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Styled Steel Wheels

Success for Automakers



**American
Iron and Steel
Institute**

Steel Wheels - Powered By Strength...Fueled By Innovation!!

Consumer research indicates that styled steel wheels are consistently favored over aluminum wheels. Today's advanced high-strength steels are taking steel wheel styling to the next level with groundbreaking design, affordable application and consumer appeal.

Advances in steel material and design applications for styled steel wheels are making cars of tomorrow safe, affordable, fuel-efficient and environmentally responsible.

Introduction

About 50 million steel wheels are produced in North America every year. The trend towards increased use of styled wheels and steel wheels are very much a part of this trend. In fact, the production of styled steel wheels has increased over 300 percent in the past five years. Carmakers identify five reasons for the dramatic increase:

- Great New Styling
- Higher Margin
- Low Mass
- Lower Warranty Cost
- Consumer Preference

Steel's comeback results from better steel, and better wheels. New steels include microalloy HSLA, dual-phase, and bainitic steels, which are high-strength and advanced high-strength steels. Significant improvement in styled steel wheels can be seen in designs that offer large ventilation openings (High Ventilation Area or HVA) that mimic the thin-spoke appearance of some aluminum alloy wheels.

Wheel manufacturers agree that simulation software has greatly improved during the last few years, allowing for far more precise designs. Improved CAD/CAM data has resulted in improved wheel uniformity and dimensional precision.

Great New Styling

Wheel manufacturers offer any and all styles that automakers might need. It can be an economical wheel styled with a permanent center cap and trim ring, or a complete permanently-fastened wheel cover. It might be a high-value, extremely attractive wheel for a vehicle option package, such as one of the popular spoked steel wheel designs with integrated trim. If weight is a problem, steel has the answer for that too.

The real advantage of steel comes from using a steel wheel design as a base unit and changing the style according to the needs of the design studio. For cost-conscious OEMs who are keeping a watchful eye on profit margins, there is great appeal to a multi-use "backbone" or low-cost steel base wheel that is dressed up with a highly styled appearance. There are techniques for changing the look such as using sharper radii, deeper draws and urethane filler for wrapping the spokes.



New integrated trim systems offer a high-quality, cost-effective alternative to aluminum wheels that can be created by using either injected urethane or bonded clads, chrome plated type finishes, or painted cladding. Many millions of units of integrated trim systems are on the road today proving their acceptance and durability.

Since 2000, integral trim technologies on steel wheels have been featured on many vehicles provided by Chrysler LLC, Ford Motor Company, General Motors Corporation and Toyota.

Because of these new technologies, consumers can have the styles they like with all the benefits of steel. Wheel manufacturers have observed that consumers are willing to pay more for styled steel wheels than they would pay for styled aluminum wheels. The bottom line is increased profit of up to \$200 per vehicle for automakers who use styled steel wheels instead of aluminum wheels.



Wheel manufacturers say that improvements in steel wheels (strength, weight, size, the ability to accept a wide variety of integrated trim designs) and the concept of a low cost steel base wheel applied to many platforms are making it difficult to justify aluminum wheels for many applications.

Higher Margin

The number of new passenger cars, light trucks, and SUVs with styled steel wheels grows while automakers increase their gross margin by up to \$200 per vehicle. New wheel designs in steel and an ever widening variety of styling packages are attracting the attention of OEM styling and marketing specialists. Fueling the growth is the ready acceptance of styled steel wheels by consumers, many of whom prefer steel over alternative materials because they perceive better safety and higher value.



Chrysler LLC's Dodge Ram 1500 has 17" x 8" integrated chrome-clad steel wheels as base wheels for the 1500 SLT and SLT+ models, and as an upgrade package on the ST model. The shiny chrome-clad finish and seamless look of the styled steel wheels for the Ram 1500 satisfied Chrysler LLC, and they were a hit with consumers. To date, ArvinMeritor has delivered more than 850,000 styled steel wheels for the Dodge Ram series. McKecknie does the cladding.

The Ford F-250/F-350 light trucks have, as part of a styling upgrade package, either 17" or 18" full face wheels with chrome stainless steel styling that is permanently attached to the wheel. According to the wheel manufacturer, Accuride, the volume shipped for 2005 was on the order of 260,000 units, which yielded a higher profit margin for the automaker. This volume is expected to increase in future model years. McKecknie supplies the integrated trim.



The Ford Expedition SUV and F-150 pickup (XLT 4 x 2 and 4 x 4 models) have as a standard wheel a 17" x 7.5" J chrome clad full-face steel wheel, with a five wide-spoke design. Ford expects to equip 170,000 vehicles with these steel wheels per year. The AISI Wheels Task Force estimates that the savings to Ford can be approximately \$50 per wheel (or \$200 per vehicle) for the steel wheel vs. the full chrome aluminum wheel and approximately \$30 over a chrome clad aluminum wheel. The wheel manufacturer is Hayes-Lemmerz, and McKecknie supplies the integrated trim.



A similar Hayes Lemmerz wheel, a 17" x 7.5" J chrome clad full face steel wheel, is a standard wheel on all base, LS and Z71 Models (4 x 2 and 4 x 4) General Motors Corporation Chevrolet Silverado pickup trucks. AISI's Wheels Task Force anticipates the per wheel savings to GM will be \$50 (\$250 per vehicle) over full chrome and \$30 over chrome clad aluminum wheels. The styling for the Silverado is identified as multiple "bubbled" round windows.



Low Mass

Wheels made with the advanced high-strength steels (AHSS) such as DP600 (dual-phase), or with the microalloy steel developed just a few years ago, will be lighter than an HSLA steel wheel of similar design. The higher strength materials permit the use of less steel, thus reducing mass.

The steel wheel for the Cobalt/Ion is close to the weight of the aluminum alternative. On the Malibu, the steel wheel is lighter than the aluminum wheel. In fact, the larger 16" steel wheel is close in weight to the smaller 15" aluminum wheel.



Another example is the PT Cruiser. It has base steel wheels each weighing 17.0 pounds. Compared to the aluminum wheels for the PT Cruiser, which weigh 16.9 pounds, there is little difference in mass. The steel wheel has a stretch form steel rim and a dual phase steel disc.

Lower Warranty Cost

Data collected by AISI's Wheels Task Force shows a significant difference in warranty costs between steel wheels and aluminum wheels. The data varies from company to company and model to model. The number of warranty incidents per thousand vehicles for aluminum ranges from a low of four to a high of 30 in comparison to only one per thousand for steel. The warranty cost savings is 15 to 50 times for steel, which includes both car and light trucks.

Consumer complaints that usually result in wheel replacement under warranty are noise, visual defects, and leaks. Sometimes the tires are at fault, but usually it is the wheel itself that is causing the problem. Therefore, using high-strength steel wheels saves money in warranty repairs.

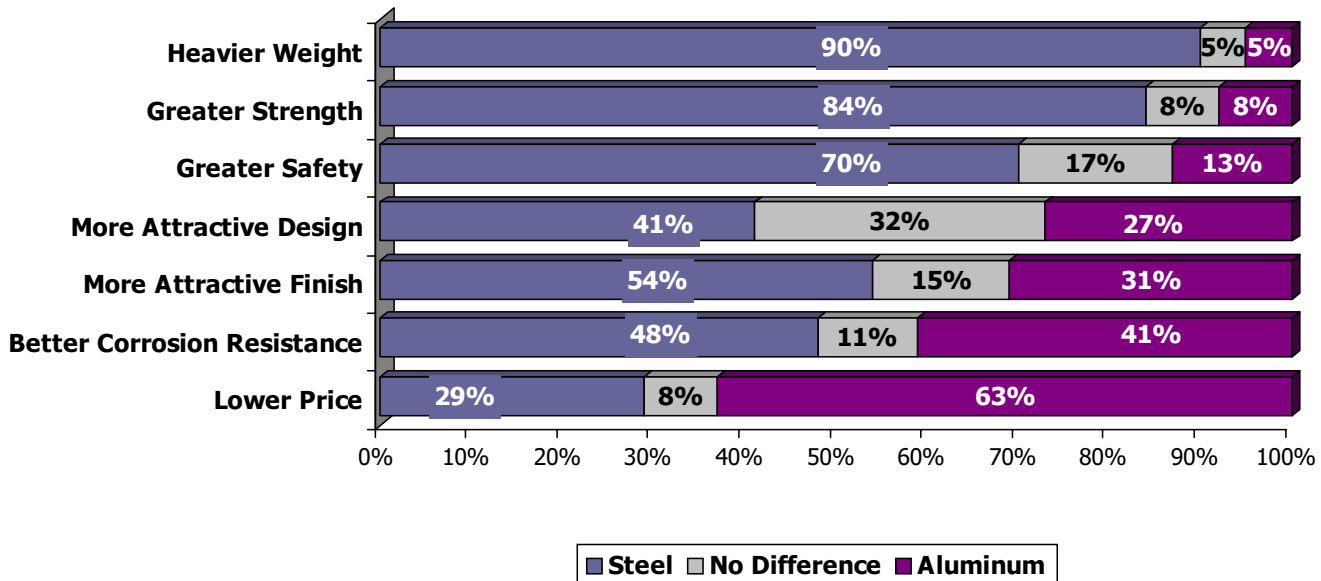
Consumer Preference

A study sponsored by AISI and conducted by an internationally recognized market research firm indicates that replacing traditional aluminum wheels with styled steel wheels in upgrade packages would maintain option package demand and revenue. Car buyers perceive styled steel wheels as both stronger and safer than their aluminum counterparts.

A clue to the potential success of styled steel wheels appeared in a consumer study conducted by Burke Marketing Research. The study measured consumer preferences with regard to styled wheels for cars, SUVs, and light trucks. The findings of this study are revealing. When compared to styled aluminum wheels of similar design:

- Consumers consider steel wheels as safer than alternative material.
- Consumers consider steel wheels to be of higher value.
- Consumers rank styled steel wheels at parity or better than styled wheels made with alternative materials.
- Consumers perceive steel wheels as stronger and more durable.
- Consumers are willing to pay more for styled steel wheels.

In another study conducted by a widely recognized marketing research organization, more than 2,700 people indicated a strong preference for styled steel wheels, believing steel to be stronger and safer than aluminum. Consumers indicated they would be willing to pay more for styled steel than they would for styled aluminum wheels.



Car buyers like the integrated trim. Their perception of steel is that it is much safer than aluminum.

Automakers like the multi-use base steel wheel concept because it lowers their investment. The net result is a resurgence of steel wheels among most automakers.

World-Class Automotive Companies Choose Steel

At Chrysler LLC, three variations of the Dodge Ram 1500 are available with steel as the base wheel. The Ram 1500 ST base wheel is painted while the SLT and SLT+ feature styled chromed steel for base wheels. Both styled aluminum and styled steel wheels are available in upgrade packages.



In several consumer preference surveys, styling was considered more important than safety, price or warranty. Designers will tell you that wheel styling is important in the overall styling package. In comparing wheel styling, steel versus aluminum, consumer surveys show that there is little preference for one material over another. The perception is that steel is stronger and safer, while aluminum is lighter.

At General Motors Corporation, approximately two million aluminum wheels will be replaced by steel. An example of steel's comeback is the Flex Wheel, which General Motors Corporation is using to replace aluminum in many car models. The high-vent wheel has a high-strength steel rim. The high-vent wheel offers a structurally efficient backbone steel wheel with

large openings with a spoke-like appearance. When combined with attractive permanent trim, a well-styled wheel is obtained at significant cost savings over cast aluminum.

General Motors Corporation Chevrolet, Pontiac and Saturn divisions feature styled steel wheels, replacing entry-level cast aluminum spoke-like wheels. The total replacement was over 70,000 vehicles in the first year. GM will benefit by a higher margin for the steel wheels, on the order of \$30 to \$50 per vehicle (entry-level wheels tend to be low cost).

The new wheels for General Motors are the high-vent area wheels produced by Hayes Lemmerz. The high-vent area gives the wheel a five-spoke appearance, which is currently very popular among carmakers. The same 16" diameter high-vent will be used for the Chevrolet, Pontiac and Saturn models but different styling features will be applied.

According to Hayes Lemmerz, General Motors also expressed interest in using its high-vent wheel with different styling to refresh cars coming off lease. Other carmakers have also expressed interest in this aftermarket application.

The center part of the wheel, which is key to the styling capability, is either high-strength or dual phase steel, depending on the application and load requirement. High-strength and advanced high-strength steels are important enablers to the manufacture of the high-vent.

Ford Motor Company is also moving towards steel wheels in its light trucks and sports utility vehicles. The Ford F-150 Lariat light truck and F-250/F-350 feature newly-styled steel wheels with permanent trim.



AISI's Steel Wheels Task Force Member Companies

Accuride Corporation
AK Steel Corporation
ArcelorMittal
ArvinMeritor Wheels Division
Chrysler LLC
Dofasco Inc.
Ford Motor Company
General Motors Corporation
Hayes Lemmerz International, Inc.
Hess Industries, Inc.
Lacks Wheel Trim Systems
Nucor Corporation
PPG Industries Inc.
Severstal North America Inc.
Topy America, Inc.
United States Steel Corporation



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