



# Automotive Technology Update

## Paintless Dent Repair

### Need to Know

- Paintless dent repair (PDR) is a method of removing small dents and dings from a vehicle using special tools and techniques that restore the metal to its original location and appearance.
- PDR requires dedicated training and high levels of visual acuity and tactile perception. For best results it should be performed by an experienced professional.
- Starting at under \$100, PDR is usually around one-third the cost of traditional auto body repair processes that involve straightening, filling, sanding and repainting damaged areas.
- PDR can typically be completed in less than an hour, and many technicians offer mobile service.
- It is estimated that 80 to 90 percent of small dents and dings can be repaired using PDR.
- PDR is *not* a viable option if the paint is damaged, a dent is too large, the panel is deeply creased and the metal is stretched too far, or a dent's location does not allow access for the repair tools.
- Do-it-yourself dent repair using tools sold on television and online is almost never as effective as PDR performed by a professional – who may use similar equipment.
- Outfitting a vehicle with protective products can help prevent dents, dings, chips and nicks.



Rear fender dents before and after PDR. (Image: Palm Beach Dent Repair)

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### What is an ATU?

AAA Automotive Technology Updates (ATUs) provide expert information on a variety of topics related to modern vehicles. Some feature in-depth answers to common questions about automobile use and maintenance. Others explore new technologies in today's rapidly evolving automobiles. For additional information, visit [www.AAA.com/autorepair](http://www.AAA.com/autorepair).



### Overview

Imagine these scenarios. A crowded parking lot with tight spaces, a child eager to get out of a car and – *wham!* – one door slams into another, creating a dent. Or, dark storm clouds roll in, thunder roars, the wind blusters and golf-ball-sized hail rains down, peppering vehicle hoods, roofs and trunk lids with indentations. Or, a careless driver backs up without looking, collides with a fender and leaves a large indentation. Now what?

Decades ago, owners of such damaged vehicles had few repair options. A visit to the local auto body shop was usually necessary and many days and dollars later the car would be returned in something close to its original condition. A less attractive, though undoubtedly cheaper, alternative was to simply drive the car with its dents, dings and damage on full display.

As early as the 1930s, automakers were using basic paintless dent repair (PDR) techniques to fix minor body damage that occurred during vehicle assembly. However, it was not until the 1980s that the process was refined and began to thrive as a commercial enterprise, changing how consumers and car dealers handle common door dings and other minor dents.

PDR is exactly what its name states – dent repair without the need for painting. A specially trained technician uses a variety of metal rods with differently shaped ends to “massage” the backside of a dent, restoring the metal to its original location and appearance without the need for traditional body repair processes. With certain dents, an external suction cup or glue puller may first be used to pull out some of the indentation, after which the repair is completed with additional metal manipulation.

With prices starting below \$100 and a typical repair time of less than one hour, PDR is much faster than traditional body repair methods and typically costs around one third as much. In addition, it is often performed by convenient mobile service providers. PDR gives consumers and car dealers a fast and cost-effective way to fix minor body damage, and it eliminates the challenge of achieving an exact paint match, which is a concern with traditional auto body repair. Finally, PDR is a safe technique for both technicians and the environment, as it involves no chemicals, toxins or paint fumes.

### How PDR Works

It is estimated that 80 to 90 percent of all small dents can be repaired using PDR.<sup>1</sup> However, every dent is unique, and they cannot all be restored to factory new appearance. While a perfect repair is usually possible for a skilled technician, in some cases only 80 to 95 percent of a dent may be removable for reasons explained below.<sup>2</sup> This level of repair is often acceptable and the remaining imperfections are usually unnoticeable to people without trained eyes.

A key factor in determining a dent’s eligibility for PDR is its location. Many body panels, and doors in particular, have reinforcing structures or window and lock mechanisms behind them that limit access to certain areas. Also, dents near the edges of panels where metal is usually rolled over and double thick cannot be resolved with PDR. Experienced technicians become familiar with the internal body structures of popular models and often know in advance when dents are in obstructed areas that make PDR impossible.

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Other factors that may eliminate PDR as a repair option include dents that are too large, and metal that has been creased or stretched beyond its “memory” point. Dents that extend across sharp edges in the body design may be repairable, but require a very skilled technician. Paint damage is another limiting factor. Modern automotive paints are relatively flexible and can remain intact even with some fairly big dents. However, once the paint is cracked or otherwise damaged, PDR can be used to straighten the metal, but the finished result will never be perfect. Touch-up paint may help conceal the damage, but traditional body repair processes will be necessary to restore a factory finish.

### The Repair Process

The initial step in any PDR job is assessment. The technician will clean and carefully examine the dent to determine whether it is a suitable candidate for PDR based on the criteria described above. Usually, the technician will set up special lighting equipment that projects one or more straight-edge lines across the body panel to help highlight imperfections. Smaller dings and metal undulations can be especially difficult to spot without sufficient contrast between them and the surrounding metal.

Dedicated lighting is also used when removing dents with PDR because it is important to restore the metal flush with, but not above, the surrounding surface. High spots can be tapped down with suitable tools and a small hammer, but it is important to minimize flexing the paint back and forth because this increases the chance of it cracking. Common lighting tools include fluorescent fixtures and “reflector boards” with multiple parallel lines that redirect external light or are backlit (often with LEDs) and may be powered by the vehicle battery.<sup>3</sup>

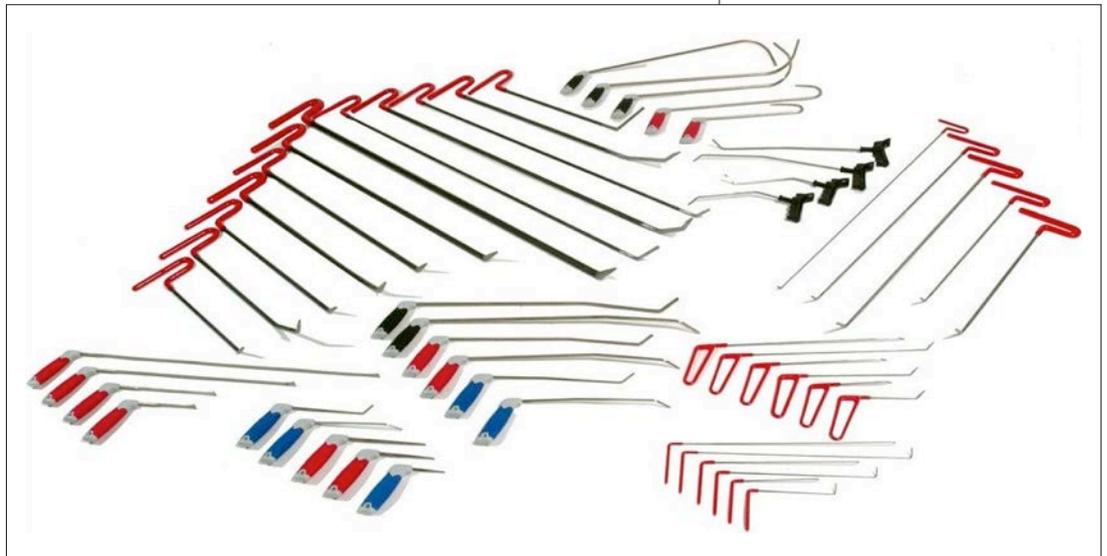
The next step – and sometimes the most challenging part of the PDR process – is gaining access to the backside of the dent. This can involve removing components such as taillights or interior paneling. Sometimes, tools can be inserted between side windows and the outer door skin. In certain cases, the only means of access is to drill a hole in a door jamb or other commonly hidden area. Professional PDR technicians consider this approach a last resort. If it is done, any bare metal must be coated with rust inhibiting primer when the work is complete, and the opening should be sealed with a tight-fitting plastic plug to keep out water. Occasionally, a dent will be in a location with no viable access point and alternative removal techniques (discussed later in this paper) or traditional body repair processes will be required.

Next is selection of the appropriate tool(s) for repairing the dent. Highly skilled PDR technicians have dozens of tools of varying lengths and tip styles. These rods enable them to reach a wide variety of dent locations, and work the metal in different ways to achieve the desired result.



**A stand-mounted fluorescent fixture used for PDR.** (Image: Ultra Dent Tools)

**A comprehensive set of metal PDR rods.** (Image: A-1 Tool)





Finally comes the actual removal process. As mentioned previously, every dent is unique and requires the application of just the right amount of pressure in exactly the right locations. In general, a PDR technician works from the outside of a dent inward in small increments. Patience is critical, and light to moderate pressure produces better results than using greater pressure in an attempt to speed the repair process. A simple dent might be removed in as little as 15 minutes, but larger more complicated dents can take more than an hour to fully repair. With a badly hail damaged car, it may take a day or more to remove all of the dents.

PDR is as much art as science. It requires a high degree of skill and extensive practice – factors that can make the difference between a dent that is still noticeable and a body panel that appears new-car straight. One industry source says a minimum of three months full-time practice is required before a PDR technician can competently remove a simple door ding or hail dent. Beyond that, a year or more of experience may be required before a technician is ready to deal with more complex damage.<sup>4</sup> To see a demonstration of the PDR process, visit <http://bit.ly/2f83cs8>.

### Materials Impact

Advancements in vehicle body materials are affecting both dent resistance and the PDR business. To help reduce weight, increase fuel economy and improve crash protection, newer cars are using strong and lightweight body materials such as plastic composites, carbon fiber, aluminum, high-strength steel (HSS) and high-strength low-alloy (HSLA) steel. Composites and carbon fiber are naturally more dent resistant than metals, but once damaged are not candidates for PDR.

Aluminum, which is significantly lighter than steel, is often used for vehicle hoods, doors and trunk lids – areas where dents are common. Aluminum can be repaired using PDR, but it is more challenging to work with because it may have increased supporting structures, requires greater force to manipulate and has less “memory” than steel so it does not return to its original shape as easily.

On the other hand, modern HSS and HSLA steels are more dent resistant than older alloys, and can also make dent removal easier because their strength allows for thinner body panels that are more easily worked with PDR tools. In addition, shallow larger dents can sometimes be simply popped out.<sup>5</sup>

### PDR Cost

Paintless dent repairs usually start in the \$75 range, but the final cost will depend on the location, size and depth of the dent(s). Some PDR providers offer discounted prices “per panel” or for the entire vehicle when multiple dents are present. One handy way to approximate PDR costs is based on the size of a dent compared to common coins:<sup>6</sup>



**Working on a rear fender dent through the taillight opening.**  
(Image: Dent Wizard)

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- Penny/dime-size dents start at \$75
- Nickel-size dents start at \$85
- Quarter-size dents start at \$100
- Half-dollar-size dents start at \$150
- Larger dents start at \$200

## Insurance Coverage

If the person who caused a dent or ding can be identified, their vehicle liability insurance should cover the cost of repair. If PDR is a viable option, the insurance company is likely to approve its use since it provides a better outcome and costs less than conventional body repair processes. However, if the cause of a dent is unknown (or worse yet, self-inflicted) consumers are unlikely to benefit from the comprehensive or collision coverage of their own insurance because PDR usually costs less than the deductible amounts.



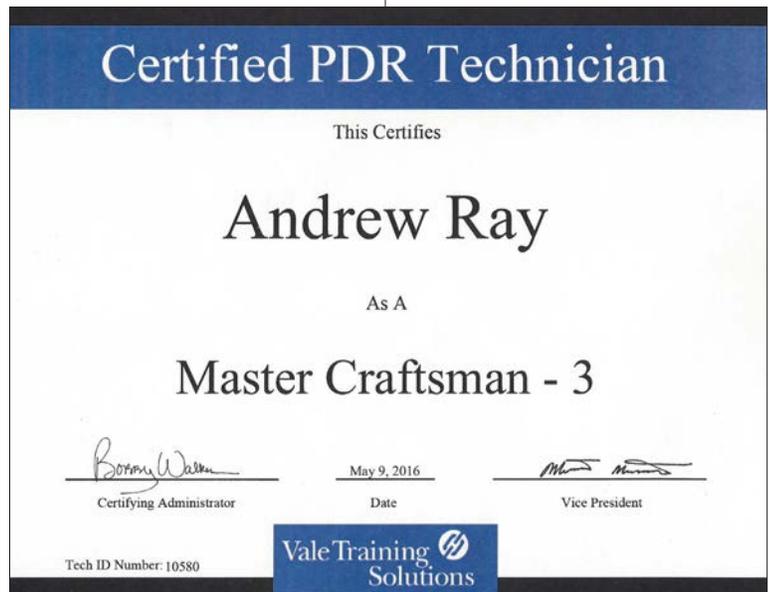
**Coin sizes can help approximate dent repair costs.**  
(Image: iStockphoto.com / &#169 jamesbenet)

## Selecting a PDR Provider

How does one go about finding a trustworthy and high-quality PDR technician? A good place to start is by asking family, friends or co-workers who have had experiences with PDR providers. Otherwise, the internet is a great resource. Dent Wizard and DentPro are two national companies that offer PDR services, but most PDR providers are independent businesses or small chains. Another option is to ask car dealers who they use, particularly dealers that specialize in high-end luxury and sports cars whose owners tend to be more particular. However, some PDR providers who work for dealers limit their business to wholesale accounts only and may decline to work on individual customer cars.

To better assess the abilities of a PDR specialist, search for online reviews and check for complaints with the Better Business Bureau and state consumer protection agency or Attorney General’s office. Once a potential provider is identified, call the business and ask how long it has been in operation, who will actually be doing the repairs and how much experience that person has in performing PDR.

Professional affiliations and certifications are also good indicators of quality PDR technicians. Those who are members of the not-for-profit National Alliance of Paintless Dent Repair Technicians agree to abide by a set of standards and a code of ethics. Another gauge of PDR skill is Vale certification, an independent testing process in which a technician pays a fee to perform timed, standardized PDR repairs on both steel and aluminum panels that are then evaluated with the aid of high-tech surface measuring instruments. Technicians who pass the test receive one of three certifications based on their level of mastery – Journeyman, Craftsman or Master Craftsman.<sup>7</sup>



**A PDR certification based on skills assessment.** (Image: Vale Training Solutions)



### Dent Repair Alternatives

Done properly, PDR can restore the damaged area of a vehicle to its original appearance. However, as previously mentioned, PDR is as much art as science, which makes it a very difficult do-it-yourself (DIY) project. Consumers seeking to repair a dent are better off identifying and using a skilled PDR service provider. However, there are other options.

For owners who want to try fixing dents and dings without the help of a professional, a variety of DIY tools are available. In addition to metal PDR rods, two other tools frequently advertised are suction cups and glue pullers. These tools are used by PDR professionals as well, but they almost always require additional metal manipulation to complete the job. The amazing dent removal results “as seen on TV” are not typical of what can be achieved by the average consumer.



**A suction cup puller being used for dent removal.** (Image: AAA)

### Suction Cup Pullers

Suction cup pullers are most effective in removing shallow, medium-size dents from flat body panels when the indentation’s edges are not creased in any way. The tool is easy to use, although it must be smaller than the dent and can require a fair amount of strength. First, the suction cup is placed on the center of the dent and a vacuum is created to adhere the puller as tightly as possible. Then, the user slowly pulls on the tool with a constant pressure until the metal flexes outward to somewhere near its original position.

In an ideal situation, the dent will “pop out” and the body panel will look like new. More commonly, the metal around the edges of the dent will be uneven and require PDR or conventional auto body repair processes to fully restore the original appearance.

### Glue Pullers

A glue puller is another dent removal tool sometimes marketed to DIY vehicle owners. Once again, the basic process of using the tool is straightforward. First, the dented area is thoroughly cleaned with isopropyl alcohol to remove all wax. Next, a special hot-melt adhesive is applied to a glue pulling tab that is positioned in the center of the dent. Tabs come in various shapes and sizes to match different dents. Once the glue sets (typically within a few minutes) a slide hammer or lifting tool attaches to a flange on the glue tab and is used to lever the dent outward. Alcohol is then used to remove the tab and/or adhesive, and the dent is reinspected.

It can often take several glue pulls with increasingly smaller or differently shaped tabs to completely remove a dent. Afterwards, it is common for the pulled area to be slightly higher than the surrounding sheet metal. It must then be carefully tapped down using special tools and light hammer blows – a common PDR process. As with a suction cup puller, the average DIY consumer may be able to remove most of a dent with a glue puller, but finishing the job usually requires the skills of a PDR professional. To see a demonstration of a glue puller, visit <http://bit.ly/2fZu78o>.



**A glue puller dent removal kit.** (Image: Dent Fix Equipment)



### Dent Prevention

The best way to avoid having to make an appointment with a PDR provider is to steer clear of dents and dings in the first place. Here are some simple strategies that can help reduce the likelihood of a vehicle being damaged:

- Park away from other vehicles in crowded lots. Or, select an end spot and park to the side farthest away from any neighboring vehicle.
- Consider the door length of adjacent vehicles; two-door cars usually have longer, heavier doors that need to be opened wider when entering the car.
- Check the height of adjacent vehicles; tall SUV doors are more likely to contact your car above protective side moldings.
- If a parking lot is significantly crowned for water drainage, park near a peak to avoid free-rolling shopping carts.
- Look for child seats in adjacent cars that may require a parent to open the door wider while loading children.
- Open the doors, hood and trunk lid or rear hatch of your vehicle slowly and carefully to avoid contact with any nearby obstacles.
- Teach children to play in appropriate areas and exercise caution around vehicles.
- Park in covered structures to prevent hail and other damage from severe weather.

Outfitting a vehicle with protective products such as door edge trim and body side moldings can help prevent dents and dings. Clear vinyl “bras” are also becoming popular as a means to protect the front bumper, leading edge of the hood and side mirrors from dings and paint chips caused by stones and other debris thrown up by surrounding vehicles.

At home, bumpers are available to install on garage walls where a car door might make accidental contact. Similar bumpers are also sold that magnetically attach to the side of the car body for use in public. These usually fold for storage and have security cables that extend inside the car through a door opening to prevent theft. Rear shields are also available to help protect plastic bumper covers from paint damage caused by unskilled parallel parking. These devices are secured by straps that extend into the car through the trunk or rear hatch opening.



**Body side bumpers that help protect against door dings.**

(Image: Dent Goalie)

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## To Learn More *Links to relevant online articles and other resources, including:*

### AAA SITES

**AAA Exchange – Car Cleaning and Detailing Tips**  
<http://bit.ly/2eWlv0w>

### REFERENCE SITES

**How Stuff Works – How Paintless Dent Removal Works**  
<http://bit.ly/2gn8HpB>

**State Farm – Parking Tips to Help Avoid Door Dings**  
<http://bit.ly/2eXDgxN>

**State Farm – What is Paintless Dent Repair?**  
<http://bit.ly/2g0eRbb>

**Wikipedia – Paintless Dent Repair**  
<http://bit.ly/2g0fVfm>

### PROFESSIONAL SITES

**National Alliance of Paintless Dent Repair Technicians  
– FAQ About Paintless Dent Repair**  
<http://bit.ly/2g0kqGV>

**Vale Training – PDR Tech Certification**  
<http://bit.ly/2gnakDw>

### TECHNOLOGY SUPPLIER SITES

**DentPro – Keep Your Car Looking New!**  
<http://bit.ly/2g0gtSv>

**Dent Wizard – How Does Paintless Dent Removal Work?**  
<http://bit.ly/2gmYERm>

**Dent Wizard – How to Avoid Door Dings and Protect Your Car from Daily Dents**  
<http://bit.ly/2gnab2W>

**Dent Wizard – Paintless Dent Repair**  
<http://bit.ly/2gn8PFE>

### MEDIA SITES

**The Morning Call – Confronting the issue of parking-lot ‘dings’, November 21, 2010**  
<http://bit.ly/2g0ljiv>

## Endnotes

- 1 *Dent or Ding? Paintless Dent Removal Can Fix It*, Beckley Automotive Services, <http://beckleyimports.com/2642-2>
- 2 *Economical Alternatives to Traditional Auto Body Repair – Paintless Dent Repair & Spot Paint Repair*, Auto Deluxe Center, <http://bit.ly/2g7y8Xp>
- 3 *Working Magic Paintless Dent Repair*, Body Shop Business, [www.bodyshopbusiness.com/working-magic-paintless-dent-repair-pdr](http://www.bodyshopbusiness.com/working-magic-paintless-dent-repair-pdr)
- 4 *Working Magic Paintless Dent Repair*, Body Shop Business, [www.bodyshopbusiness.com/working-magic-paintless-dent-repair-pdr](http://www.bodyshopbusiness.com/working-magic-paintless-dent-repair-pdr)
- 5 *Paintless Dent Removal*, Mopar Magazine, [www.moparmagazine.com/2016/04/paintless-dent-removal](http://www.moparmagazine.com/2016/04/paintless-dent-removal)
- 6 *How much is PDR?*, Dent Werkz, [http://dentwerkspdr.com/how\\_much\\_is\\_pdr.htm](http://dentwerkspdr.com/how_much_is_pdr.htm)
- 7 *PDR Tech Certification*, Vale Training, [www.valetrainingsolutions.com/pdr-tech-certification](http://www.valetrainingsolutions.com/pdr-tech-certification)