

Scholarship Essay

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Hot dip galvanization is the process of dipping fabricated steel in molten zinc in order to protect the steel from corrosion. This process can be very beneficial to the architecture industry, and is critical that people understand the process in order to be able to appreciate the benefits. Dipping the steel in zinc that has been raised to 830 degrees Fahrenheit allows the zinc to fully coat the steel and provide a barrier between the steel and the environmental elements that surround it. A common problem with steel is that it stands no chance when it comes into contact with moisture and oxygen. As the iron in the steel reacts with the oxygen and water, it produces a hydrated ferric oxide, also known as rust. Hot dip galvanization has been implemented for years in the industry to prevent this reaction of corrosion. Although the primary purpose of hot dip galvanization is to protect the steel from corrosion; there are also many other benefits such as providing a maintenance free and sustainable solution.

The longevity of the materials used when erecting or designing a building is crucial. Since steel is made of iron, it reacts easily with moisture and air, which makes corrosion inevitable. Thankfully for the process of galvanizing metals; architects, contractors, and owners do not need to worry about the corrosion of their structures. Once the metal is fully coated in zinc, the metal will be protected from the surrounding environmental elements that threaten it.

The zinc does not just offer protection from the environment by providing a barrier, but it also offers cathodic protection. Cathodic protection, also known as a sacrificial anode, means that the zinc that is covering the steel will "sacrifice" itself and be the part that slowly corrodes. Cathodic protection prevents corrosion by converting all of the anodic sites on the metal surface to cathodic sites by supplying electrical current from an alternate source.

Another form of protection that hot dip galvanization provides is the accumulation of a zinc patina over the zinc and steel. As the zinc is exposed to the environment, it reacts with oxygen, moisture, and carbon dioxide. The exposure to oxygen creates zinc oxide. Exposure to moisture forms zinc into hydroxide. And exposure to carbon dioxide causes zinc to form into zinc carbonate. The exposed zinc as a whole results to a product called zinc patina. The zinc patina provides a film of protection for the underlying zinc layer. The zinc patina corrodes exceptionally slow and retards the corrosion of the zinc layer up to 1/30th of the original corrosion rate.

Other than providing extra protection for the underlying metals, hot dip galvanization is also a sustainable solution. It has become such a widespread trend

among the architecture industry due to the growing demand for buildings to become LEED certified and to reduce their carbon footprint. This process is completely sustainable since the elements are considered natural resources. Zinc can be found in the Earth, and also in the air, water, biosphere, and even among living organisms. The zinc that is used for hot dip galvanization can be found abundantly in more than fifty countries, with the largest being China, Peru, Australia, India, the United States, and Canada.

Zinc is not only abundantly natural, but it is also recyclable. Therefore, if a structure is damaged and the metal parts need to be disposed of, an expensive treatment to recycle the parts wouldn't be required. Metallic parts could be directly sent to the recycling center and easily used for the next project.

Hot dip galvanizing also provides a maintenance free corrosion protection for over seventy years. Since the processed steel is used in structures that are exposed to some of the harshest environments, being maintenance free for a long period of time provides an increased economic value. The less maintenance that is required to upkeep a building parallels directly with the increasing value and the amount of money that the property owner saves over time.

The process of hot dip galvanizing metals, specifically structural metals in a building, is an ingenious way of preventing structural failure, while offering monetary benefits with its maintenance free longevity in a sustainable manner. The results of hot dipping metallic members not only benefit the architect and contractor from liability issues, but the process also protects all users and owners from any structural damage. The process should be advertised more within the architectural and construction industry as a way to protect the structure and everyone in it.

The best way to promote this ingenious process would be to advertise it more at architectural and engineering trade shows and conventions, such as the American Institute of Architects annual trade show or the National Council of Structural Engineers Association. These conventions and trade shows are a perfect way to publicize the process and all of its benefits. The trade shows are attended by the world's best engineers, architects, and builders from around the country.

Since I am a current Georgia Tech student I have been privileged enough to learn about hot dip galvanizing and its benefits to the industry. Given that Georgia Tech specializes in technology and engineering majors, many students at Georgia Tech are knowledgeable of the process, such as: Architecture and Building Construction students as well as Materials Science and Engineering students. This being said, including hot dip galvanization in the curriculum of technical programs around the country is the best way to educate the incoming generation of industry professionals. Being knowledgeable about how materials are protected and how they react with the elements is necessary in order to become a successful designer, builder, and engineer.

As a student who has majored in Building Construction and is continuing my education to receive my Master's in Architecture, I have a viewpoint of the industry that encompasses both the designer's side as well as the contractor's. As someone with this multidisciplinary perspective, I can appreciate the beneficial properties that hot dip galvanization offers. My educational background gives me an understanding of the liabilities involved with both building and designing buildings; therefore I can appreciate that this technology provides so many benefits that prevent an architect from needing to worry about structural failure.