Collision repair begins with an awareness of the current state of a vehicle's damage. Measuring the vehicle is the only way to validate the extent of damage in order to establish a complete and accurate repair plan. Taking the time to plan your work in the beginning goes a long way in saving time, aggravation and the expense of not having to redo work.

Measure, measure, measure
In carpentry an old adage, “Measure twice, cut once,” is one that many a woodworker no doubt learned the hard way once or twice. Excellent advice for a carpenter, but what does it have to do with bodywork? This advice is, in fact, very relevant to your collision business. You see, more than ever, careful planning — and by that I mean accurate electronic measurements — will ultimately determine the success and profitability of your collision repairs.

State of our industry
It’s long been understood that a collision affects a vehicle’s structure in three directions: height, width and length. Restoring these three dimensions to their original specifications — perfectly — is more important than ever. In other words, a little better planning upfront, in terms of careful measuring, will save you time, money and lots of heartache down the road. Let’s look at 3-D measuring and the world we now work in. Like many industries, the collision industry is in the throes...
of major technological change — ever newer and more advanced changes that make our jobs easier in some ways and make our livelihoods more challenging in other ways. But do we really appreciate how fast and furious this business is changing?

Many of these changes are driven by the ever-increasing sophistication of the vehicles we’re fixing. It’s not news that the first step in putting a damaged vehicle back together is to accurately assess the damage. That’s a given when estimating a job. I like to think that every dollar that flows to the bottom line starts with that estimate. But the operative word here is “accurately.” Shifts in technology have redefined the word “accurate.”

It wasn’t all that long ago that typical OEM build guidelines dictated body panel tolerances in fractions of an inch; usually +/- 1/8.” In that era, body panels often included adjustment slots and shims. One would not be exaggerating to suggest that a measuring system simply meant fitting the sheet metal, and if it fit, it evidently “measured” correctly. The essence of body repair could be best summarized as “bang,

Upper body digital measurement assures the job is done right the first time. Time can be saved by assuring perfectly located door hinge mounting points and panel gap alignment.

On today’s collision restoration, millimeters now make a huge difference in lower body and suspension points. The vehicle must perform and maintain the same level of safety to the occupants as before the repair.
heat and pull.” The more pulling power you had and the more heat you used, the easier it was to pull things back into more or less the correct shape.

Early full-frame vehicles didn’t involve the efficient and precise robotic manufacturing that later unibody, and even full-frame, vehicles would eventually incorporate. A tape measure and tram gauge were good enough and self-centering gauges were considered “advanced high-end” measurement equipment.

Meanwhile, the OEMs were busy developing new processes, new features and new materials — all of which affect us in a big way. Modern vehicles incorporate a dizzying array of advanced aircraft material technology, from exotic metals to aluminum and even carbon fiber, all requiring advanced repair techniques.

**Repair of OEM engineering marvels**

Today, we bask in a veritable golden age of automotive manufacturing efficiency and technology — one that has provided us with more comfort, performance and fuel economy than ever before. But there are consequences of these engineering marvels we must remember when making repairs, the first being much tighter body tolerances than we’ve ever seen before. Body tolerances are now often measured in +/- 1 mm increments.

The second phenomenon is the increased use of sophisticated, strong, lightweight and expensive aircraft-based material technology in vehicle design and build. For us in collision repair, this means the OEMs are extremely concerned that a vehicle maintain its complete collision integrity after the repair. The car or truck must protect the occupants with the same engineering robustness with which it was originally designed. In order to create a consistent standard that addresses the changing technology and amazing engineering achievements we’re seeing today in weight savings and design, OEM collision repair certification is becoming a focus in our industry.

Collision shops that are OEM certified are held accountable in many operational areas to ensure their success as professionally run businesses with standards to uphold. They must act as the brand representative for the OEM. Intensive investment must be made in technician training. Government regulators are also getting involved more than ever. Legislative bills are pending that would create two levels of collision repairers that would require the top tier to have OEM steel and aluminum certification. Digital measurement is a standard in these shops to enhance accuracy and also validate the estimation process, while it also increases profitability by reducing the repair cycle time.

“Measuring twice and cutting once” now involves the use of OEM-specified fixturing and anchoring. This is no longer found only on high-end luxury vehicles but also on high-volume, lower-cost platforms. The body must be precisely held in place during the repair and replacement of components.
Many OEM certification programs now control accessibility to repair measurement data as well as accessibility to the parts to make the repair.

The importance of following a standard really hit home again in a recent American Honda Motor Company display at the NACE/CARS 2015 event showing a 2014 Acura MDX that had been in a side-impact crash alongside an identical vehicle that had been previously damaged and poorly repaired. The second vehicle failed during the same side impact. The dramatic and chilling intrusion of impact damage into the occupant seating area was due to improper repair sectioning and welding of a 1,500-megapascal ultra high strength steel door ring.

More science than art
Our business is now vastly more science than it is an art. There’s a lot less pulling — certainly fewer of those 20-ton pulls and more of the short, tightly focused, simultaneous multiple pulls from different angles to precisely position, with measurement, the receiving part behind the cut. And it’s important to remember that in all the years we’ve been building cars and trucks, the physics haven’t changed. A 40-mile-per-hour crash is still 40 mph of force. What the OEM engineers have changed is how a vehicle absorbs and transfers that energy throughout the vehicle. In fact, it’s possible that the energy from a rear hit can also damage areas at the front of the car.

Consequently, accurate electronic digital measurement is a necessity to document this damage, particularly the hidden damage. This is pretty important for everyone — for the insurer, for repair-time savings, and for your liability protection down the road. And, accurate, documented electronic digital measurement helps your shop in that age-old give-and-take with insurers over getting paid for your time. Even as total repair times have increased due to more insurer inspections and approvals, allotted repair times continue to shrink.

New metallurgy
A couple of brief examples go a long way to illustrate the sophistication that goes into today’s vehicles. First, the evolution of OEM metallurgy is stunning; high-strength steels, carbon fiber, boron alloys and, of course, aluminum are upending our industry as are new vehicle designs that demand different repair techniques. And by the way, with seemingly endless CAFE legislated fuel economy targets, you can bet the OEMs will be sending even more aluminum and other lightweight bodied vehicles down the assembly lines. The new Dodge Dart features pinch welds that aren’t designed to hold even during a 10-ton pull. If the body is not stabilized using additional universal anchoring fixtures, more damage will occur during the repair.

Body panels are now used that can incorporate three thicknesses and three different steel alloys that are factory spot welded, then riveted and bonded to aluminum castings. Lastly, a particular $130,000 European luxury import sports car is built with a front seat that has an array of sensors and various memory and climate control features. And it has more than 450 pieces. That’s 450 parts that make up one seat. Now that’s complexity! By the way, this same vehicle has roughly $6,000 worth of perimeter safety-related sensors and high-tech HID lighting. In an accident, that could easily mean $6,000 of parts before a single fender is straightened, replaced, or sprayed.

And while we’re talking about vehicle complexity, consider this. A $150 million F-22 Raptor fighter jet has a computer system with 1.7 million lines of computer code — the directions that make the software do its magic. A Boeing 787 Dreamliner has an estimated 6.5 million lines of code, while a luxury car boasts computing power requiring 100 million lines of code. With technology like this, you really have to know what you’re doing. The days of just eyeballing measurements, banging, heating, and pulling are history.

Low volume today, high volume tomorrow
It’s easy to convince yourself that special equipment and training is a requirement to fix only the complex features of high-end luxury cars. You should be prepared though, as this technology has already started its downward migration into mainstream vehicles — perhaps even in the next Chevrolet, Dodge or Ford that comes into your shop on a rollback. Consumer features move into the mainstream as volumes in-
crease and manufacturing economies of scale allow prices to drop. The same is happening under the sheet metal with safety, accident-avoidance computer, and increasing strength and weight reduction metallurgy technologies.

So, while many of these high-tech features are indeed introduced in the high-end/low-volume segments of the market (making them easy to dismiss), they are migrating to less expensive, high-volume vehicles. You will see these vehicles in your shop. It’s not a matter of “if,” but “when.” You can dismiss them, but at your own peril. Other industry voices echo mine. I-CAR’s Director of Industry Technical Relations Jason Bartanen has gone on record saying, “Today’s vehicles cannot be properly repaired without 3-D measuring.”

Measure for success

The current collision repair landscape is no different from that of dealer service departments and independent repair garages a few years ago. As sophisticated, computerized engine management evolved, repair shops had no choice but to invest in the equipment and training required to fix these cars. The main difference now is that there are additional safety concerns, OEM certification programs and government legislation that are combining to drive these changes.

Those dealerships and independent garages I referenced that didn’t change? They don’t fix cars anymore. Those that did? They took the plunge, invested in the new equipment, took the training, and today are prospering.

That sea of change is now sweeping through our industry. High-tech vehicles and electronic measuring equipment are here to stay. But the reality is that a relatively small percentage of shops actually have the electronic measuring tools needed. An even smaller percentage actually use them, mostly due to lack of training. We’ve all been there; maybe just one tech knows the equipment. But he quits and the next thing you know the equipment is gathering dust in the corner.

The reasons to be savvy about 3-D electronic measuring have never been greater. If yours is a shop that doesn’t use electronic measuring, let me leave you with a few closing thoughts to ponder when you start your next repair without measuring.

- Repair cycle time can be significantly reduced if 3-D measurements are used to more accurately diagnose the needed repair, are used during the repair, and validated before the next “assembly” phase of the repair.
- Insurance companies are starting to require computerized measurements. Shop management software is starting to use measurements to more accurately to calculate the needed parts and labor times. Collision math measurement history and the repairs generated can be used in a historical analysis and can more accurately predict the repair parts and labor requirements based on data from similar vehicles that were in the same types of accidents.
- Improperly diagnosed suspension and driveline geometry when not measured during the collision estimation can lead to mechanical problems such as torque steer, unwanted vibrations or incorrect wheel alignment.
- Deflection can be caused by pulling energy travelling through the vehicle. Electronic measuring lets you look at every pull in detail on the computer.
- High-strength steels protect passengers better, but they’ve changed the way cars and trucks absorb and transfer energy. That could lead to hidden structural damage that can be uncovered before the repair begins with proper collision estimate measurement.

I look forward to the day when we can take that old carpenters’ adage I started with and make it our own — albeit with a slight tweak. Perhaps eventually we’ll see a sign over measuring equipment in every collision repair shop reminding those who venture forth to “Measure twice, and pull, cut, bond, rivet, weld and repair once.”

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