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WHITEPAPER

Trends in Paintless Dent Repair

Learn more about the latest PDR trends and how changes in technology are driving new PDR processes.

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Introduction

New vehicle technology and construction are transforming the repair industry. They are also introducing challenges to those tasked with properly and safely returning collision-damaged vehicles to the road. For example, Advanced Driver Assistance Systems (ADAS)—now standard on the latest automobiles—have made diagnostic scanning and calibration a necessary step in the repair process.[1] Additionally, automakers focused on fuel economy have prompted increased investments in equipment designed to repair components made of aluminum and other lightweight materials.[2] These changes to vehicle technology and design—along with the industry's continued focus on quality, structural integrity and environmentally sound practices—are renewing interest in paintless dent repair (PDR).

Just like traditional collision repair methods, PDR—also known as paintless dent removal—restores the body of a damaged automobile to pre-loss function and appearance. It is primarily used to fix small dents and dings, body creases and hail damage but can also be applied to other patterns of damage on exterior components. Highly trained and certified PDR technicians with special tools carefully massage the impacted area, removing the dent without using paint or body filler.

For consumers, PDR can be a viable alternative to collision repair processes that require straightening, filling, sanding and repainting. In fact, according to AAA, an estimated 80% to 90% of minor dents and dings may be fixed using PDR.[3]

In this white paper, we explore the latest PDR trends, discuss its benefits and challenges, and highlight the technology changes driving new PDR processes.

[1]https://www.aaa.com/AAA/common/AAR/files/ADAS-Technology-Names-Research-Report.pdf

[2]https://www.energy.gov/eere/vehicles/lightweight-materials-cars-and-trucks

[3]AAA, "Automotive Technology Update", November 2016.

PDR Benefits & Challenges

Unlike other repair methods, PDR retains the factory fit panel, eliminates the use of foreign substances on the vehicle, and preserves the factory basecoat and clear coat—all significant benefits. It is most often applied to new vehicles (those 0-3 years old) at a rate of 6.43% as compared to 3.38% for all other vehicle ages combined (Figure 1).

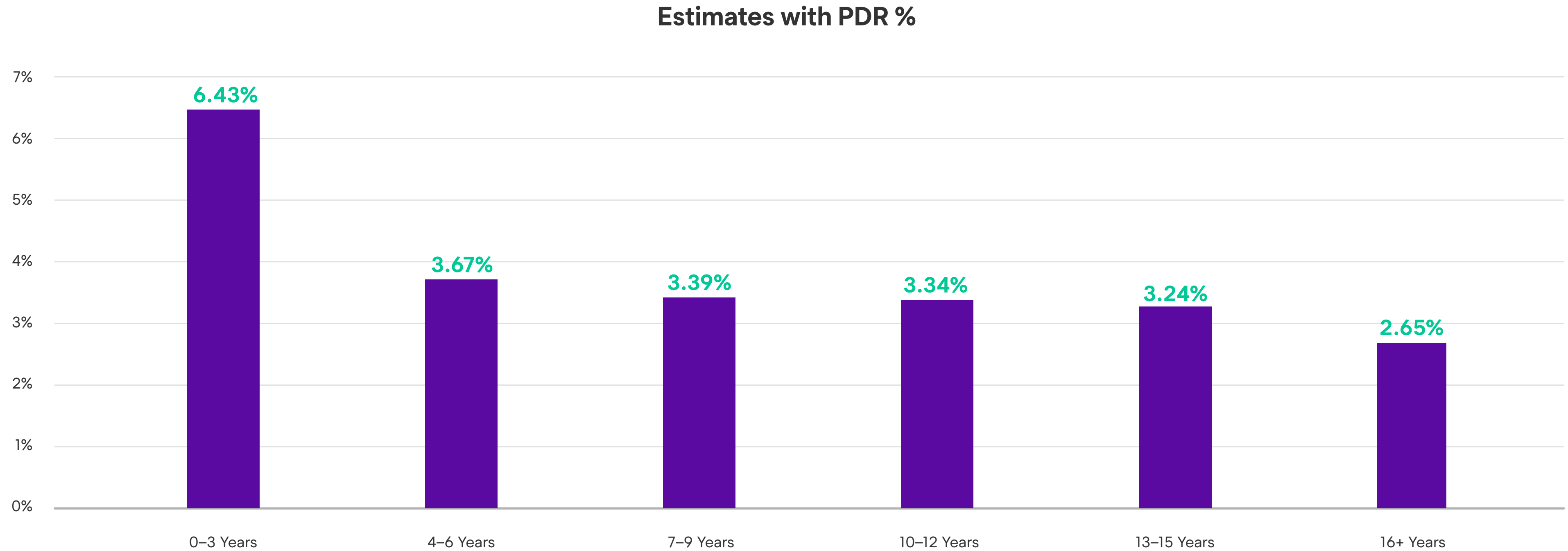

Figure 1: The percentage of repairable estimates with PDR based on vehicle model year.

In addition, there is very little difference in the utilization of PDR based on material type, although one of the primary challenges affecting widespread PDR adoption is the responsiveness of lighter weight substrates—such as aluminum and high strength steels—to PDR methods. However, data from Mitchell International, Inc. shows almost identical results in the use of PDR regardless of whether the panel is constructed of mild steel or a lightweight material (Figure 2). This is encouraging as a greater percentage of major component panels now feature lighter weight materials, especially as manufacturers look to offset the weight of high-voltage batteries in increasingly electrified fleets.[4]

While the frequency of PDR utilization declines the closer a vehicle gets to full electrification (Figure 3), the differences in repair methods can likely be explained by the lower adoption rate of vehicles with electrified powertrains in areas most impacted by severe hailstorms. When we examine PDR use in collision and property damage claims only, we find a similar pattern but with a much lower degree of spread between the different propulsion types (Figure 3).

[4] https://www.energy.gov/eere/vehicles/lightweight-materials-cars-and-trucks

Besides providing a high-quality repair outcome with the least amount of invasiveness, PDR also presents repair facilities with opportunities for increased efficiency and environmental stewardship.

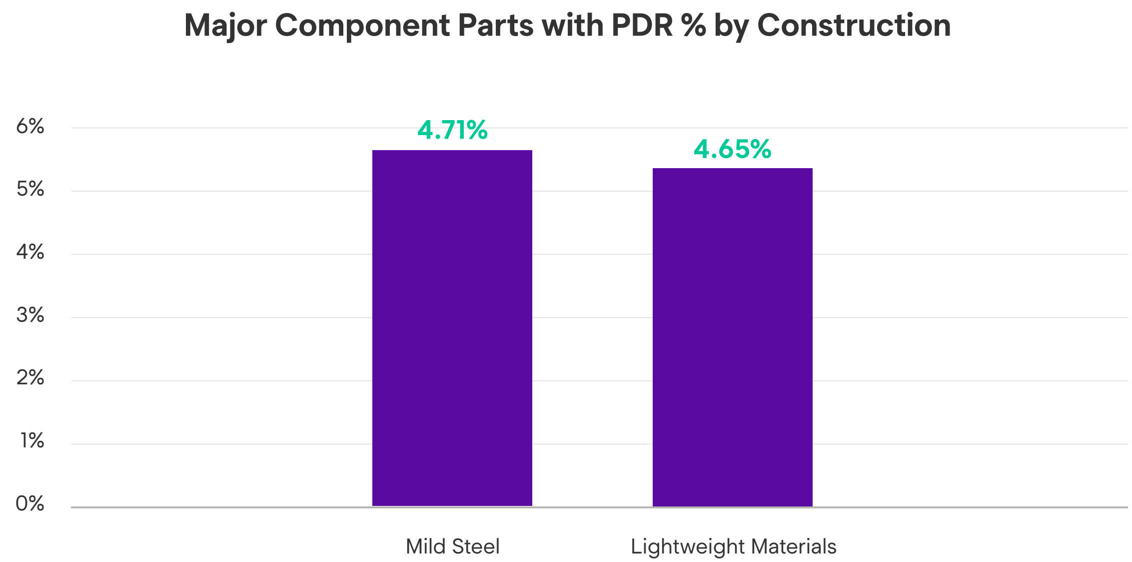

Figure 2: The percentage of major component parts with PDR based on part construction.

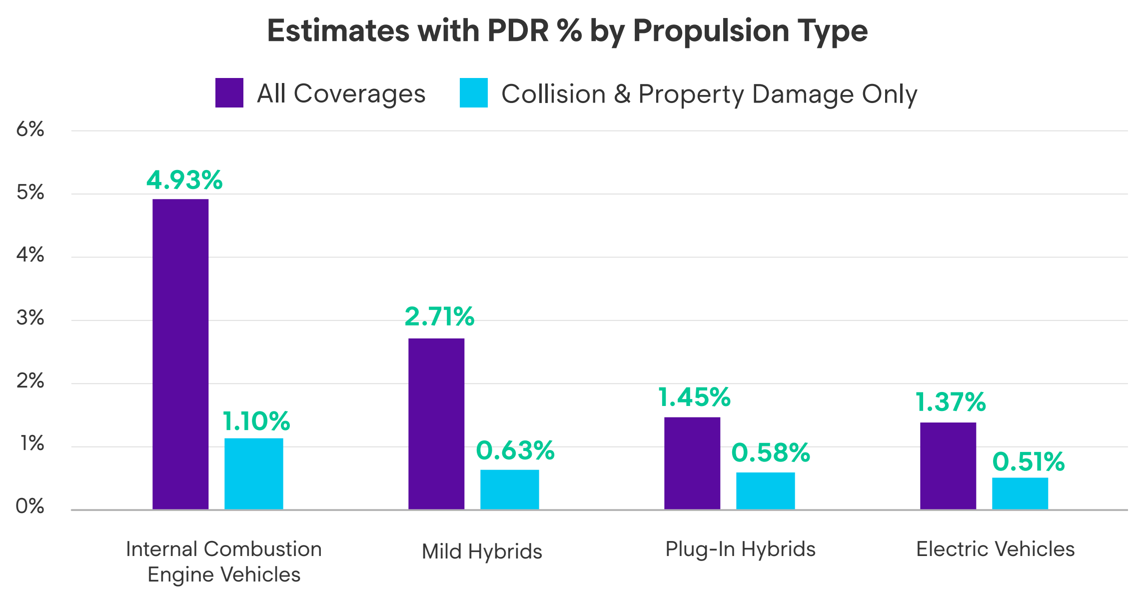

Figure 3: The percentage of estimates with PDR by vehicle propulsion type.

Reducing the need for refinish operations using PDR has the potential to lower material costs, streamline the repair process and decrease cycle time.

Besides providing a high-quality repair outcome with the least amount of invasiveness, PDR also presents repair facilities with opportunities for increased efficiency and environmental stewardship. AkzoNobel and other companies reported paint price increases of 9% in Q3 2021 and forecast further hikes in the months ahead, putting collision repairers under duress as they attempt to manage expenses for paint and materials.[5] In most cases, these facilities receive a flat hourly rate for paint and materials that does not fluctuate based on changing market conditions. During a period of unpredictable inflation, the paint and materials profit center—while slim at best—can quickly turn into a liability on a balance sheet. Reducing the need for refinish operations using PDR has the potential to lower a collision repair facility's cost for materials, streamline the repair process and decrease cycle time.

Lowering expenses on the repair side also benefits insurance carriers responsible for covering the repair costs of their policyholders. This, in turn, benefits consumers by preventing premiums from rising too rapidly. A Mitchell analysis that compared a 3-hour conventional repair on a 2018 Toyota Rav4 hood to PDR repair methods found that PDR provided a savings of $278.85 for this single panel. The reason: PDR eliminates the need for refinish time, drastically reducing the overall expense of the repair operation.

[5] https://www.fxempire.com/news/article/dulux-paint-maker-akzo-nobel-expects-costs-inflation-to-weigh-through-mid-2022-790274

Environmental Considerations

As it relates to environmental stewardship, PDR is perhaps the most eco-friendly option for any sheet metal repair since it requires no chemicals, fillers, paints or replacement parts.

Metals manufacturing plants typically use varying styles of blast furnaces, which are most often coal fueled. This process normally requires approximately 770 kg. (3,212 lbs.) of metallurgical coal to manufacture one ton of new steel.[6 7] When a shop repairs a part, the original finish must be sanded away. After metalworking is completed using an appropriately selected method, a plastic body filler is applied and sanded before primer, basecoat and clear coat are added.

Many common fillers use a styrene monomer base (a derivative of benzene) along with inert compounds, such as titanium dioxide, to produce the properties necessary to make the products effective and robust. However, this styrene monomer poses potential risks. A popular filler manufactured by 3M contains 204 grams per liter of Volatile Organic Compounds (VOC) as well as 0.372 pounds of Hazardous Air Pollutants (HAPS) per product pound.[8]

The diagram on the next page illustrates the expected carbon footprint of three different collision operations performed on a steel hood: 1.) replacement of the part, 2.) traditional repair using body filler, and 3.) PDR. While the exact figures used here are estimates only and based on a variety of data sources, it is clear that there is a wide range of environmental impacts introduced depending on the repair method.[9 10]

[6]https://www.bhp.com/what-we-do/products/metallurgical-coal

[7]https://www.ieabioenergy.com/wp-content/uploads/2020/01/IEA-Bioenergy-Task-Lignin-as-a-met-coal-substitute-December-2019-Final-191218-1.pdf

[8]https://multimedia.3m.com/mws/mediawebserver?mwsId=SSSSSuUn_zu8l00xM8tvN8t9nv70k17zHvu9lxtD7SSSSSS--

[9]https://terrapass.com/carbon-footprint-calculator

[10]https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.959.9977&rep=rep1&type=pdf

Carbon Footprint by Repair Method

REPLACE

Part Manufacturing
56.21 lbs. CO_2

Replacement Part Transportation
(Manufacturer to Dealer & Dealer to Shop)
201.5 lbs. CO_2

Part Refinish
(Basecoat + Clear Coat)
0.748 lbs. VOC

Total Carbon Footprint
257.71 lbs. CO_2
0.748 lbs. VOC

REPAIR

Transportation of Materials
7.75 lbs. CO_2

Body Repair Using Filler
0.45 lbs. VOC
0.129 lbs. HAPS

Part Refinish
(Primer + Basecoat + Clear Coat)
0.878 lbs. VOC

Total Carbon Footprint
7.75 lbs. CO_2
1.328 lbs. VOC
0.129 lbs. HAPS

PDR

Part Manufacturing
N/A

Mobile Tech PDR*
7.75 lbs. CO_2

Part Refinish
(Basecoat + Clear Coat)
N/A

Total Carbon Footprint
7.75 lbs. CO_2

*This is negated if a shop performs the operation in-house.

Diagnostics & PDR

Diagnostics has become a critical component of almost every automotive repair, including PDR. The absence of traditional repair methods or parts replacement does not exempt a vehicle from requiring diagnostic scanning and even calibration to restore its sensitive safety systems. While some individuals may mistakenly believe that damage fixed by PDR is minor and does not necessitate diagnostic procedures, the OEM repair information may still require them based on the event that caused the damage—regardless of the repair method.

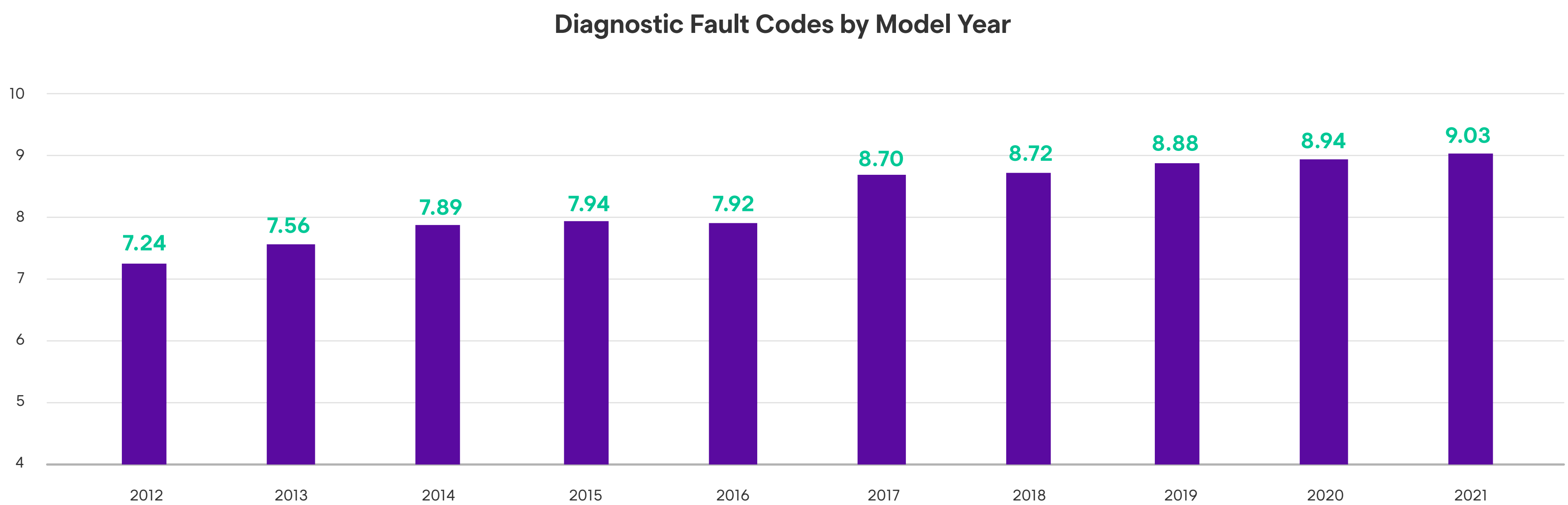

Figure 4: The average number of diagnostic fault codes by vehicle model year.

In addition, diagnostics may also be needed when intrusion into a door panel is necessary to complete the PDR process or when removing and replacing a mirror calls for calibration of the blind spot monitoring system. The only way to know for sure is to review the relevant OEM repair procedures. As a result, today's PDR technicians must have access to these procedures to understand the diagnostic requirements of every vehicle they repair.[11] Combined with the right tools, this can help them return those vehicles to pre-loss condition—structurally, cosmetically and electronically.[12]

The need for diagnostics is amplified as newer ADAS-equipped models replace older automobiles. Data from the Mitchell Diagnostics platform and its more than 3 million scans demonstrates that the average number of fault codes present increases steadily with each new model year (Figure 4)—illustrating exactly how complex and interconnected vehicle systems are on the most current automobiles.[13] As automakers continue to equip their vehicles with advancing levels of autonomy and safety, diagnostic scanning and calibration become even more critical to proper, safe PDR.

[11]https://www.bodyshopbusiness.com/oem-repair-procedures-the-new-normal/

[12]https://www.mitchell.com/pdr

[13]https://www.mitchell.com/insights/auto-physical-damage/articles/cracking-code-what-dtcs-tell-us-about-vehicle-repair-trends

Conclusion

While PDR is by no means a new repair method, its applications may be more relevant and beneficial today than ever before. When applied appropriately, it has the potential to offer an efficient and profitable means of exterior panel repair for collision repair operators, a lower cost of repair for insurers, and a higher quality, less invasive repair for consumers—one that reduces the overall impact on the environment.

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