

WHICH BUMPER IS RIGHT FOR YOU?

Today's fleets have more choices than ever when it comes to bumpers. From weight to corrosion-resistant materials, this guide looks at all the factors that need consideration when choosing a bumper for the best total cost of ownership.

Today many truck manufacturers build their trucks with plastic bumpers — they are lightweight and seem to be more aerodynamic. But the difference in weight savings between plastic and metal bumpers is not as significant as some claim. Plus, weight and aerodynamic performance are not the only factors that should be considered in bumper selection.

This guide examines the impact that corrosion has on various bumper materials, the ability of various materials to resist chipping, cracking and peeling, and other appearance-related issues. From there, it turns to weight savings, environmental concerns and serviceability. When spec'ing a bumper, all these items need consideration before a fleet or truck owner can assess the total cost of ownership (TCO).

Explaining the Processes

Before any discussion about which bumper makes the most sense in a given application, it is important to understand the terminology as well as the processes used to manufacture different types of metal bumpers.

CHROME

The viability of a chromium (chrome) bumper is dependent on a technique that involves polishing the metal. Some people misunderstand the way a chrome bumper is made and think the bumper gets bent and shaped, goes to the plating tank and then gets polished. What actually happens is a chrome-plated bumper starts with a steel base material. Different manufacturers use different grades of steel, which is then formed and fabricated. Next, the metal itself gets polished, buffed and in some cases ground down.

It is important when polishing the base metal to make sure there are no polishing lines. If the polishing is not done just right, any imperfections will be accentuated during the electroplating process and waves will be visible once the chrome plating is applied.

Plating is the next step in the process. This adds a coating to the polished steel by first submerging it in a dipping tank to clean it before sending it to other tanks, where bright nickel and semi-bright nickel are applied. Finally, a thin layer of chromium is plated over the bumper using an electroplating process.

CLAD

With a clad bumper, two different metals are fused together, creating an intermolecular bond. Once the metals are fused, the bumper becomes a solid material. From there it goes to the forming and fabrication process.

AERO CLAD® bumpers from Hendrickson start with pre-polished materials as the base. The material goes through a long process that includes multiple buffing and polishing heads to achieve its bright finish. Once the bumper is formed, no extra polishing is needed. The AERO CLAD forming process utilizes unique technologies designed to form the bumpers without any distortions.

Road Rash, Corrosion and Other Problems

Since the bumper is mounted directly at the front of the truck, it's no surprise that it receives the most impact from items thrown from the road. It's also no secret that the chemicals used to de-ice roads have an extremely corrosive affect on many parts of a vehicle. Magnesium chloride and calcium chloride are so powerful that they have been known to cause major damage in as little as one winter season. According to a report from the Technology & Maintenance Council called Corrosion: Complaint, Cause & Correction, any metal on a truck is susceptible to corrosion damage, but areas prone to splash, such as the front and underside of the tractor, are most vulnerable.

IS DAMAGE UNAVOIDABLE?

Plastic: While plastic bumpers do not usually exhibit rusting and corrosion on the outside, these bumpers are typically attached to the truck using metal brackets, which are subject to the same effects of splash from road chemicals, and as a result can corrode.

Many truck manufacturers are designing vehicles with plastic bumpers and placing them lower and lower to the ground. This trend is likely to continue as OEMs continue to work on improving tractor aerodynamics. Unfortunately, this is going to make bumpers even more susceptible to impact from debris like rocks and gravel. The closer a bumper gets to the ground, the more damage is likely to occur. So while plastic bumpers may help with aerodynamics and are not susceptible to corrosion, there is a serious tradeoff in terms of durability and resistance to cracking or corrosion within the mounting components, which further compromises the durability. Plastic bumpers have been known to rip off entirely during snowy seasons or in animal collisions.

Painted or chrome-plated steel: Like plastic, plated or painted surfaces are penetrated by gravel and small or large objects that strike the bumper. If the bumper takes enough hits from road debris, it can develop something called "road rash." Road rash is the result of sand, gravel or other objects hitting the bumper at high velocity. Once the outer coating of the bumper is compromised, it is easy for corrosion to set in. The protective chrome layer or the paint is penetrated, allowing the corrosive chemicals to begin their attack. In some climates, you can start to see rust in as little as two or three weeks.

Clad: The stainless steel used on AERO CLAD® bumpers is a much thicker layer than what is found on any kind of chrome-plated or painted bumper. In the case of AERO CLAD, the steel materials used to clad the bumper are 42-thousandths of an inch thick, whereas with a typical chrome bumper, the thickness of the chrome plating is only two- to four-thousandths of an inch thick. This means the outer layer of the stainless steel clad bumper is going to help prevent rust and corrosion from setting in much more effectively than a painted or plated bumper.

The Truth about Weight

It's no secret that the changes made to vehicles to meet emissions standards have added weight to today's trucks. In some cases, vehicles are 1,000 pounds or more heavier than they were just a few years ago. As a result, truck manufacturers are looking for ways to reduce weight in other areas.

Plastic: Many have turned to multi-piece plastic bumpers as a weight-savings option. On the surface, plastic bumpers seem to be a lightweight option, but the reality is these multi-piece plastic bumpers require a great deal of support brackets to attach them to the truck, which add extra weight.

Painted or chrome-plated steel: On the other end of the weight spectrum are steel bumpers, which can be painted or chrome plated. While they do not require as many brackets, they still add significant weight as they wrap around and follow the contours of the hood.

Clad: Bumpers clad in stainless steel in most cases do not offer much of a weight difference compared to plastic. These bumpers do not have the same amount of support brackets as needed for plastic. Clad bumpers can weigh nearly the same as plastic bumpers, with the worst-case scenario being 10-20 pounds heavier.

The typical weight for plastic and clad bumpers is approximately 50 pounds. When using steel, that figure can double and in some cases weigh as much as 120 pounds.

Go to <http://www.hendrickson-intl.com/Other-Documents/Aerodynamics-Study> to read more about the differences in aerodynamics among heavy-duty bumpers.

Durability and Serviceability Count

If a bumper does not absorb the impact from an animal strike, ancillary damage to other components may occur. For example, charge air coolers and cooling system components are most susceptible to damage following an animal strike.

Steel or clad bumpers compared to plastic are better able to withstand the impact of an animal strike and prevent damage to components. While steel and clad bumpers may cost more initially, if they protect components during an animal strike, they often end up costing less in the long run. This is especially true when you consider the fact that it may take weeks to get a cooling system repaired in addition to the hours it takes to replace or fix a bumper.



These photos show how whether a plastic or stainless steel bumper, damage is likely to occur on more than one component. With the consequential damage on multi-piece bumpers, it can actually be more cost effective to replace a one-piece bumper, in part, due to reduced assembly time.

In the case of a multi-piece bumper, it may seem easier to service but in reality, damage often occurs to more than just one section. This means adjoining bumper fascia pieces and the connecting brackets on the backside may also need replacement. With the consequential damage on multi-piece bumpers, it can actually be more cost effective to replace a one-piece bumper, in part, due to reduced assembly time.

There is also appearance to consider with a multi-piece bumper. If you only replace the sections of a multi-piece bumper that are damaged, the bumper will no longer have a uniform look. This is true especially if the bumper is several years old and the paint or other finishes are worn.

Environmental Implications

Everyone in the trucking industry is very aware of the impact trucks have on the environment. Certain types of products are known to be more environmentally friendly. The manufacturing process plays a large role in whether a product is seen as "green."

In 2004, the Environmental Protection Agency launched SmartWay, an initiative designed to reduce transportation-related emissions that affect climate change, reduce environmental risk for companies and increase global energy security. SmartWay can include aerodynamic bumpers, such as AERO CLAD®, as one of the requirements to have a SmartWay-verified tractor.

There are environmental concerns beyond fuel emissions as well. For example, the chemicals involved in the manufacturing of some types of bumpers have negative impacts on the environment. With the painting process, there are emissions from Volatile Organic Compounds to consider, and Chromium VI, which is commonly used to plate bumpers, has been identified by the Environmental Protection Agency as a known carcinogen. Due to these toxins, there is concern about how to dispose of them after their useful life.

Appearance Matters

There is no denying that a new chrome bumper has an appeal when it comes to appearance over other types of bumpers. However, once the chrome bumper is in service, the shiny surface begins to dull and the bumper loses its appearance advantage. Chrome bumpers are more susceptible to chipping, cracking and pitting — all of which mar the surface and open the gate to corrosion.

Plastic bumpers are also subject to downgrades in appearance, especially when it comes to the paint and cracking of the materials.

It Comes Down to Total Cost of Ownership

When looking at TCO on any truck part, you have to consider the upfront investment and the trade-offs that come with a particular component. Trade-off costs can outweigh any initial cost savings. For example, with painted bumpers it is important to determine the cost of upkeep and how much deterioration will occur from road rash. This will add additional maintenance costs to the TCO equation.

Things to consider when spec'ing bumpers include:

- Cost of upkeep/needed maintenance
- Susceptibility to cracking, peeling and pitting
- Susceptibility to rust and corrosion
- Likelihood of damage to other components in the event of an animal strike or other collision
- Amount of downtime to repair or replace damaged components
- Value at resale or cost to dispose

	PLASTIC	PAINTED OR CHROME-PLATED STEEL	AERO CLAD
Corrosion-resistant	X		X
Resilient to damage		X	X
Long-term durability		X	X
Easy to service	X		X
Low upfront costs	X		
Low long-term costs		X	X
No Volatile Organic Compounds (VOCs)	X		X
Recyclable	Not always	Not always	Always

For more information on AERO CLAD® bumpers and for a complete listing of bumper applications, contact Hendrickson Bumper at 800-356-6737 or visit www.hendricksonbumper.com.

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