutions to harden their aluminum components. The right quenchants can help optimize performance and reduce costs in this hardening process.



Eliminating NVH in e-Motors and Transmissions

For e-Motors and transmissions to run quietly and smoothly, the surface quality of each component is paramount. Achieving this with machining finishing operations requires advanced fluid solutions like high-quality mineral oils, synthetic oils or ester-based oils. Choosing the right process fluid with stronger lubricity will not only enhance the surface quality, it will also reduce the need for rework and improve production rates, energy efficiency and operating costs.

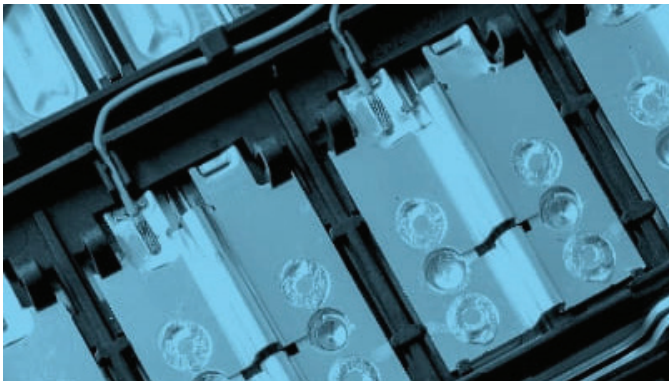
Cleanliness is important so oils and residues don't interfere with subsequent manufacturing processes. Here, component manufacturers can significantly improve their process time and total cost of ownership with low-residue, longer-lasting spray and immersion metal cleaners. These fluids offer good oil-splitting characteristics for effective metal cleaning, improving downstream processes.



Optimizing Battery Can Production

When forming battery cell casings or housings, a high-performance metal forming fluid can provide a wide range of benefits to improve production. Battery manufacturers can easily apply these fluids by spray or rolling to enhance the lubricity, die life and release of the shell from the die to reduce the rejection rate and improve overall efficiency.

Cleanliness is also a critical factor in the production of EV batteries. Minimizing residues and enhancing the compatibility with downstream assembly processes are key to success. But without the right process fluids, this demanding process can be resource- and time-intensive. Manufacturers can optimize their cleaning processes with fast-acting cleaners that minimize process time and provide long system life for fewer refills. They can also enhance the sustainability of their cleaning operations with fluids that enable low-temperature cleaning. The result is a faster cleaning process that creates less waste and uses less energy.



Advancing the Future of Mobility With the Right Fluid Technology Partner

Mobility is changing fast, and automotive component manufacturers are tasked with meeting rapidly growing demand for more affordable, more advanced EVs. Fluid solutions are an important piece of the puzzle for improving productivity, lowering costs and maximizing efficiency. But OEMs aren't left on their own to figure out which solutions will bring them the performance they need.

Partnering with an expert fluid technology provider such as Quaker Houghton gives manufacturers the assistance they need to find the optimal solution for each application. But the right partner will deliver value that goes far beyond process fluid products – they'll work in close collaboration with manufacturers to provide technology and services in areas like operating solutions, fluid management and industry 4.0. With an expert fluid partner, EV component manufacturers can meet the challenges of today and tomorrow by improving the efficiency, sustainability and profitability of their overall production.

