

# TECHNICAL FEATURE

## ADVANCED ECONOMICAL VEHICLES

For two decades' worth of evolutionary advancements, we have been trying to warn the masses that technology will hit them fast and hard, like a double right uppercut with a finishing left hook from Mike Tyson. It all started in 1995 with the introduction of the Audi A8 Aluminum Space Frame, followed by these events:

■ In early 1999, Volvo started to use one of the highest-strength steels we have ever seen, boron-alloyed, in their rear body panels/bumper reinforcements.

■ In 2001, many European OEs started to use boron-alloyed steel in dash crossbeams and seat assemblies.

■ In early 2003, we first saw boron-alloyed steel used for door intrusion beams and in B-Pillars for reinforcements on many European models.

■ In early 2005, we saw Martensitic (hot-stamped steel or quenched steel) and boron-alloyed steel used in rocker panel reinforcements, B-Pillars and upper outer roof rail assemblies on most European and Asian vehicles.

The American Big Three (GM, Ford and Chrysler) started using Dual Phase (DP) steels and Ultra High Strength Steels (UHSS) in 2003 and did not start using Martensitic or boron-alloyed steels until late 2009/early 2010 on some of their models for rocker panel and B-Pillar reinforcements. Asian OEs have been utilizing Advanced High Strength Steels (AHSS) in the

passenger compartment of inner structural reinforcements since 2008 on their economical vehicles. As for the American Big Three, high-grade DP is now being utilized in most GM vehicles, High Strength Low Alloy (HSLA) steels are being utilized by Chrysler and Ford is utilizing boron-alloyed steels in their economical vehicles for A-Pillar, B-Pillar and rocker panel reinforcements on late model vehicles (2012 and newer). As you can see, much of what the European (specifically the German) OEs have been doing since late 1999 through the early part of the 2000s is now catching on with the Asians and Americans. However, there is more copying going on.

Since about 2001, Mercedes-Benz has had procedures for rivets for steel-to-steel attachment mating areas where the Squeeze-Type Resistance Welding arms could not gain access to the backside and silicone bronze in the open sectioning joints on outer panels. Since about 2003, BMW has required outer steel panels and inner structural aluminum to be replaced with a rivet-bond procedure with the sectioning joints to be a butt joint with the insert fully bonded. On the other hand, Chrysler has had weld-bonding (STRSW and adhesives) with a bonded butt joint procedure on their vehicles since 2001, and Ford has had similar weld-bond procedures (but with a welded butt joint with backing). Over the past two to three years with the higher usage of HSS in outer panels on Toyota, Honda and VW, they have adopted many sectioning areas on outer panels that require silicone bronze welds. Most OEMs now require STRSW when replacing outer components and inner



A BMW i3 on display during the 2015 North American International Auto Show at the COBO Center in downtown Detroit.

structural components, as opposed to MAG (Metal Active Gas) welding.

Another thing we are seeing that started with the European OEMs back in early 2001 is the dealer-sponsored, OEM-trained independent collision centers. As of about 2012, we have seen Ford, Chrysler/Dodge/Jeep and GM jump on board with a Collision Repair Program. Last year saw Nissan/Infiniti open a program, while Honda/Acura launched their program in 2015. BMW just introduced the i3, which is constructed with many Carbon Fiber Reinforced Plastic (CFRP) components. CFRP was generally used on super cars like Ferrari, Corvette ZR1/Z06, Viper, Lambos, etc., but the i3 is an electric vehicle that is intended to be economical. The 2016 BMW Series 7 structure will be constructed from AHSS, aluminum and CFRP. Based on history, how long do you think it will be before economical vehicles will be designed with CFRP? History does repeat itself and sets up a look at what we did not realize, because we did not envision it. Let us look at the history of aluminum-intensive vehicles:

■ 1995: The Audi A8 ASF is introduced

■ 2003: Jaguar introduced the monocoque XJ

■ BMW introduced the first hybrid construction aluminum steel Graf

■ Audi followed with their own hybrid construction in 2008 with the TT

■ Porsche introduced Panamera in 2010, another hybrid construction vehicle

Nuts and bolts, tips and tricks from our resident industry experts.

BY LARRY MONTANEZ III, CDA & JEFF LANGE, PE

Nevertheless, it seems that not many were interested in aluminum repair procedures and equipment over the past 10-20 years — until now. You might ask why, and that's an easy answer. Ford has introduced one of the most popular vehicles, the F-150, in an aluminum body over a steel frame. Now the masses will need to understand aluminum repair procedures, but as we mentioned elsewhere in this article, steel economical vehicles have also advanced in construction.

Remember to review all the OEM repair information prior to beginning any repair, as there will probably be a difference between how the OEM made the vehicle and how the OEM wants the panel reattached in the repair process. We hope this article has helped the industry to better understand how high-end European vehicle designs are now influencing Asian and American OEs in the designs of their economical vehicles.

Larry Montanez III, CDA is co-owner of P&L Consultants with Peter Pratti, Jr. P&L Consultants works with collision repair shops on estimating, production and proper repair procedures. P&L conducts repair workshops on MIG & resistance welding, measuring for estimating and advanced estimating skills. P&L also conducts investigations for insurers and repair shops for improper repairs, collision reparability and estimating issues. P&L can be reached by contacting Larry at (718) 891-4018 (office), (917) 860-3588 (cell), (718) 646-2733 (fax) or via email at [larrygoju@aol.com](mailto:larrygoju@aol.com). The P&L website is [www.PnLEstimology.com](http://www.PnLEstimology.com).

Jeff Lange, PE is president of Lange Technical Services, Ltd. of Deer Park, NY ([www.LangeTech.net](http://www.LangeTech.net)). Jeff is a Licensed New York State Professional Engineer who specializes in investigating vehicle and component failures. Lange Technical Services, Ltd. is an investigative engineering firm performing forensic vehicle examinations and analysis for accident reconstruction, products liability and insurance issues. Jeff can be reached at (631) 667-6128 or by email at [Jeff.Lange@LangeTech.net](mailto:Jeff.Lange@LangeTech.net). **H&D**

# 60% OFF

list price on all  
**REPLACEMENT  
AFTERMARKET  
DOOR MIRRORS**

from April 1 through June 30, 2015

## EMPIRE





We stock thousands of parts so we have them when you need them.

We satisfy our customers through our unsurpassed service and quality.

CERTIFIED BY



EMPIRE AUTO PARTS

www.empireauto.us

888 700 8074

ISO

9001:2008

CERTIFIED



## Aluminum Outer Body Panel Repair Workshop

**This workshop consists of a 1 ½ Hour Presentation on the following:**

- ✓ Aluminum Usage
- ✓ Aluminum Intensive and Hybrid Construction
- ✓ Aluminum Series and Alloys
- ✓ Repair vs. Replace Decisions
- ✓ Repair Equipment for Outer Panels
- ✓ Heating Techniques
- ✓ Hammer and Dolly Techniques
- ✓ Dent Removal Equipment and Techniques
- ✓ Reshaping Techniques

**The Presentation is followed up by 3 ½ Hours of hands-on aluminum repair on hoods, doors and fender panels.**

**Cost \$150 per student**

**Contact our office at 917.860-3588 or email us [info@PnLEstimology.com](mailto:info@PnLEstimology.com) to set up a workshop training at your location and for more information.**