

Galvanizing in Automotive Assembly Plants

APPLICATION DOCUMENT

There are many automobile manufacturers all over the world, all with different production processes and ways of doing things, but they do all have one thing in common – they all feature galvanization lines in their facilities.

In general, galvanizing is the process of applying a protective coating, usually zinc- or manganese-based, to steel or iron parts as a way to inhibit rusting. There are three specific galvanizing processes that typically take place in an automotive assembly plant:

- **Hot-Dip Galvanizing:** Hot-dip is the most common form of galvanizing. In the hot-dip galvanizing process, the steel or iron part is immersed in a bath of molten zinc. When exposed to the atmosphere, the zinc coating reacts with oxygen to form zinc oxide (ZnO), which reacts with carbon oxide to form zinc carbonate ($ZnCO_3$). The dull gray material that results is capable of protecting the steel or iron that it envelops from corrosion.
- **Phosphating:** This is technically a “conversion coating” process that converts a steel surface to one that is classified as an iron phosphate. To achieve this state, a dilute solution of phosphoric acid and phosphate salt is applied via spraying or immersion, where it chemically reacts with the steel surface to form a layer of insoluble crystalline phosphates, usually in the form of iron, zinc or manganese crystals. The result is a steel part that is now corrosion-resistant.
- **E-Coating:** This is another name for electrocoating, electropainting or electrophoretic lacquering. The e-coating process places a paint or lacquer coating onto steel or iron parts. Once coated, the parts are “electrified,” which binds the paint or lacquer to them, resulting in a corrosion-resistant surface.

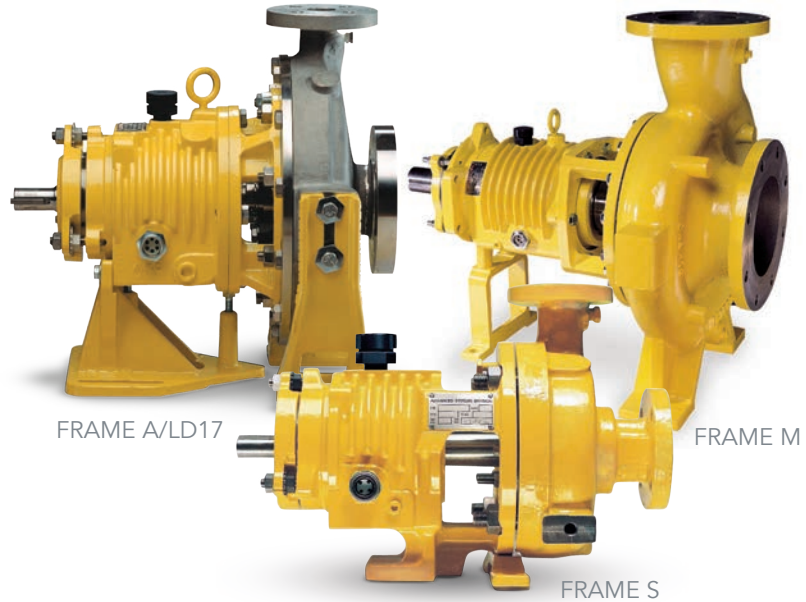


In all instances, the galvanizing liquid – known as a “flux” – that the steel or iron part is dipped into or coated with needs to be pumped into storage tanks. For many years, centrifugal pumps have been the pumping technology of choice for flux-transfer operations. However, common centrifugal pumps have a number of operational shortcomings that can hamper a successful galvanization process in an automotive assembly plant – the two most significant being product leakage around the seals and excess vibration at high speeds that can lead to loud operation and premature breakdowns.

A better alternative is Blackmer® Centrifugal Pumps. Blackmer Centrifugal Pumps have been designed with oversized bearings for greater load capacities and extended bearing life, which allows them to operate reliably in continuous severe-duty applications. Blackmer offers three centrifugal pump families for use in galvanizing applications in automotive assembly plants. Frame S pumps are available in four models, all of which feature mid-size frame strength in a small frame space, making them a perfect alternative to heavy-duty small-frame pumps. They are capable of producing flow rates up to 450 gpm (103 m³/hr). The Frame A and LD17 family has an 11-model roster of pumps that is designed around the seal, where 90% of centrifugal pump failures occur. They also feature a stiffer, heavy-duty shaft and larger bearings, which deliver the widest operational window off the pump’s Best Efficiency Point (BEP). They can achieve flow rates as high as 1,400 gpm (320 m³/hr). Finally, there is the Frame M family, which incorporates a design that is engineered for use in the most demanding operating environments. Frame M pumps are ideal for extremely high-volume applications, with flow rates up to 4,500 gpm (1,020 m³/hr).



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COMPETITION

• Other Centrifugal Pumps

The bane of any galvanizing operation in an automotive assembly plant is a leaking pump that allows fluids to be spilled all over the manufacturing facility. Many common models of centrifugal pumps are prone to developing leaks around their seals, which creates maintenance, cleanup, remediation and safety concerns for plant operators. Common centrifugal pumps are also prone to extreme vibration when run at high speeds, which leads to noisy operation and premature pump wear that can result in breakdowns and associated downtime that will affect the overall production process.

FROM THE FIELD

In North America, several automotive assembly plants use Blackmer Centrifugal Pumps in a combination of hot-dip galvanizing, phosphating and e-coating to rust-proof any steel or iron components in their vehicles.

One particular facility has been using a fleet of 20 Blackmer Centrifugal Pumps for these operations for

around 20 years. This facility has been so pleased with the performance of the leak- and vibration-free Centrifugal Pumps that it is planning to install additional units at the facility for hot-water-handing applications.

A new sister facility had been experiencing difficulties with the generic brand of centrifugal pumps it was using for hot-dip galvanizing, phosphating and e-coating to the point that the site's operational personnel had begun a search for a replacement. Yes, it's true, this facility is in the process of replacing these generic pumps after just two years due to issues with their operation. Thanks to the success that their sister facility had with Blackmer Centrifugal Pumps, the second facility has confidence in replacing the ill-performing centrifugal pumps with up to 40 Blackmer models on each of its production lines.

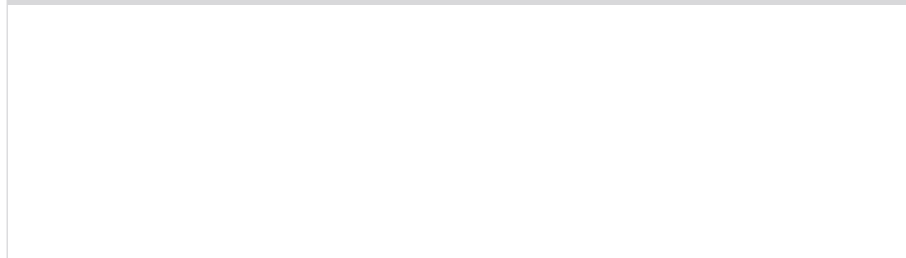
The reliability, efficiency, safety and cost-effectiveness of Blackmer Centrifugal Pumps fit perfectly with the needs of this global automotive manufacturer. The Blackmer value proposition aligns with a commitment to cleanliness and efficiency through the implementation of continuous-improvement operating principles.

For more information on these additional solutions, visit us at blackmer.com.

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PSG
1809 Century Avenue SW
Grand Rapids, MI 49503-1530 USA
P: +1 (616) 241-1611 • F: +1 (616) 241-3752
info@blackmer.com
blackmer.com